ISO 50001 is more than a number, it's the standard of excellence in Energy Management. It helps corporations to cut electricity bills, save resources and contribute to a greener planet. Apave has the expertise to give your Energy Efficiency Plan the green light. We'll assist you every step of the way to meet all ISO 50001 requirements. Our audits will collect valuable data to create an energy baseline. This will be the foundation to build energy efficiency management and sustainable development. For monitoring and follow-up, count on us, we're happy to share our positive energy.
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GOING UP IN 2018

Is one of your New Year’s resolutions to walk up the stairs, rather than to take the elevator? Well, think again - as buildings in the Middle East grow taller, walking upstairs has become quite a challenge. And, as Beirut rises vertically and people spend more time in elevators, efficiency is of essence and focus is on the design, electricity consumption and ride comfort of elevators. This issue of Building&Co. highlights the latest trends in elevator safety and design, as it is clear that they are no longer just cages that transport people up and down.

To ensure safety, the Order of Engineers and Architects in Beirut has created an official Elevators’ Technical Monitoring Agreement. In this issue, Carlos Issa, Technical Systems Engineer and Senior Inspector / Lifting Expert at Apave advises on technical monitoring of lifts to ensure a safer ride. And, as Occupant Evacuation Operation is becoming an important consideration in high-rise design, Ziad Hakim Rahme, Senior Managing Partner at S.M.Art Work, advises on the five elevator specifications for project owners. Moving on to responsible planning, quantity surveying is one of the most critical activities in the lifetime development of a project, and yet in Lebanon the role of a quantity surveyor is often undervalued and misunderstood. Alec Ibrahim, Civil Engineer and Consultant, sheds light on this age old and highly valued profession to draw attention to its importance.

Accessibility remains a challenge in 2018 and this edition features ways to implement accessible lifts to enable access for all according to Lebanese Decree #7194. On the topic of sustainability, innovations in efficient elevator and escalator energy consumption are a major topic to be measured. And, so are the various factors that should be respected in the evolution of energy conservation measures.

We are also pleased to share the exciting news that Mitsubishi Elevators and Escalators recently achieved three Guinness World Records® with the installation of the fastest elevator, tallest elevator in a building and fastest double-deck elevator in Shanghai Tower, China’s tallest building. Congratulations!

Every year brings new beginnings, and what a better way to start the year than with new training. As part of its annual Training Calendar, Apave offers over fifty training topics on trending issues, such as Energy Audits, Commissioning For LEED (Leadership in Energy And Environmental Design) and Energy Conservation Code.

On this positive note, we look forward to a prosperous 2018. Building&Co. takes this opportunity to thank all readers and authors for their part in making the issues such a success.

Happy New Year from the Building&Co. team.
Flexible with outstanding performance.

synergy features a cutting-edge finish concept offering you enormous flexibility in cabin design.

These are elevators that will meet the highest demands of your building and exceed passenger expectations in genuine style.
Talk Of
The Town
THE APAVE ANNUAL TRAINING CATALOGUE IS OUT!

Whether you are planning for your team’s technical qualifications or aiming to improve your own skills and optimize your business performance, Apave will answer your needs with more than 50 training topics to be tackled in 2018.

From in-house and customized training sessions, to organized training programs within the framework of an annual training plan, Apave Liban offers a complete and adjustable range of training services covering various domains.
Our trainers are key figures in their field of expertise and have close contact with the different activities. And, all Apave training programs are adapted to meet the requirements and expectations of clients.

The training courses take place at Apave’s training center in Beirut and bring together the participants over a common theme: creating new opportunities through expert training.

*For more information, refer to the Training Calendar at the end of this issue.*
The International Beirut Energy Forum (IBEF) is one of the most reputable and professional energy events in the Middle East that is specifically dedicated to sustainable energy issues and projects. IBEF is by far the biggest forum in Lebanon attracting key energy people from Lebanon, the Arab World, and the international community.

The event is the main yearly platform to discuss all topics related to renewable energy, energy efficiency, and green buildings.

Held on a yearly basis since 2010, Lebanon welcomed 1270 energypreneurs from 28 countries in the 2017 edition. The synergy that the International Beirut Energy Forum has created over the past 8 years reconfirmed the reputation of this event as a lighthouse for development, dialogue, hope, and progress.

In 2018, The International Beirut Energy Forum will be held from 26 to 28 September 2018 at Le Royal Hotel Dbayeh, and is expected to attract more than 1,500 delegates.

Organized by MCE group in strategic partnership with LCEC, The International Beirut Energy Forum receives the support and participation of a large number of key players in the energy sector. The main supporters of the event are the Lebanese Ministry of Energy & Water, The Italian Ministry for the Environment, Land and Sea (IMELS), the League of Arab States (LAS), the European Union (EU), the Central Bank of Lebanon (BDL), the United Nations Development Programme (UNDP), the ESCWA, The Lebanon Oil Installations, the Regional
Center for Renewable Energy and Energy Efficiency (RCREEE) and the Order of Engineers and Architects of Beirut. Since 2013, IBEF has also become the main event of the Lebanon Committee of the World Energy Council (WEC).

Under the theme of Digitalization in Sustainable Energy: Expanding the investment frontiers, IBEF 2018 will embark on a new journey, that of approaching the evolving integration of digital technologies in sustainable energy, assessing how the digitalization of the sustainable energy sector could transform the sector, practically leading to the expansion of the investment frontiers.

Over 3 days, The International Beirut Energy Forum (IBEF) 2018 will shed the light on how energypreneurs are and should be grappling with a world that is more volatile and more complex, yet demands greater agility, more speed, and more digital competence.

Lebanon is striving to have a distinguished added-value in this regard, not only nationally, but also regionally and internationally. Whether through national partnerships and initiatives, or through regional cooperation and international collaboration, Lebanon is striving to keep up with the digitalization of the sustainable energy sector, aiming at becoming a beacon for the entire region.

During the conference and at the exhibition level, local and international energypreneurs will be meeting, exchanging views, creating business links, and developing financing schemes for the entire spectrum of sustainable energy.

Join the International Beirut Energy Forum 2018, get to know the latest trends in energy innovation, environmental leadership, and sustainability solutions. Be part of the engineers, bankers, decision makers, corporations, universities, and even states and governments willing to work together and join efforts to include digitalization in the sustainable energy market, thus expanding the investment frontiers.
Architecture & Techniques
QUANTITY SURVEYING

Alec Ibrahim, Civil Engineer - Consultant

A critical and yet undervalued activity in the development of a project.

Quantity Surveying (QS) is one of the most critical activities in the lifetime development of a project, yet it is not understood and valued as such in the local Lebanese market. And, even though a quantity surveyor is the entity that links an architectural concept to cost a development - controlling it, verifying any slip or errors - most developers leave this job to architects and consultants who are not qualified to perform such services.

A VALUED PROFESSION

Although Ancient Egyptians used quantity surveying, no evidence of this was found until the 17th century when the restoration of the city of London after the Great Fire led to the development of Quantity Surveying as an occupation. From that time, the English professionals took the lead of the business through the Royal Institute of Chartered Surveyors (RICS). In Lebanon, Quantity Surveying is not a well-known and appraised industry; a few professionals monopolize the market, some of them are chartered, others are not. The quantity surveyor, also known as construction economist or cost manager, is part of a team of professional advisors/consultants to the construction industry. Quantity surveyors estimate and monitor construction costs, from the conceptual stage of a project through to the completion of the construction period. At the completion stage, they participate to final cost estimation, sometimes in mediation and arbitration. Quantity surveyors work closely with architects, engineers, contractors, suppliers, developers, financiers, and arbitrators and as experts in courts. The profession’s name derives from the Bill of Quantities, a document...
which itemizes the quantities of materials and labor in a construction project. This is measured from design drawings, to be used by the contractors for tendering and for progress payments, for variations and changes and ultimately for valuation.

At the feasibility stage a quantity surveyor normally participates in establishing a project budget by the use of techniques such as cost planning, estimating, cost analysis and value management. They also advise the developer and architects on alternative material or methods to induce savings at concept stage.

During design the quantity surveyor ensures that the design remains on budget through cost management. Essential additions are offset by identified other savings. On completion of design and drawings, the surveyor may prepare a Bill of Quantities, which is issued with the specification, for use by contractors in submitting tenders. The contractor's quantity surveyors/estimators generally prepare tenders, and may price alternatives for consideration. During construction the quantity surveyors are called on to fairly value progress payments at regular intervals. They will also value changes to design or quantities, which may arise by reference to appropriate Bill of Quantities rates.

The contractor's quantity surveyor/contract administrator will have prepared claims for progress payments and additional work. When construction is completed the quantity surveyor will value the final payment certificate and in the case of construction disputes here is often called on as an expert witness, and some quantity surveyors act as arbitrators. Both the contractors and owner's quantity surveyors will be involved in this.

In addition to new projects, quantity surveyors also use their skills in refurbishment of old buildings and alterations to existing buildings. Quantity surveyors must have orderly and analytical minds and be prepared to work to very rigid time schedules. As decisions involving large sums of money are often made using information produced by them they must be accurate in all aspects of their work in the private and public sector with consulting firms, building contractors, investors, property developers, project managers and courts.

TRADITIONAL QUANTITY SURVEYING SERVICES

- Cost consulting, cost estimating
- Cost planning
- Cost control
- Contracts negotiation
- Procurement advice
- Preparing Bill of Quantities (BOQ) and Tender Document
- Monitoring budget
- Preparation of payment application, certification and valuation of construction work
- Assessment of variations
- Dispute resolution
- Preparing feasibility studies
- Value estimation
- Advice on cost limits and budgets
- Whole life cycle costing
- Valuation for insurance purposes
- Project management
- Advice on contractual disputes
- Preparation of final account
- Preparation of final detailed BOQ
SMOKE MANAGEMENT SYSTEMS

How to ensure optimum performance in the event of a fire.

Bassam Habre, Head of Inspection Division, Apave

On June 14th, 2017 a fire disaster hit the 24-storey Grenfell Tower block of public housing flats in North Kensington, West London. It caused 71 deaths, including one stillbirth, and over 70 injuries. On August 4th, 2017 a fire broke out and engulfed more than 40 floors of the Torch Tower in Dubai, the fifth tallest residential building in the world stands at more than 330 meters. Residents were able to evacuate the building in just ten minutes with no loss of life, thanks to its smoke free escape routes - in stark contrast to London’s Grenfell Tower disaster. Fire records have always shown smoke to be the primary threat to life in building fires. Smoke rapidly spreads within the building and obstructs possible exits. This results in people getting trapped in untenable environments due to reduced visibility, exposure to toxic gases, heat and thermal radiation. Many areas filled with smoke make rescue operations and occupant evacuation very difficult. And, regardless of the fire’s source, smoke is the major death causing element.
SAFETY CODES AND REGULATIONS

Building life safety codes, whether European, American or International, recognize the importance of smoke control in case of fire. Codes also recognize that in order to achieve fire safety and preserve lives, fires must be kept as small as possible and their effect limited to as small an area as possible. This resulted in conventional building configurations employing fire compartments made of fire rated floors and walls. However, in some cases such as in shopping mall buildings where atriums break with orthodox concepts of safety, smoke control and other safety issues become more critical.

French fire safety regulations are very precise when it comes to smoke management. Rules are provided for the proper control of smoke in corridors, stairs, large volumes, and in every area exceeding 300m² above ground or 100m² underground. The American life safety code (NFPA 101) mandates an engineering approach that relies more on sprinkler systems; being more performance based, the code requires that an engineering analysis be performed, for large volumes, to demonstrate that smoke will be managed during the time needed to evacuate the building. For protect-in-place occupancies, such as health care or prison premises, smoke control performance criteria must be maintained indefinitely.

The main objective of smoke management is to keep the possible means of egress free of smoke so that occupants can move away from a fire and reach a safe or protected area.

Another objective is to facilitate fire brigade intervention, considering the difficulties inherent in entering a smoke filled area. A complicating element that must be addressed is that in an emergency situation people tend to use the route they are familiar with. Occupants of office buildings can be trained by fire drills; but visitors will only know the way from which they came in. This is why codes require that exits always be provided with appropriate emergency lighting and exit signs that indicate egresses, as well as visible and audible notifications in case of an emergency.

Effective smoke control depends on rapid control of the fire size to limit smoke quantities to manageable volumes. Thus early detection and suppression are key issues for effective smoke control. Manual and automatic detection and suppression means are required depending on building occupancy, construction type and size. Smoke control systems could be stand-alone or integral to the buildings ventilation systems. Integral systems are more reliable because their components are constantly being monitored and maintained.
SMOKE EXHAUST SYSTEM DESIGN

Several design approaches could be considered for the same building type. Smoke exhaust could be achieved either by means of natural evacuation through ventilation openings provided in the building roof or facade for this purpose. Alternatively mechanical systems with smoke exhaust fans could be provided. In both cases calculations are necessary to determine the size and location of openings and equipment. In addition to smoke exhaust manual calculations or computer modeling, smoke management systems must be designed to adhere to all other requirements such as emergency power supply and the mandatory installation of a fire control panel to allow manual operation of equipment.

Ultimately, to achieve an optimum smoke management system in a building, a successful and reliable smoke control system should be designed by a qualified specialist engineer, properly maintained, and periodically inspected. It is false economy to cut corners when installing and maintaining smoke control systems - they are critical to ensuring the safety of property and lives.
Sustainability & Energy
ELARD is a leading consultancy firm providing **Health, Safety and Environment (HSE)** environmental geology and geophysics (G&G), water resources management, waste management and other related services to various sectors including the oil and gas, energy, industrial, building and construction, and infrastructure with focus on the Middle-East, Gulf region, North Africa, Asia and the Adriatic.

ELARD has been serving major clients in Lebanon and the region including governments, such as the Lebanese Ministry of Environment, Lebanese Petroleum Administration, Saudi Ministry of Environment, Water and Agriculture, Saudi Ministry of Municipalities and Rural Affairs, Ministry of Economy in Montenegro, Dubai Municipality, Abu Dhabi Department of Municipal Affairs and Transport, as well as international financing institutions such as the World Bank, European Investment Bank, European Bank for Reconstruction and Development, large private corporations and engineering firms (Holcim, Lafarge, Total, SHELL, Foster Wheeler, Samsung Engineering) and local authorities.

**MAIN SERVICES PROVIDED TO THE VARIOUS SECTORS INCLUDE:**

- Policy development and strategic planning
- Alignment of strategies with Sustainable Development Goals (SDGs)
- Water and wastewater master planning
- Strategic Environmental Assessment
- Environmental Impact Assessment
- Environmental Baseline / Monitoring Studies
- Environmental Site Assessment (Phase 1 and Phase 2)
- Soil and Groundwater Remediation
- Environmental Training
- Atmospheric & Acoustic Studies
- Waste Management
- Green House Gases & Carbon Footprint Studies
- Risk, Safety & Reliability Studies
- HSE Compliance Studies
- Geological Investigations / Mapping
- Geophysical Surveys
- Water Resources Studies / Management
- Soil & Groundwater Remedial Investigations & Feasibility Studies
- Water and wastewater engineering
SUSTAINABLE PLANNING GUIDELINES

The five elements of responsible urban planning.

Ricardo Khoury, Senior Environmental Engineer / Head of Environmental Division at ELARD.

As part of the development of a policy to update the National Spatial Strategy (NSS) and Planning Act (PA) for the Kingdom of Saudi Arabia (KSA), ELARD has reviewed the Sustainable Planning Guidelines that were prepared under the leadership of the Saudi Energy Efficiency Center (SEEC).

The Sustainable Planning Guidelines for Urban Growth in the KSA supports a larger Kingdom-wide effort to reduce energy consumption as a fundamental component of a responsible resource management and economic stability program. The guidelines are comprised of two major undertakings:

1. Reduction in transportation-related fuel consumption through the development of planning and implementation guidance for Smart Growth, Density, Mixed Use, and Transit Oriented Development.
2. Reduction in energy consumption on a municipal scale through the development of design and implementation guidance for District Cooling, Water Conservation, and Building Energy Efficiency.

Five elements of urban planning are addressed in these guidelines:

1. Site
2. Urban planning and transport
3. Public realm
4. District cooling
5. Building energy and water

The elements provide guidelines for new developments on existing or planned corridors, infill sites or edge/adjacent sites. Sites should not be located in areas prone to excessive seismic activity or flooding, contaminated areas or in areas designated for preservation.
Urban planning and transport guidelines provide land use and transportation investment criteria for low-density, mid-density and high-density developments leading to transportation energy savings of 20 to 30% compared to business-as-usual scenario. The guidelines intend to reduce the growth in fuel consumption and reduce auto dependency. Public realm design guidelines are provided based on 10% minimum open space criteria, accessibility to amenities, and walk ability among others as well as landscape planting and irrigation guidelines. Criteria to determine the applicability of district cooling are provided in addition to building envelope and energy use intensity guidelines. Building water guidelines are also defined to reduce water consumption. Preparation and adoption of similar guidelines tailored to the Lebanese context would substantially contribute to the sustainable development of our country primarily through resource conservation and would demonstrate the environmental stewardship of Lebanon's leadership and its citizens.
Customers and consumers, stakeholders and shareholders are increasingly demanding environmentally sound products and services, and environmental legislation is getting stricter all the time. Apave offers solutions to reach environmental, social and economic targets, by monitoring and optimizing the sustainable development aspects of business activities, through technical assistance, consultancy and trainings.

**TECHNICAL ASSISTANCE**

With proven experience, knowledge of regulatory trends and technological expertise, Apave can help its customers to ensure compliance of their equipment, installations or processes with different norms or national and international standards.

**ENERGY AUDITS**

Apave performs energy audits and prepares engineering and economic reports which specifically identify the energy improvements and operational changes which are recommended to be installed or implemented. Throughout the structure, source side and energy tariffs, lighting energy audit missions, all the energy aspects are studied including building and related controls, heat and hot water production, air conditioning and ventilation, elevators and other electrical equipment, and automation and set points.

**COMMISSIONING FOR NEW CONSTRUCTIONS**

Commissioning facilitates and ensures the required communication, coordination, testing, verification, and results in the delivery of a building whose systems are energy efficient, and satisfy stringent quality and comfort expectations. Apave offers commissioning services directly for owners, independent of designers, contractors, vendors and suppliers on the project. Such independence is essential for the commissioning authority to be seen as totally objective in leading the commissioning process.

**COMMISSIONING FOR LEED (LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN)**

In order to comply with the LEED requirements, the commissioning process done by Apave, as Commissioning Authority designated by the project owner, is divided into two levels: Fundamental Commissioning of Building Energy Systems, a prerequisite for the system, and Enhanced Commissioning with its optional credits. Its mission is to lead, review and oversee the completion of the commissioning process activities.
ENERGY CONSERVATION CODE
The Code was established to regulate the minimum energy conservation requirements for new buildings. Apave can intervene through reviewing construction documents, inspecting the construction upon notification or after building completion to confirm its conformity with the Code.

MANAGEMENT CONSULTANCY
Apave designs and develops tailored consulting services to its clients for the implementation of international standards and local regulations.

ISO 14001
The ISO 14001 set of standards and guidelines defines the core environmental management system (EMS) itself, and the auditing procedures necessary for verification.

ISO 50001
ISO 50001 is intended to provide organizations with a recognized framework for integrating energy performance, including use and consumption, into their management practices.

ISO 26000
The implementation of social responsible practices contributes to sustainable development, by considering the social, economic and environmental impacts of the institution.

APAVE GREEN LABEL
Delivered by Apave Liban, the Green Label rates the environmental performance of Lebanese public & private institutions. It is based on a positive approach that will help managers and staff, understand their impact on the environment and find ways to improve their performance.
## THE BENEFITS OF STANDARDIZATION

<table>
<thead>
<tr>
<th>ISO 14001</th>
<th>ISO 50001</th>
<th>ISO 26000</th>
<th>APAVÉ GREEN LABEL</th>
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<tbody>
<tr>
<td>Reduce incidents and liability</td>
<td>Reduce costs</td>
<td>Identify areas for improvement, new risks and opportunities</td>
<td>Awareness &amp; participation of staff</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Improve business performance</td>
<td>Respond to call for tenders</td>
<td>Prevention / Maintenance &amp; control of equipment &amp; tools</td>
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<tr>
<td>Performance</td>
<td>Engage top management</td>
<td>Facilitate access to markets</td>
<td>Monitoring of pollution sources</td>
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<tr>
<td>Improved corporate culture</td>
<td>Comply with legislation</td>
<td>Improve customer awareness and reputation</td>
<td>Conservation of Biodiversity</td>
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<tr>
<td>Public image and community relations</td>
<td>Reduce GHG emissions</td>
<td>Engage with and retain stakeholders loyalty</td>
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<td>Formalize energy policy and objectives</td>
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<td>Integrate management systems</td>
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<td>Secure energy supply</td>
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<td>Drive innovation</td>
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<td>Flexible and scalable</td>
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- Awareness & participation of staff
- Prevention / Maintenance & control of equipment & tools
- Monitoring of pollution sources
- Conservation of Biodiversity
**TRAININGS**

As part of its annual Training Calendar, Apave proposes the following training programs, which aim to enhance the participants’ knowledge and experience in all environmental issues.

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>OBJECTIVE</th>
<th>TARGET PEOPLE</th>
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<tbody>
<tr>
<td><strong>ENVIRONMENTAL MANAGEMENT SYSTEMS</strong>&lt;br&gt;<strong>ISO 14001</strong></td>
<td>Introduction to the Environmental Management standard requirements</td>
<td>Persons involved in establishing, implementing, developing &amp; improving an EMS</td>
</tr>
<tr>
<td><strong>ENERGY MANAGEMENT SYSTEMS – ISO 50001</strong></td>
<td>Introduce energy management systems &amp; new practices to better manage and reduce energy use</td>
<td>All persons interested in energy saving &amp; energy conservation</td>
</tr>
<tr>
<td><strong>CORPORATE SOCIAL RESPONSIBILITY – ISO 26000</strong></td>
<td>Introduce the CSR principles and core subjects and learn the methods that can be used to apply the guideline</td>
<td>Persons involved in implementing the Corporate Social Responsibility concept</td>
</tr>
<tr>
<td><strong>OCCUPATIONAL HEALTH &amp; SAFETY – OHSAS 18001</strong></td>
<td>Present the main general requirements and preventive measures pertaining to health &amp; safety at the workplace</td>
<td>Persons responsible for the OH&amp;S within a company, all persons and staff wanting to learn more about health and safety at work place</td>
</tr>
<tr>
<td><strong>GREEN BUILDINGS</strong></td>
<td>Learn general principles of sustainable construction &amp; green building evaluation methodologies</td>
<td>Architects, engineers, entrepreneurs, contractors, designers, developers and any person interested in Green Building</td>
</tr>
<tr>
<td><strong>ENERGY AUDITS</strong></td>
<td>Introduce energy saving measures in industrial, public &amp; residential buildings</td>
<td>Architects, Engineers, Consultants, operators and all persons involved in energy conservation, sustainability and environment protection in general</td>
</tr>
</tbody>
</table>
FOCUS ON

Transportation systems for buildings
GOING UP

New safety standards for lifts

Bechir Hasbani, Electro-mechanical Engineer, Apave and Libnor Elevators committee member

In 2014, the European Committee for Standardization released two new safety standards for the construction of lifts and for the testing of lift components as follows:

• EN 81-20 defines the technical requirements for the construction of lifts.
• EN 81-50 defines design rules, calculations and tests of lift components.

Both new standards apply for passenger and goods passenger lifts. They started being effective as of September 1st, 2017. The revision of EN 81 Parts 1 & 2 to become EN 81 Parts 20 and 50 is the greatest change to the lift design standards in the last 20 years.
FOCUS ON
Transportation Systems for Buildings
STANDARDS’ EVOLUTION

EN 81-1- ELECTRIC ELEVATORS

EN 81-2- HYDRAULIC ELEVATORS

EN 81-20- ELECTRIC + HYDRAULIC LIFTS

EN 81-50- EXAMINATIONS & TESTS

MAJOR MODIFICATIONS TO LIFT DESIGN STANDARDS

• Fire extinguisher (sprinkler) is now allowed in the well. Lift must go to exit floor and park with doors open before sprinkler discharges.
• Machinery spaces containing hydraulic equipment are designed such that they will contain any spilt fluids.
• Lift well ventilation is the responsibility of the building designer/architect.
• Glass panels used in the construction of the well must be able to withstand 100kg applied over an area of 0.3m x 0.3m.
• New requirements changing the dimensions of counterweight screens and a requirement to withstand 300 N without deflecting into the path of the counterweight.
• Requirement for shaft division screens has now been changed from 500 mm from the side of the car to the nearest moving part, to 500 mm from the handrail to the nearest moving part.
• There must be standing areas for the number of persons anticipated to work on the car and in the pit and clear signage stating how many persons are permitted to work there.
• Clearance over fixed equipment increased to 500 mm with exception of the handrail.
• New requirement for a pit inspection control station.
• Modified rules for lighting levels in machinery spaces.
• If accessible spaces do exist below the well, the base of the pit shall be designed for an imposed load of at least 5 000 N/m², and the counterweight or the balancing weight shall be equipped with safety gear.
• New requirements for pit access ladders and to provide them with a corresponding safety contact where necessary.
LANDING/CAR DOORS

- All fire test certification of lift landing doors shall be according to EN 81-58.
- All doors in future, including their frame, will be subject to soft and hard pendulum impact testing at their weakest points.
- New requirement for 1000 N and 300 N forces applied to doors and locks to act simultaneously for design and test purposes.
- New requirements for protection of children’s fingers on glass doors.
- Car doors should not be able to be opened more than 100 mm under manual effort when outside of unlocking zone.
- Door leading edge not to be less than 20 mm thick if made from glass.
- Access ladder to be provided to unlock the doors from the pit if lowest landing door lock is not within 1m of pit.

LIFT CAR

- All lift cars regardless of well clearances to have a “toe board” around the car roof edge.
- Emergency lighting in lift car shall be of 5 lux for 1 hour autonomy.
- New requirements for the use of 1100 mm high balustrades.
- A new sample calculation, including loading devices is given.
- New requirement for combustibility of car materials.
- Surface of car roof where persons work to be made from non-slip material.
- Modified requirements for normal car lighting and emergency lighting lux levels.
- Car apron must withstand a horizontal force of 300 N without deflection greater than 25 mm.
SUSPENSION ORGANS

- All ropes to comply with EN 12385-5.
- No longer possible to use rope grips as a means of rope termination.
- All buffers, except energy accumulation type, shall have a label with the type certificate number, buffer type, and oil details where hydraulic.
- For accumulation type buffers with non-linear characteristics the maximum compression now takes consideration of the fixing element.

ELECTRICAL INSTALLATION AND APPLIANCES

- Electrical equipment shall now be in accordance with EN 60204-1.
- Labelling now required for electrical and thermal hazards.
- Socket outlets to be provided with RCD at 30 mA.

CONTROLS

- Inspection controls are to stop the lift with 2 m clearance in the pit and headroom. Further movement towards the minimum refuge spaces is then allowed upon pressing the control button again at 0.3 m/s.
- Inspection controls on the car top to have a “Run” button to act with up and down buttons:
- It is now allowed to have a feature, accessible to authorized and competent persons only to by-pass the car and landing doors’ locking contacts for maintenance purposes.
- The alarm is now specified as that of EN 81-28
**EARLY ALERT**

Technical monitoring of lifts ensure a safer ride

Carlos ISSA, Technical Systems Engineer & Senior Inspector / Lifting Expert, Apave

Lifts are the most frequently used mode of transportation worldwide. Billions of people use them and our daily schedule depends on this electro-mechanical machine. Practically, it is used in all sectors such as residential buildings, hospitals, schools, multi-level office blocks and factories and by most people, the young and old, strong and weak, lone and accompanied.

The vast majority of us step into lifts without thinking twice about our personal safety. And yet, this equipment, similar to all electro-mechanical machines, may malfunction and is a potential source of serious injuries and deaths to the general public and to operation and maintenance personnel.

Based on significant elevators incidents and following raised awareness attributed to international and local life safety and engineering associations, the Lebanese State pursued the decree No. 123/2014 giving legal binding status to national standards related to elevators. This decree clearly defines the legal standards to be followed in order to install and operate safe elevators.

The Order of Engineers and Architects in Beirut, with the assistance of technical control companies, is dedicated to apply the perused decree and to ensure that all related parties apply the recognized standards. The Order created an official Elevators’ Technical Agreement that should be signed between two parties: Owners requesting a permission to construction work, *Izn moubachara* in Arabic and the Technical Control Company.
With a wide experience in this field, Apave is an accredited inspection party for existing and new elevators under the Elevator Technical Agreement signed between Apave and willing owners. Apave is committed to:

- Review the drawing layouts and details related to the elevator(s) belonging to the building licensed on the above property, and to verify the compliance with the requirements of the Lebanese decree# 123/2014.
- Visit the elevator(s) at installation stage and send a report to the owner regarding the technical observations.
- Final visit to the installed elevator(s); declare the final observations and then issue a final report to the client.

A site inspection visit by Apave covers the following:

- Visual examination
- Tests and verification of the safety devices conformity
- Load tests

Apave undertakes to follow all conditions mentioned in the Elevator(s) Technical Agreement above. Also, Apave’s team composed of qualified engineers performs full elevator’s inspection following the elevators Standard Specifications issued by the Lebanese standards and specifications and approved by the Lebanese decree No. 123 as defined here:

**LIST OF APPLICABLE LEBANESE STANDARDS**

<table>
<thead>
<tr>
<th>STANDARD NUMBER</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NL EN 81-80:2011</td>
<td>Safety rules for the construction and installation of lifts – Existing lifts – Part 80: Rules for the improvement of safety of existing passenger and goods passenger lifts</td>
</tr>
</tbody>
</table>
According to RIDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations) and CNAM (Caisse Nationale de l’Assurance Maladie), elevator incidents in Europe have significantly decreased after implementing related safety standards. This news is motivation for Lebanese contractors, owners and users to apply the requirements mentioned in the local decrees and to employ the assistance of competent technical control offices for inspection.

**LEBANESE DEGREE NO. 123:**
Giving legal binding status to national standards related to elevators.

- Pursuant to the Constitution, mainly article 62 thereof,
- Pursuant to the July 23, 1962 law, concerning the establishment of the Lebanese Standards and Specifications Institution, particularly Articles IV and VII thereof,
- Pursuant to the decision of the Board of Directors of the Lebanese Standards and Specifications No. 166/3 dated 24/06/2011,
- Pursuant to the proposal of the Minister of Industry,
- After consultation with the State Consultative Council (Opinion No. 202/2012 - 2013 dated 13/3/2014), and after the Council of Ministers’ agreement on 9/5/2014,

Decrees the following:

**ARTICLE I:**
The legal binding status shall be given to the following related to elevators Standard specifications set out below.

**ARTICLE II:**
The Industrial Research Institute shall be responsible for verifying the conformity of the concerned products related to this decree with their respective specifications.

**ARTICLE III:**
This Decree shall be published and reported where needed.

Beirut on 3 July 2014
Issued by the Prime Minister
Signature: Tammam Salam, and co-signed by 20 ministers

The specifications attached to this decree are available from the Lebanese Standards and Specifications Institution.
MEANS OF ESCAPE

Occupant Evacuation Operation is becoming an important consideration in high-rise design.

Ziad Hakim Rahme, Senior Managing Partner, S.M.ArtWork - Lebanon.

For years we have been told not to use the elevators in case of fire. However, with the evolution of the construction and the emergence of midrise buildings (up to 13 floors) architects and engineers are now accounting for elevators to be used by firemen in rescue operations. Furthermore, the Occupant Evacuation Operation (OEO) is becoming an important constraint in the design of mid to high-rise buildings, highlighted on 9/11, as elevators should be used in case of emergency when the building population cannot be evacuated just via the staircase.

LEBANESE ELEVATOR STANDARDS

The EN81.1+A3 is the applicable norm for new electrical elevators to be installed permanently in new buildings even though does not repeat all the general technical rules applicable to every electrical, mechanical, or building construction including the protection of building elements against fire (Clause 0.2.1) is specific when it comes to elevator behavior under fire conditions by stating in its clause 7.2.2: Landing doors shall comply with the regulations relevant to the fire protection for the building concerned. Landing doors should be the fire tested by certified bodies and as per European norm. Moreover, the building fire protocol has separated between buildings where the well is required to contribute against the spread of fire, and those where the well is not required to contribute against the spread of fire. In the former, the well shall be totally enclosed by imperforate walls, floor and ceiling while in the latter the well does not need to be totally enclosed, provided. In line with the above it is understandable that only elevators with totally enclosed wells and in buildings where OEO requires the passage of persons in elevator lobbies to access escape stairs or forced to use the elevators, should be equipped with fire rated doors. The time of protection and sustainability is defined by the fire code applicable in the country or as defined by the Controlling Office (30 mn – 60 mn – or 120 mn).

ELEVATORS LANDING DOOR FIRE RATING CLASSIFICATION

It is worth differentiating between class E (Integrity), Class EI (Integrity and Insulation) and Class EW (Integrity and Radiation) elevator doors. The integrity E is the ability of an Elevator Landing door, when exposed to fire on one side, to prevent the passage through it of flames and hot gases and to prevent the occurrence of flames on the unexposed side. The requirements are the following: cracks gaps of certain dimensions; ignition of a cotton wool pad; - sustained flaming on the unexposed side.

The Insulation I, is the ability of Elevator Landing door when exposed to fire on one side, to restrict the temperature rise of the unexposed face to specified levels.

The radiation W, is the ability of the elevator landing door to withstand fire exposure on one side only, so as to reduce the probability of the transmission of fire as a result of significant radiated heat either through the element or from its unexposed surface to adjacent materials. The element may also need to protect people in the vicinity which is why most elevator manufacturer propose fire rated doors E120 – EI120 and EW 60, all tested according to EN81-58.

Finally, no matter what type of protection is required by the OEO, it is important that other finishing material in the elevator lobby used as a passage or escape route is also fire retardant and that the fire door is installed as per the fire test requirement mainly the installation of the door frame and the installation of the connection with the surrounding walls.
(1) **THE BUREAU OF PLANNING AND SUSTAINABILITY IN THE USA HAS DEFINED:**

- Low-rise buildings are buildings of 1-6 stories and up to 18 meters height
- Mid-rise buildings are buildings of 7-12 stories and up to 35 meters height
- High-rise buildings are buildings of 13 stories and above and the sky is the limit in height.

These definitions are useful within the context of planning for cities

(2) Occupant Evacuation Operation (OEO(2)) It’s a more feasible way to evacuate people from tall buildings. The OEO protocol uses Software that operates the elevator system during fires as well as signal fixtures to direct occupants to safety.

(3) EN81.1+A3 Safety rules for the construction and installation of lifts - Part 1: Electric lifts in its clause 0.2.1 This standard does not repeat all the general technical rules applicable to every electrical, mechanical, or building construction including the protection of building elements against fire. And in clause 1.4 this standard does not specify the additional requirements necessary for the use of lifts in case of fire.

(4) Type of lift in partially enclosed well observation lifts in connection with galleries or atriums; in shop lifts; lifts inside open stairs

(5) Definition of Fire resistance classes as per RISE Research Institutes of Sweden, E-mail info@ri.se

(6) In 2003, a specific harmonized standard for the testing of fire resistant lift landing doors was adopted. Standard EN 81-58:2003 Safety rules for the construction and installation of lifts - Examination and tests - Part 58: Landing doors fire resistance test developed by CEN TC 10.
ACCESSIBLE ELEVATORS

Tayma Awaiss, Civil Engineer, Apave

Vertical communications, such as staircases, elevators, and escalators, are required in buildings in order to travel from one level to another. However, for mobility-impaired persons, the only way to get to a floor level and to consider all the floor levels of a building as accessible is via an elevating equipment, such as an elevator. An alternative solution for an elevator is a platform lift, where the mobility-impaired person can be safely placed on a moving platform. The difference between an elevator and a platform lift is that a platform lift is accessible only for one individual, requires a special knowledge and most of the time requires the intervention of a qualified person. Finally, it will be more subject to a risk of breakdown due to the fact that it will be used occasionally.

According to French norms, an elevator is required if the total occupant load exceeds 50 persons in the building, (as in most of the cases) but, also if all the services in the building cannot be provided at the ground floor level and requires a travel to another floor level. Elevators should be in accordance with the NF EN 81-70 norm concerning the accessibility to lifts for persons including persons with disability.

An elevator should have specific dimensions depending on its type. These dimensions are shown in the schemes below extracted from the French norms; however, three elements should be provided in every accessible lift in order to be considered as user friendly. The elements are:
• Command buttons located between 0.90 m and 1.20 m and distant from any corners in order to be easily accessible
• A mirror in order to allow a backward travel of persons with disabilities at their exit from the lift
• A handrail that will provide support for the mobility impaired.

The following are local requirements extracted from the Lebanese Decree #7194:
• Elevators should have a minimum area of 110 cm x 140 cm.
• Elevators doors width should be not less than 80 cm.
• Elevators lobby should have a minimum area of 140 cm x 180 cm.
• Car operating panel and landing operating panel should be placed at a maximum height of 90 cm.
• Buttons should be embossed.
• Floors numbers should be placed at 150 cm height on both sides of door borders.
• Signs showing the way to the elevator should be at a height of 180 cm.
• Audiovisual signs should be provided to mark each floor stop.
• Elevators floor should be slip resistant.
• Elevator door’s color should be different from wall’s color.

Finally, the Lebanese decree needs to be developed to adapt to accessible building to ensure the safety of all citizens.
Burj Khalifa in Dubai, U.A.E. – The tallest building in the world at 829.8 m housing 57 elevators
FOCUS ON
Transportation Systems for Buildings

ELEVATOR SYSTEMS

The core of a building’s planning, design and construction

Georges Rizk, Electromechanical Engineer & Resident Manager of Apave International – Abu Dhabi

Although stairs are always an option, lifts are the most used vertical transportation system in buildings. And, architects and designers need to take this factor into consideration, and conceive their projects accordingly. But, how exactly?

Imagine if just one single elevator served a building like Burj Khalifa in Dubai, U.A.E. which has 160 storeys?

Percentage of people using stairs and lifts according to the number of floors. Even with only one floor to go down, 85% of people prefer to wait for an elevator rather than to use the stairs!

<table>
<thead>
<tr>
<th>FLOORS TRAVELLED</th>
<th>USAGE (STAIR : LIFT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UP (%)</td>
</tr>
<tr>
<td>1</td>
<td>10 : 90</td>
</tr>
<tr>
<td>2</td>
<td>5 : 95</td>
</tr>
</tbody>
</table>
Actually Burj Khalifa, the tallest building in the world at 829.8m, houses 57 elevators due to traffic analysis, a study of the population distribution and their predicted pattern of flow within the day. This analysis should be performed at the early conceptual stages of a project in order to ensure an easy access to buildings and smooth flow of people and goods, allowing the selection of:

1. The correct number, type, sizes and speeds of elevators
2. The proper control systems and features to optimize and synchronize the traffic flow
3. The optimum layout and correct positioning in the building in relation to one another

Overcrowded elevator lobby showing that the installed elevator system is not compatible with the traffic pattern

The typical passenger demand for an office building over a working day characterized by a morning up peak traffic, lunch down traffic, either to outside the building or to the cafeteria (usually located at lowest floors) and up traffic, evening down peak and the interfloors traffic during the day.

A traffic analysis study is always conducted for the most demanding scenario which is the morning up peak for office buildings (employees arriving in rush at the same time and therefore waiting times shall be minimized). For this, a calculation during the up-peak traffic condition is performed using defined factors: handling capacity, interval and average waiting time.
Passenger times relationship

<table>
<thead>
<tr>
<th>JOURNEY TIME</th>
<th>TIME TO DESTINATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAITING TIME</td>
<td>TRANSIT TIME</td>
</tr>
</tbody>
</table>

- Call registration → Doors opening
- Passenger arrives
- Doors opening → Passenger alights

Target passenger average times for office buildings to achieve satisfactory passenger experiences

<table>
<thead>
<tr>
<th>PASSENGER TIME</th>
<th>TARGET</th>
<th>POOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVERAGE WAITING TIME (AWT)</td>
<td>&lt;25 s</td>
<td>&gt;30 s</td>
</tr>
<tr>
<td>AVERAGE TRANSIT TIME (ATT)</td>
<td>&lt;60 s</td>
<td>&gt;70 s</td>
</tr>
<tr>
<td>AVERAGE JOURNEY TIME (AJT)</td>
<td>&lt;80 s</td>
<td>&gt;90 s</td>
</tr>
</tbody>
</table>

Relationship between the quality of service and interval in office buildings

<table>
<thead>
<tr>
<th>INTERVAL (S)</th>
<th>QUALITY OF SERVICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20</td>
<td>Excellent system</td>
</tr>
<tr>
<td>25</td>
<td>Very good system</td>
</tr>
<tr>
<td>30</td>
<td>Good system</td>
</tr>
<tr>
<td>40</td>
<td>Poor system</td>
</tr>
<tr>
<td>&gt;50</td>
<td>Unsatisfactory system</td>
</tr>
</tbody>
</table>

Design criteria for residential buildings

<table>
<thead>
<tr>
<th>TYPE</th>
<th>LUXURY</th>
<th>NORMAL</th>
<th>LOW INCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval (s)</td>
<td>45-50</td>
<td>50-60</td>
<td>50-70</td>
</tr>
<tr>
<td>Two-way handling capacity</td>
<td>8%</td>
<td>6-8%</td>
<td>5-7</td>
</tr>
</tbody>
</table>

**NOTE:** The value suggested for interval is nominal and should be calculated for 80% occupied car.

Location and zoning of elevators is decided based on functional (next to busiest entrances, separated passenger and freight traffic flows, etc.), comfort (acoustically isolated from sensitive areas, etc.), safety (next to egress stairs, etc.) and economical and efficiency (energy saving, etc.) criteria.
Elevators have become so essential in our modern day-to-day life, but most of us only know the lift cabin interior and rarely question its functions, either out of curiosity or fear. For example, are elevators held up by only one rope that can break, leaving passengers trapped in a falling car? Will an overcrowded elevator fall? Can the hall doors open when the elevator cabin is not there facing the people to the risk of falling in the shaft? Or, if an elevator is stuck between floors, are the passengers in danger of falling and should they try to get out? Will the elevator appear faster if the CALL button is repeatedly pushed? Absolutely not! The call is registered just once; movement is in response to the elevator controllers.

A lift system is composed by a pit, the lowest part housing buffers located under the car and the counterweight, a shaft where the car evolves on rails in front of the landing doors and usually a machine room housing the lift motor and driving system. Elevators are supported by multiple steel cables with each alone being able to support a fully loaded car.
A triplex elevator system shaft

Elevators can be of the traction type, geared or gearless; hydraulic, direct acting or suspended; or of the machine room-less type (MRL) where the driving system is located within the shaft enclosure.

Details of a traction elevator system
Each of these types has its specific advantages and disadvantages, but, the main difference and decisive factors in the choice of which elevator to install are the travel and speed.

<table>
<thead>
<tr>
<th>TRACTION</th>
<th>HYDRAULIC</th>
<th>MRL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPPEED</strong></td>
<td>17 m/s</td>
<td>0.63 – 1 m/s</td>
</tr>
<tr>
<td><strong>TRAVEL</strong></td>
<td>No significant limitations</td>
<td>18 m</td>
</tr>
</tbody>
</table>

For any elevator, safety is a necessity achieved and guaranteed by the following certified mandatory devices ensuring the protection of people and machinery:

- Brakes operating in the event of power failure
- Over speed governor restricting the increase of speed
- Safety gear preventing the cabin fall
- Buffers supporting the car in case of a fall at low heights
- Landing door locks allowing its opening only after the elevator car stops at the landing and engages an unlocking device
- Safety edge and photo eye preventing passengers or objects from getting trapped by the closing doors
- Communication system between the cabin and a constantly attended location in case people are trapped inside the elevator
- Overload device preventing the elevator operation above the car capacity

Also, elevator cars are designed as “safe rooms”. Therefore, the safest place in case of breakdown is inside the car. Ring the alarm and wait for help. Leave the car only with the assistance of professional rescuers as leaving the car on your own could result in injury. Determining and choosing the lift system characteristics is only a first step. Indeed, being literally at the core of buildings’ planning, design and construction, the whole project shall be conceived according to the architectural (number of elevators per enclosure, lift lobbies arrangement, etc.), structural (loads, seismic conditions, heights and clearances, etc.), electrical (distribution diagram, feeder section, normal and emergency lighting, etc.), ventilation and air conditioning (ventilation, smoke exhaust, etc.) and fire protection criteria (shaft and machine room fire resistance rating, sprinklers, fire detectors, fire operation, etc.) imposed by the adopted governing codes (American, European, British, French or International standards).

Preferred elevators facing topologies (architectural criteria)
Elevator shafts are the core of buildings (structural criteria)

Guide rail brackets fixation in seismic conditions (structural criteria)
Mandatory clearances between elevator cars and the wall facing its entrances (structural criteria)

Ventilation of the lift well and machine room above (ventilation and air conditioning criteria)

Elevator placard forbidding the use of elevators in case of fire (fire protection criteria)

Typical elevator electrical distribution diagram
CONGRATULATIONS

THREE GUINNESS WORLD RECORDS® FOR MITSUBISHI ELEVATORS AND ESCALATORS
Mitsubishi Elevators and Escalators recently achieved three Guinness World Records® with the installation of the fastest elevator, tallest elevator in a building and fastest double-deck elevator in Shanghai Tower, China’s tallest building.

Shanghai Tower is a 632-meter skyscraper complex in the Lujiazui Finance and Trade Zone of Pudong, Shanghai. It houses offices, a hotel, retail stores, conference and exhibition halls, culture and tourism facilities and restaurants.

The Mitsubishi Electric elevators were certified by Guinness World Records Ltd. as follows:

**FASTEST ELEVATOR:**

The elevator travels at 1,230 meters per minute, or 73.8 kilometers per hour, directly from the second basement level to the observation deck on the 119th floor in just about 53 seconds.

**TALLEST ELEVATOR IN A BUILDING:**

Two emergency-use units that travel 578.55 meters between the third basement level and the 121st floor.

**FASTEST DOUBLE-DECK ELEVATOR:**

Eight units that travel at 600 meters per minutes, or 36.0 kilometers per hour, directly between the ground floor and hotel lobby on the 101st floor.

Mitsubishi Elevators and Escalators are exclusively available at Mitsulift Lebanon S.A.L.

www.mitsulift.com
info@mitsulift.com
FOCUS ON
Transportation Systems for Buildings

Ultra-fast lifts in race to the top

The race to build ever taller skyscrapers has sparked a battle among lift manufacturers to develop new-age elevators. High-speed lifts in China’s 632-metre-tall Shanghai Tower will travel at 18 metres per second.

- 2015: 18.0 m/sec
  Shanghai Tower, China

- 2014: 10.3 m/sec
  One World Trade Center, U.S.

- 2010: 10.0 m/sec
  Burj Khalifa, UAE

- 1974: 0.1 m/sec
  Willis Tower, U.S.

- 1931: 7.1 m/sec
  Empire State Building, U.S.

- 1930: 4.5 m/sec
  Chrysler Building, U.S.

Shanghai Tower – Designed by Gensler (U.S.)
- 121 floors
- Elevators: 106 – built by Mitsubishi Electric
- Distance of 578m between basement and top floor
- Twin rails: Guide elevator
- Aerodynamic capsule: Reduces air resistance
- Ceramic brakes: Can stop lift within 15 metres if car moves too fast
- 13-tonne counterweight
- 310-kilowatt motor: Drives pulley

Source: Mitsubishi Electric, Financial Times, Popular Science
© GRAPHIC NEWS

Top of the World
Three world records* in Shanghai Tower

- World’s Fastest Elevator 20.5 m/s
- World’s Tallest Elevator 578.55 m
- World’s Fastest Double-deck Elevator 10.0 m/s

More detail

* Mitsubishi Electric Research as of December 2016
what floor?
EFFICIENT ENERGY CONSUMPTION

The evolution of energy conservation measures in elevators and escalators

Ali Bechara, Mechanical Engineer, LEED AP O+M

Energy has become a major topic for all building services. Although energy costs are currently considered low due to low oil price, building owners are trying to investigate means to save energy taking into consideration future energy price fluctuation, and environmental impacts of energy consumption. The evolution of energy conservation measures included in elevators and escalators and recent innovation made to benefit from energy produced by elevator mechanism is a current topic. In the early 19th century, practical electric motors were invented, and almost all elevators were converted and built to be powered by electric motors. Today, the major implication of energy efficiency of elevators and escalators is how to move an average load with the least effort possible.
INTRODUCING REGENERATIVE DRIVE TECHNOLOGY

The regenerative drive module operation is similar to a second inverter operation in synchronization with power-line frequency. Regeneration in elevators happens in two states: empty car going up, or full car going down). In this manner, the energy that was once wasted as heat in a braking resistor is now returned to the utility distribution system, which can feed other building loads (lighting, HVAC, other elevators loads etc.).

Although regenerative drive provides a great opportunity for the energy that was once wasted in the braking resistors, safety measures shall be taken into consideration when sizing the emergency power supply in order to take into consideration any regenerated energy that will be fed during any utility power failure.

The amount of regenerated energy from elevator depends on various factors: height of building, weight of the load, frequency of use, capacity of elevator, cabin speed…etc. Detailed listing of factors concerning elevator and escalator energy consumption can be found in NF EN ISO 25745, November 2012 and CIBSE Guide D – Transportation Systems in Buildings, 2015.

In order to access the possibility of adding regenerative drive modules in elevators, a detailed simulation and traffic analysis shall be conducted in order to evaluate the regeneration occurring, its feasibility, and post-construction measurement verification.
ELEVATOR FACTS

- Elevators are statistically the safest way to travel.
- Close Door button will not make door close faster.
- In three days elevators carry equivalent of entire Earth’s population.
- Elevator music first appeared in 1920s to calm the fearful passengers who used the elevators for the first time.
- During ancient times, there were 24 elevators in the Roman Colosseum which were operated manually by around 200 slaves.
- Mirrors are common in elevators as a means of keeping passengers occupied during the journey. This was because people would complain about the journey time when elevators were still relatively slow and mirrors tricked the mind, making it appear faster. They also relaxed people suffering from claustrophobia.

Source: Elevators Ltd.co.uk
MOVING STAIRS

5 Escalator specifications to ensure a safe and efficient ride

Ziad Hakim Rahme

An escalator is the most efficient means to move large numbers of people between floors. The primary advantage of escalators is that they connect all floors together in a smooth and easy manner. As shopping malls and recreational centers have numerous parking floors, escalators thus assist in facilitating the travel of tenants and visitors to the shopping or recreational areas. Escalators are also used to direct the flow of visitors by cleverly making them visit the entire mall or all attraction sites when moving between floors. Also, escalators are used as publicity display banners since they are often located at the center of these buildings and seen by all tenants and visitors. Now regulated by the EN 115-1:2008 safety norm they are made safe for all riders, safety that is further enhanced by the evolution and introduction of new technology.
THE FIVE ELEVATOR SPECIFICATIONS

The main characteristics of elevators are defined by the following five main specifications:
Inclination / Step width / Speed / Level steps / Environment

INCLINATION:
The inclination of the escalators specifies the riding comfort of passengers. The maximum angle of inclination under EN 115-1:2008 is 35°, subject to the following restrictions:

- The vertical rise must not exceed 6,000 mm
- The step band speed must not exceed 0.5 m/s

Three inclination angles are available in the market.

1. 27.3° inclination. This optional angle is ideal when the escalator needs to be installed adjacent to a staircase (27.3° is the normal angle for a staircase) as it provides a good alignment between the escalator truss and the staircase.

2. 30° inclination. This popular inclination offers a good compromise between passenger comfort, safety and the overall length of the escalator and is used in both commercial and infrastructure applications.

3. 35° inclination. This angle offers the most compact and economical dimensions and is commonly used in retail applications. However the maximum rise for this inclination is 6000 mm as defined by the EN115-1:2008.
**STEP WIDTH**

The maximum and minimum permitted step widths under EN 115-1:2008 are 1100 mm and 580 mm respectively. However most of escalators producers have limited themselves to three sizes. First, the 600 mm step width, which allows only one adult passenger to stand on each step. This width should only be selected where space for an escalator is restricted and is suitable for installations where passengers will not be carrying large shopping bags. The most common step width is the 800 mm that allows one adult passenger and a small child, or one adult passenger with shopping bags or luggage (i.e. 1.5 passengers) to stand on each step. This is suitable for medium or low usage installations, such as shops. Finally, the 1,000 mm step width that allows two adult passengers to stand on each step. This step width maximizes transport capacity for high usage installations such as large department stores, shopping malls, airports and railway stations.

**LEVEL STEPS**

Horizontal (level) steps are required at each landing of an escalator to enable passengers to safely board and disembark the moving step band. They allow passengers to steady themselves and position their feet correctly on the steps before reaching the transition curve into the inclined section. When disembarking, horizontal steps allow passengers to safely step off the moving step before their feet touch the combs. Escalators must be equipped with horizontal steps on both ends. The minimum number of horizontal steps at each landing under EN 115-1:2008 is two.

Note that the vertical rise must not exceed 6000 mm. EN 115-1:2008 also specifies that the step speed must not exceed 0.5 m/s. For greater rises and step band speeds up to 0.65 m/s, three horizontal steps (1200 mm) at each landing are required. The exceptions to this rule are escalators with a step band speed in excess of 0.65 m/s. These require a minimum of four horizontal steps (1600 mm) at each landing. At nominal speeds above 0.5 m/s and not exceeding 0.65 m/s or rises above 6 m this length should be at least 1200 mm, i.e. 3 horizontal steps.

**SPEED**

The maximum permitted step band speed under EN 115-1:2008 is 0.75 m/s. However, this speed is only appropriate for high-rise, heavy-duty escalators and, as such, is not applicable to the majority of escalators. The step band speed is normally 0.5 m/s, which is permitted at any angle of inclination or vertical rise (max 35°).

This is the optimal speed for the retail environment as it combines sufficient transport capacity, optimal safety and minimum space requirements. Furthermore, it gives customers an opportunity to “window shop” from the escalator.

For heavy-duty escalators in public service environments, a step band speed of 0.65 m/s is allowed by the norm. However, it should be noted that escalators with step band speeds in excess of 0.5 m/s are subject, as per EN 115-1:2008 to the following restrictions:

- The angle of inclination must not exceed 30°
- There must be a minimum of three horizontal steps (1200 mm) at each landing
- The upper transition radius must be a minimum of 1.5

Available optional speed in the market are first 0.65 m/s which is a speed recommended for public transportation environment such as railway stations and metro station and in situations where passenger arrivals are intermittent.

Second, are the 0.75 m/s, which is usually reserved for extreme transportation situations only, such as high-rise escalators.

This speed is not recommended for two reasons:

- As the speed increases people hesitate longer before stepping onto the escalator, thus reducing the effective transport capacity.
- This speed is less comfortable for elderly passengers and children.
ENVIRONMENT

Finally, to ensure the reliability and availability of escalators over their lifetime, it is essential that their specifications match the environmental conditions. Most escalators will normally be installed indoors. They are designed for such an environment as standard. An indoor environment is defined as a weather-tight, temperature-controlled environment where the escalator will not be exposed to the elements such as rain and snow.

An outdoor environment can be either semi-outdoor or fully outdoor. Semi-outdoor is an uncontrolled environment in which the unit might be exposed at times to the elements. However, as it is covered with a roof and walls, the escalator is not directly exposed to the elements.

Fully outdoor is an uncontrolled environment where the unit will be fully exposed to the elements. Temperature therefore becomes a key consideration; heaters and/or coolers may have to be installed, depending on the climate. EN 115-1:2008 recommends that outdoor escalators are covered by a roof. This is for safety reasons. For example, passengers on a fully outdoor escalator in a downpour are likely to hold umbrellas as well as shopping trolleys/bags and therefore not the handrail, which could be dangerous.

Selection of the characteristics depends primarily on the expected number of passengers your escalator will be transporting daily. This is also known as calculating traffic capacity. The EN 115-1:2008 code indicates an average practical transport capacity rather than the previous theoretical approach. The figures are based on the step width and nominal speed of an escalator.

<table>
<thead>
<tr>
<th>NOMINAL SPEED</th>
<th>0.5 M/S</th>
<th>0.65 M/S (OPTIONAL)</th>
<th>0.75 M/S (OPTIONAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP WIDTH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 mm</td>
<td>3,600 persons/h</td>
<td>4,400 persons/h</td>
<td>4,900 persons/h</td>
</tr>
<tr>
<td>800 mm</td>
<td>4,800 persons/h</td>
<td>5,900 persons/h</td>
<td>6,600 persons/h</td>
</tr>
<tr>
<td>1000 mm</td>
<td>6,000 persons/h</td>
<td>7,300 persons/h</td>
<td>8,200 persons/h</td>
</tr>
</tbody>
</table>

When carrying out such traffic capacity calculations other important factors come into play which may influence traffic capacity:

- Every step is not likely to be 100% occupied
- In reality, many passengers leave at least one clear step between themselves and the passenger in front
- As the speed of the step band increases, step occupancy decreases, because passengers hesitate longer before boarding.

Having defined the needed step width and speed required to accommodate the expected number of users one should decide on the inclination angle of the escalators depending on the type of building.
## Typical Configurations for Commercial Units

<table>
<thead>
<tr>
<th></th>
<th>Small Retail Shops</th>
<th>Large Shopping Malls</th>
<th>Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>35° escalator</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>800 mm step width</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5 m/s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stand-by speed or Stop &amp; Go operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glass balustrade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primed sheet steel side cladding</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Large Shopping Malls</th>
<th>Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>30° escalator</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,000 mm step width</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.5 m/s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuous</td>
<td></td>
<td>Stop &amp; Go operation</td>
</tr>
<tr>
<td>Glass balustrade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customized or stainless steel side cladding</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>30° escalator</em></td>
<td></td>
</tr>
<tr>
<td>1,000 mm step width</td>
<td></td>
</tr>
<tr>
<td>0.5 m/s</td>
<td></td>
</tr>
<tr>
<td>Stop &amp; Go operation</td>
<td></td>
</tr>
<tr>
<td>Glass balustrade</td>
<td></td>
</tr>
<tr>
<td>Customized or stainless steel side cladding</td>
<td></td>
</tr>
</tbody>
</table>
Finally, the new trend is to have escalators in high-rise residential and office buildings’ lobbies. And, with the tremendous increase of building occupants, and as a result of the previously mentioned lack of space to augment the number of elevators vertical transportation experts advise the following:

Dedicate elevators to specified zones of the building (i.e. not all floors are served by all existing elevators). And, expand lobby space, because, in these buildings, more than 75% of the population will enter the building from the lobby’s floor. Lobbies are now spread over two floors (Lower GF and Upper GF) and with the use of Advanced Destination Control and Double Deck elevators, the number of needed elevators can now be reduced and the existing one made more efficient. In order to smoothly transport people between the two floors (Lower and Upper GF) architects must account for an escalator inside the lobby.

In conclusion, on many projects the escalators are installed on site long before the final opening of the premises. It is important that project owners take the necessary measures needed to protect their equipment until they are put in operation. Finally, escalators are electro-mechanical products used to carry people in a safe and smooth manner. They therefore require constant maintenance by qualified people.

FOCUS ON
Transportation Systems for Buildings
CONSTRUCTION HOISTS

This highly utilized lifting equipment increases productivity during building construction

Carlos ISSA, Technical Systems Engineer & Senior Inspector / Lifting Expert, Apave

One of the most utilized lifting equipment for construction work is the construction hoist, also known as the builder's hoists to transport persons and materials in a vertically guided cage. The main objective of using construction hoists is related to the need to increase productivity during construction of buildings. The European technical standards EN 12159-2012 defines builders hoist as a temporary lifting machine serving landing levels on sites of engineering and construction with a platform, cage or other load carrying device, which is guided. The hoist is made up of several structural, mechanical and electrical components (base frame, mast sections, mast ties, guides, counterweight, cage, landing doors, safety devices, electrical devices/panels, motors rack and pinion, etc.). Noting the different conditions that may be found on site and the progress of project, the construction hoists may be erected/dismantled and altered along the project milestones. Hazards with high risks affecting the site performance (safety of persons, condition of the hoist, etc.) are available. Thus, hoists should be erected, modified, dismantled, maintained and tested by competent people. Any modification should be based on manufacturer's instructions and in compliance with normative standards and local legislations.

Commissioning should be performed by a competent person before putting a hoist into service; periodically, after major modification or repair and following the manufacturer requirements and recommendations. The inspection and tests shall include, but not necessarily be limited to the following:

- Documentation (Manufacturer’s manual, Maintenance records, Installation records, Commissioning handover certificate, Engineers drawings for mast attachments, building ties and foundation design, Periodic and major inspection certificates, etc.
- Power sources (Cables and wiring)
- Environment
- Structure
- Access provisions
- Landings and guarding
- Car and operating and emergency controls
- Freedom of movement of the hoist, including ensuring that there are no external obstructions in the hoist’s path (visual check and a trial elevation and descent under no load)
- Safety switches and interlocks
- Placards, decals, warnings, control markings, operating manuals and logbooks
- Cleanliness, including build-up of building materials or waste under the platform
- Items specified by the management

All safety related problems need to be rectified prior to using a hoist to ensure safe and productive operations.
FOCUS ON
Transportation Systems for Buildings

مرسوم رقم 1908

تنظيم الحماية والوقاية والسلامة في البناء

التركيبة والجر

الحالة: 3

يراعى في البناء والجر ما يلي:

أ- أن تكون كل الآلة العدة تعمل أو للمواد المستعملة بثابة الصنع سليمة.

ب- يقارن المستطاع بحبس كل آلة فحصا لفية في مكانها وتقي كل

الآليات والرجل المكلف بإلائازه أو تدميره أو ضعفه على صاحب الآلة أو مستعمرا ما يبرز الكشف للجهاز المخصص في وزارة العمل عند الطلب.

ج- أن تتخذ الاحتياطات اللازمة لمنع أي شخص من الفقد أو الاقتراب من الجر

المتحرك من الآلة.

د- أن يوضع على كل آلة وفي مكان نافذة وتقوم بمراقبة جميع العمال في

الجهاز. يخلي بحث الشخص المختص زيارة آلة ما من قبل الصنع ويحرص أن تعمل أي آلة بأكثر من مساحة الصنع المحددة لما.

ه- أن تكوئ اللدائن والآليات المعدة لنقل العمل عادة ما أقفا مزودة

بآليات يحكم إغلاقها طوال فترة تتحركها.

و- أن تكون السلسلة والسلاسل الجر والرفع والجر والحمل وما شابهها جيدة الصنع

والتحمل بأكثر من حجامها

ز- لا يجوز زرع أو نزل أو حمل أي شخص بواسطة جهاز رفع أو نقل يمكن مصنعها

ومركبها ومستخدمها هذه القاعة. وتسنح من ذلك الحالات الطارئة التي يحتوي فيها حوادث اصابات خاصة خطيرة أو وفيات ويكون فيها استعمال الجهاز

الرفع مسمو وتحت إشراف المهندس المحترم.

الحالة: 9

مع مراعاة الإجراءات القانونية المعمول بها في الإجراءات المتعلقة بتحديد الشروط الفنية

والوقائية الخاصة بمراقبة السلامة العامة في تجهيزات المصعد يجب أن

يكون كل معدة أو مصعد متين التركيب من الهجاء الميكانيكية ولا تقص

بها الحالة الطارئة. يرمي لنا أنتفع إذا وقف الكابين عند قنوات

اللباب. كما يجب أن لا تتحرك المصعد إلا عند فتح الطابق.

يجرب أن يوضع على كل معدة،رغم أن يكونها جاهزة للتفريغ، في حالة الطوارئ. وإذا ربطت بوسيلة

تعودية وفعالة وسيلة للاستغلال. في حالة توقف المصعد يجب أن

تكون هناك صيانة دورية للمعدة من قبل شركة متخصصة في المصعد.
Since its foundation in 1995, Apave Liban’s mission has been to control risk in different and various technical fields, mainly related to construction, industry, transportation and infrastructure. This includes essential systems used in modern constructions, the buildings transportation systems such as elevators, escalators and moving walks.

Whether it is a residential or commercial application, people depend on the safe and reliable operations of transportation systems. Especially, elevators are of critical importance to the owners and ultimately to the tenants, guests or visitors who travel throughout residences and buildings every day. The design, construction, installation and maintenance of elevators, escalators and moving walks are subject to many legislations and standards. In Lebanon, the commonly adopted are the European standards. One of the most important aims is to set the mandatory safety rules related to transportation systems, with a view to safeguarding persons against the risk of accidents associated with the installation, use and maintenance of such systems.
Examination, inspection and preventative maintenance of elevators, escalators and moving walks are critical to ensure that they are correctly installed, then inspected and maintained in order to achieve longevity, reliability and safety.

**APAVE ELEVATOR INSPECTION MISSION**

Apave offers two classic inspection missions, the “Examination and tests of elevators before putting into service” and the “Periodic inspection of in service elevators”.

“Examination and tests before putting into service” are described in the European standard EN 81-1 Normative Annex D and in the recent standard EN 81-20 paragraph 6.3. Accordingly, the examination and tests focus on elevator braking system, electric installation, traction, safety gears, buffers, over speed protection, leveling accuracy, protection against unintended car movement and protection against falling.

“Periodic inspection of in service elevators” is conducted according to a pre-established methodology and using an exhaustive checklist of around 75 items covering all elevators’ important components. For each item in the checklist the methodology defines the type of verification that should be done. Periodic inspections shall be implemented every year for high-rise buildings and every five years for other buildings.

All inspections should be done within strict consideration of safety rules and guidelines. Inspections involve several items located at hazardous locations such as the top of the car, inside hoistway, in the pit and in the machine room.

All owners of elevators are responsible for the safe operation of an elevator, as are facilities managers or supervisors. They should ensure that an elevator is properly inspected and that it is safe to use. Apave’s team of qualified elevator inspectors offers a reliable service to ensure safety and adherence to specifications.
Apave news
at a glance...

Projects on the run
Christmas is all about the joy of giving! So, for a second consecutive year, the Apave team decided to put joy into the hearts of those who need it the most, through two social activities:

WITH CHILDREN

Apave teamed up with “Smile in a box”, an initiative that aims to draw a smile on the face of children in need through small, yet meaningful, gift boxes to help them celebrate Christmas with a smile. The Apave team filled more than 30 boxes with clothes and accessories, toys, school items, hygiene items and food related items. The boxes were distributed to boys and girls, between 3-12 years old, all around Lebanon, by the “Smile in a Box” team.

@SmileinaboxLB

WITH FAMILIES

Basic necessities of everyday life such as heating equipment, blankets, pajamas, carpets, and hygiene products, were provided to seven families by the Apave team who visited them to delivered the gifts and wish them all a joyful Christmas.
PROJECTS ON THE RUN

Periodic verification chairlift and ski lifts at Mzaar Ski resort and the Cedars

- Examination of equipment’s state of conservation and its components. This investigation is subject to visual examinations, on parts normally accessible without disassembly.
- Testing to verify the equipment’s operation and the effectiveness of devices contributing to the safety of users (tests under load, tests of the brakes).
- Examination of the sustainable state of conformity limited to provisions, which determine safety, set by the profession’s specifications.
- Existence and state of the instructions or indications made necessary.
- Examinations and tests carried out are those that can be carried out without dismantling, and using permanent or specially arranged, appropriate and in good condition accesses. They are carried out in the configuration(s) presented or, if necessary, specified by the employer for the intended use.
- Visual check of the cable for the chairlift and ski lifts.
PROJECTS ON THE RUN

Advanced NDT inspection - PAUT/TOFD inspection on pipeline

Apave’s qualified and experienced team use suitably calibrated equipment to conduct Advanced NDT Inspection, performing automated ultrasonic testing, using PAUT (Phased Array Ultrasonic Testing) and TOFD (Time of Flight Diffraction) methods of inspection on welds pipeline at the premises of TOTAL Lebanon.
REGULATORY WATCH BY APAVE

Stay informed on the latest standards and regulations with Apave

New draft of ISO 50001 energy management standard -

Using energy efficiently helps organizations save money as well as helping to conserve resources and tackle climate change. ISO 50001 supports organizations in all sectors to use energy more efficiently, through the development of an energy management system (EnMS).

Like all International Standards, ISO 50001 has come under periodic review to ensure that it continues to meet the rapidly changing needs of the energy sector. This work is being carried out by the ISO technical committee responsible for energy management and energy savings (ISO/TC 301), whose secretariat is held by American National Standards Institute (ANSI), ISO’s member for the USA, in a twinning arrangement with the ISO member for China, Standardization Administration of the People’s Republic of China (SAC).

The Draft International Standard ISO/DIS 50001 was approved in November 2017, and the new version of ISO 50001 is expected to be published in 2018.

ISO 30500, Non-sewered sanitation systems

Prefabricated integrated treatment units – General safety and performance requirements for design and testing

In many places around the world, rural and urban populations have to use toilets that aren’t connected to mains sewers. In many cases, city planners are working hard to address this by investing in infrastructures. But, for millions of people, non-sewered systems are the only option and with waterborne diseases posing major risks to human health, it’s important to get it right.

The ISO 30500 standard seeks to provide general safety and performance requirements for the product design and performance testing of non-sewered sanitation systems for prefabricated integrated treatment units. It will apply to any integrated sanitation system that is not attached to a sewer.

Source: www.iso.org
Announcements

TRAINING CALENDAR
## Upcoming Apave trainings

### 2018

## SAFETY TRAINING

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
<th>MONTH</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health &amp; Safety on Site: Accident Investigation</td>
<td>2 half days</td>
<td>January</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Authorization Certificate for Electrical Safety of Personnel</td>
<td>2 full days</td>
<td>January</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Health &amp; Safety Risk Assessment</td>
<td>2 half days</td>
<td>February</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>NEBOSH: International General Certificate</td>
<td>10 full days</td>
<td>April</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>Working at Height</td>
<td>2 half days</td>
<td>March</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Health &amp; Safety on Site: Control of Temporary Works hazards IOSH</td>
<td>2 full days</td>
<td>March</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Managing Safely</td>
<td>3 full days</td>
<td>April</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Health &amp; Safety on Site: Musculoskeletal Hazards &amp; Risk Controls</td>
<td>2 half days</td>
<td>May</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Lightning Protection Systems</td>
<td>1 full day</td>
<td>May</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>Fire Safety in Buildings – Decree # 7964</td>
<td>3 full days</td>
<td>June</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Health &amp; Safety on Site: Work Equipment Hazards &amp; Risk Controls</td>
<td>2 half days</td>
<td>June</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Managing Lifting Operations: Authorization for Riggers - Level 1</td>
<td>2 half days</td>
<td>June</td>
<td>25</td>
<td>26</td>
</tr>
<tr>
<td>Low Voltage: Protection and Implementation</td>
<td>2 half days</td>
<td>June</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>ISM –ATEX (Level 1)</td>
<td>2 half days</td>
<td>July</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Implementation of Occupational Health &amp; Safety Assessment Series OHSAS 18001:2007</td>
<td>3 half days</td>
<td>August</td>
<td>7</td>
<td>9</td>
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<tr>
<td>Low Voltage: Grounding and Special Installations</td>
<td>2 half days</td>
<td>August</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Low Voltage Electrical Equipment and Cable Sizing</td>
<td>2 half days</td>
<td>Septembre</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Scaffoldings Types, Materials &amp; Drawings</td>
<td>2 half days</td>
<td>Septembre</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Scaffoldings General Stability &amp; Assembly</td>
<td>2 half days</td>
<td>October</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Intervention in confined spaces</td>
<td>2 half days</td>
<td>October</td>
<td>17</td>
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<tr>
<td>Managing Lifting Operations: Authorization for Riggers - Level 2</td>
<td>3 half days</td>
<td>October</td>
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<tr>
<td>On Site Activity for Scaffolding Erection &amp; Inspection</td>
<td>2 half days</td>
<td>November</td>
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<tr>
<td>Introduction to Lashing</td>
<td>2 half day</td>
<td>Novembre</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>ISM –ATEX (Level 2)</td>
<td>3 half days</td>
<td>November</td>
<td>14</td>
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</tbody>
</table>
## CONSTRUCTION TRAININGS

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
<th>MONTH</th>
<th>FROM</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Managing Quality in Construction Projects</td>
<td>2 half days</td>
<td>Janvier</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Building Services and Fire Protection Systems</td>
<td>3 half days</td>
<td>April</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Facility Maintenance and Management</td>
<td>3 half days</td>
<td>May</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>Vertical Transportation System (Elevators)</td>
<td>3 half days</td>
<td>July</td>
<td>17</td>
<td>18</td>
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<tr>
<td>Gaz Combustibles – Installation dans les Bâtiments</td>
<td>2 half days</td>
<td>November</td>
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## SUSTAINABILITY TRAININGS

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
<th>MONTH</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Buildings</td>
<td>2 full days</td>
<td>February</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Renewable Energies</td>
<td>3 half days</td>
<td>March</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Energy Management Systems ISO 50001:2011</td>
<td>3 half days</td>
<td>May</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Operation and Maintenance of Waste Water Treatment Plants</td>
<td>3 half days</td>
<td>July</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Environmental Management Systems ISO 14001:2015</td>
<td>2 half days</td>
<td>August</td>
<td>29</td>
<td>30</td>
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<tr>
<td>Energy Efficiency in Buildings</td>
<td>3 half days</td>
<td>Septembre</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
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## MANAGEMENT TRAININGS

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
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<th>FROM</th>
<th>TO</th>
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<tbody>
<tr>
<td>Implementation of Quality Management Systems ISO 9001:2015</td>
<td>3 half days</td>
<td>March</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Human Resources Management: Workforce Planning</td>
<td>2 half days</td>
<td>May</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Implementation of Corporate Social Responsibility (CSR)</td>
<td>2 half days</td>
<td>May</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Human Resources Management: Recruitment Process</td>
<td>2 half days</td>
<td>June</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Human Resources Management: Training &amp; Development</td>
<td>2 half days</td>
<td>July</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Introduction to Project Management</td>
<td>2 half days</td>
<td>August</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Human Resources Management: Performance Appraisal</td>
<td>2 half days</td>
<td>September</td>
<td>17</td>
<td>18</td>
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<tr>
<td>Quality in Hospitals</td>
<td>1 half day</td>
<td>September</td>
<td>20</td>
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<tr>
<td>Customer Relationship Management</td>
<td>3 half days</td>
<td>October</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>Contracts Management using FIDIC Suite of Contracts</td>
<td>3 full days</td>
<td>November</td>
<td>7</td>
<td>9</td>
</tr>
</tbody>
</table>
## FOOD SAFETY TRAININGS

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
<th>MONTH</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Safety Management Systems ISO 22000:2005</td>
<td>3 half days</td>
<td>February</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Basic &amp; Intermediate Food Safety</td>
<td>1 half day</td>
<td>June</td>
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<tr>
<td>HACCP Methodology</td>
<td>1 full day</td>
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## SOFT SKILLS TRAININGS

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
<th>MONTH</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation &amp; Communication Skills</td>
<td>3 half days</td>
<td>February</td>
<td>20</td>
<td>22</td>
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<tr>
<td>Time Management</td>
<td>2 half days</td>
<td>April</td>
<td>11</td>
<td>12</td>
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<tr>
<td>Business Etiquette</td>
<td>2 full days</td>
<td>May</td>
<td>23</td>
<td>24</td>
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<tr>
<td>Building &amp; Implementing Effective Strategy</td>
<td>3 half days</td>
<td>July</td>
<td>10</td>
<td>12</td>
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<tr>
<td>Conflict Management</td>
<td>3 half days</td>
<td>July</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Management Skills</td>
<td>2 full days</td>
<td>Septembre</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>Leadership</td>
<td>3 half days</td>
<td>November</td>
<td>27</td>
<td>29</td>
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</table>

## UPCOMING AFNOR MIDDLE EAST TRAININGS

<table>
<thead>
<tr>
<th>COURSE TITLE</th>
<th>DURATION (DAYS)</th>
<th>MONTH</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 9001: 2015 Auditor / Lead Auditor Trainings</td>
<td>5 days</td>
<td>January</td>
<td>15</td>
<td>19</td>
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<tr>
<td>Course IRCA Certified</td>
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<tr>
<td>Internal Audit For Quality Management Systems ISO 9001:2015</td>
<td>2 days</td>
<td>February</td>
<td>13</td>
<td>14</td>
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<tr>
<td>The ISO 22000:2005 Management Systems Auditor</td>
<td>5 days</td>
<td>March</td>
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<td>23</td>
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<tr>
<td>Lead Auditor Training Course IRCA Lead Auditor</td>
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<td>5 days</td>
<td>May</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Course IRCA Certified</td>
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<tr>
<td>The OHSAS Management Systems Auditor Lead</td>
<td>3 days</td>
<td>September</td>
<td>3</td>
<td>5</td>
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<tr>
<td>Auditor Conversion Training Course</td>
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<td></td>
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<tr>
<td>Internal Audit For Quality Management Systems ISO 9001:2015</td>
<td>2 days</td>
<td>October</td>
<td>25</td>
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<tr>
<td>The ISO 14001:2015 Management Systems Auditor</td>
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<td>14</td>
<td>16</td>
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<tr>
<td>Lead Auditor Conversion Training Course</td>
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</tr>
</tbody>
</table>
May all your dreams be built in 2018.
IT'S A GO!

apave

THE UNDISPUTED #1
TECHNICAL CONTROL OFFICE IN LEBANON

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Tel: +961 1283 072 | +961 1295 010
info@apaveliban.com

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APA 1867-2017
A MATTER OF CONFIDENCE