CES 651

Compulsory Ethiopian Standard

second Edition
2026

Parking facilities-building parking-requirement

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Foreword

This Ethiopian Standard has been prepared by the Technical Committee for Building Structures and Elements of Buildings (TC 42) approved by the National Standardization Council and published by the Institute of Ethiopian Standards (IES).

In preparing the working draft, relevant technical information source documents including recommendations based on research findings have been presented to IES by the Addis Ababa City Government Transport Programs Management Office (TPMO).

Acknowledgement is made to TPMO for its efficient and effective collaboration with IES and for its unreserved effort in achieving the desired outcome, developing this standard.

Introduction

All standards are subject to revision and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Institute of Ethiopian Standards (IES).

This Ethiopian Standard has been prepared by the Technical Committee f or Road Vehicles (TC 54) and has been approved by the National Standardization Council and published by the Institute of Ethiopian Standards (IES)

The working draft and related source documents have been developed in collaboration with Addis A baba City Government Transport Programs Management Office (TPMO) and submitted to IES.

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Parking facilities- building parking - Requirements

1. Scope

This Ethiopian Standard specifies minimum requirements for design, efficiency, quality, safety, accessibility, reliability and provision of sustainable service of parking building for 85th percentile vehicle size (4.7 m X1.9 m) of light duty vehicles.

2. Normative references

The following Ethiopian Standards contain provisions, which through reference in the text constitute provisions of this Ethiopian Standard. At the time of publication, the editions indicated were valid.

ES EN 1990, Conformity to Basics of structural design

ES EN 1997-1:2015 and ES EN 1997-1-2, Conformity to Geotechnical design

ES EN 1991-1-1, ES EN 1991-1-2, ES EN 1991-1-3, ES EN 1991-1-4, ES EN 1991-1-5, ES EN 1991-1-6, ES EN 1991-1-7, Conformity to actions on structure from part 1-7.

ES EN 1992-1-1, ES EN 1992-1-2, Conformity to Design of concrete structures

ES EN 1993-1-1:2015, ES EN 1993-1-3, Conformity to Design of steel structures

ES EN 1994-1-1, Conformity to Design of composite steel and concrete structures

ES EN 1996-1-1:2015, ES EN 1996-1-2Conformity to Design of masonry structures

ES EN 1995-1-1, Conformity to Design of timber structures

ES EN 1998-1-1, Conformity to Design of structures for earthquake resistance

ES 3965, Conformity to Design Occupational health and safety

ES 3962, Mechanical ventilation and air conditioning in buildings

ES 3961, Ethiopian Building Code Standard for electrical works

ES 3964, Fire precaution during building construction design work

ES 3960, Conformity to Plumbing services of buildings with

ES 1511: 2005 (R2014) lifts and service lifts. Specification for eyebolts for lift suspension

ES 1512:2005 (R2014) lifts and service lifts. Specification for guide rails

ES 3090:2006 (R2014) safety rules for the construction and installation of escalators and passenger conveyors. Part 1. Specification and proformas for test and examination of new installations

ES 3158:2006 (R2014), safety rules for the construction and installation of lifts - part 1: electric lifts

ES 3159:2006 (R2014) safety rules for the construction and installation of lifts – part 3: electric and hydraulic service lifts

ES 3160:2006(R 2012) safety rules for the construction and installation of escalators and passenger conveyors

ES 3641:2006(R 2012) mobile elevating work platforms — design calculations — stability criteria — construction — safety examinations and tests

ES ISO 4344:2007(R2014) steel wire ropes for lifts - minimum requirements

ES ISO 4190-1:2014 lift (elevator) installation – part 1: class i, ii, iii and vi

lifts ES ISO 4101:2007(R2014) drawn steel wire for elevator ropes -

specifications ES ISO 4190-2:2015 Lift (US: Elevator) installation—Part 2:

Class IV lifts

ES ISO 4190-5:2015Lift (Elevator) installation — Part 5: Control devices, signals and additional fittings

ES ISO 22199:2015 Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Emission

ES ISO 22200:2015Electromagnetic compatibility — Product family standard for lifts, escalators and moving walks — Immunity

ES ISO 22201-2:2015Lifts (elevators), escalators and moving walks — Programmable electronic systems in safety related applications —

Part 2: Escalators and moving walks (PESSRAE)

ES ISO 22559-1:2015Safety requirements for lifts (elevators) —Part 1 : Global essential safety requirements (GESRs)

ES ISO 25745-2:2015Energy performance of lifts, escalators and moving walks — Part 2: Energy calculation and classification for lifts (elevators)

Es xxx Traffic sign and marking typeface

ES xxx Pump standards.

3. Terms and definitions

For the purpose of this Ethiopian standard the following terms and definition shall apply

3.1. Light duty vehicle
any motorized vehicles whose size is not more than 5.3 X 2.36 X 2.083 meter.

3.2. Parking building

3.3. Parking bay
a space (parking space) designated for the parking of one motor vehicle.

3.4. Parking area
an area set aside or designated for the parking of three or more motor vehicles.

3.5. Ramps
3.6. Bay
3.7. Base dimension
3.8. Aisle
3.9. Vehicle lift
3.10. Sub-structure components
3.11. super structure components
3.12. Functional components
3.13. Structural components
3.14. Vertical circulation: means stair, lifts, ramps escalators etc.

4. General requirements

4.1. Parking building shall have clearly defined boundary.

4.2. Parking building vertical circulation systems shall make use of ramp or lifting mechanism.

4.3. Parking building shall be built to serve for a minimum of 50 years.

4.4. Functional and structural components of parking building shall be designed with careful consideration for safety, security, ease of accessibility, reliability, durability, stability, maintainability, aesthetic, environmental- friendly and service efficiency.

4.5. Parking building shall be safe, secure, attractive, comfortable and accessible for all users and operators including children, elderly and persons with disabilities.

4.6. Parking building entrance shall be accessible without backing into or otherwise re-entering a public right-of-way.

4.7. There shall not be any obstruction that can affect safety of vehicles at the entrance, exit and circulation area of the parking building.

4.8. Parking building shall be free of obstacle which causes hindrance to visibility at its

entrance, exit and circulation area.

4.9. Parking bay shall be accessible for persons with disability.

4.10. Parking building layouts shall consider safe pas sage for emergency situation.

4.11. Parking building structural and non -structural components shall not affect visibility and operation.

4.12. Parking building shall be clean, neat and have proper drainage system.

4.13. Parking building shall have ventilation system.

4.14. Parking building shall have proper water supply and sanitary utility systems.

4.15. Parking building shall have appropriate power supply for all loads and illumination level throughout parking building facilities.

4.16. Parking building area shall be entertaining and maintain natural greenness.

4.17. Parking building shall have a system of traceability including identifying user's vehicle by their parking bay.

4.18. Parking building shall have efficient system for fee collection.

4.19. Clear and visible parking signage and markings shall be installed.

4.20. Parking building adjoining designated Property shall have architecturally treated decorative fence wall.

4.21. Parking building area shall have fire protection system.

4.22. Parking building shall have appropriate management with effective communication, monitoring and controlling systems.

4.23. Parking building shall comply with Electromagnet Compatibility (EMC).

5. Design consideration

5.1. Structural and geotechnical Design of parking building shall fulfill the following:

5.1.1. Conformity to Basics of structural design with ES EN 1990:2015

5.1.2. Conformity to Geotechnical design with ES EN 1997-1:2015 and ES EN 1997-1-2:2015

5.1.3. Conformity to actions on structure from part 1-7 with ES EN 1991-1- 1:2015, ES EN 1991-1-2:2015, ES EN 1991-1-3:2015, ES EN 1991-1-4:2015,

5.1.4. ES EN 1991-1-5:2015, ES EN 1991-1-6:2015, ES EN 1991-1-7:2015.

5.1.5. Conformity to Design of concrete structures with ES EN 1 992-1- 1:2015, ES EN 1992-1-2:2015

5.1.6. Conformity to Design of st eel structures with E S E N 1993 -1-1:2015, ES EN

1993-1-3:2015

5.1.7. Conformity to Design of composite steel and concrete structures with ES EN 1994-1-1:2015

5.1.8. Conformity t o Design of masonry structures with ES EN 1 996-1- 1:2015, ES EN 1996-1-2:2015

5.1.9. Conformity to Design of timber structures with ES EN 1995-1-1:2015

5.1.10. Conformity to Design of structures for earthquake resistance with ES EN 1998-1-1:2015

5.1.11. A minimum clear internal column spacing of 7m.

5.2. Architectural design

5.2.1. Large parking buildings shall have separate entrance and exit.

5.2.2. Entrance/exit shall have a clear line of sight.

5.2.3. Minimum di stance o f entry/exits from corner intersection shall be 30 meter.

5.2.4. Parking building shall provide pedestrian walkway adjacent to entry/exit lanes.

5.2.5. Entrance/exit areas that have parking control equipment shall have a maximum of 3% slope.

5.2.6. Each Parking building bay shall have parking bumper blocks of steel reinforced, so lid plastic or other equivalent materials and 1. 83 meter in length.

5.3. Ramp

5.3.1. Slope of Parking building ramps shall not exceed 6.67%

5.3.2. Minimum single lane width of internal parking building straight ramp between pillars or walls shall be 3 m.

5.3.3. Minimum width of internal par king building straight ramp between pillars or walls shall be six meter for double lane.

5.3.4. Minimum inner radius of par king building spiral ramp limit shall be five meter

5.3.5. Minimum single lane width of internal parking building spiral ramp between pillars or walls shall be 4.2 m

5.3.6. Minimum double lane width of internal par king building spiral ramp between pillars or walls shall be 8.4 m with physical median divider and 6.9

m with no physical median divider.

5.3.7. A minimum length of 3.6m transition curves between straight and curved ramps shall be provided

5.3.8. Continuous spiral ramps shall not exceed 4 stories.

5.3.9. Separate vertical circulation system for people shall be available in building parking.

5.3.10. Parking building area shall include security guard post, toilets and related facilities.

5.3.11. Parking building shall have a minimum head room of 2.5 meter

5.3.12. A single parking bay width for persons with disabilities within par king building shall be a minimum of 3.3m.

5.3.13. Parking bay s provision and accessibility to per sons with disabilities within parking building shall be as specified in Table 1 below.

Table 1 Parking bay requirements for persons with disabilities

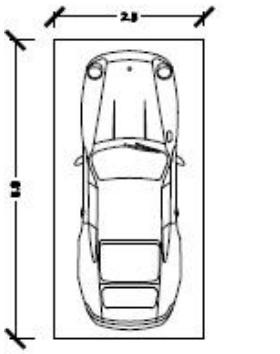
Total No. of Car Parking bay	Required No. of Accessible Car Parking bay
1-50	1
51-150	2
151-250	3
251-350	4
351-450	5
Above 450	6

5.3.14. Parking bays for persons with di sabilities shall be located on ground floor

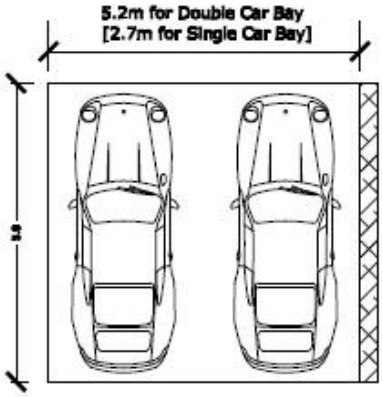
5.3.15. The layout of parking building shall fulfill the following: Table 2: parking bay size

Obstruction	Single car bay (LXW) minimum size	Double car bay (L X W) minimum size
No	5.0x2.5	-
One side	5.0X2.8	5.0X 5.2
Both side	5.0X3.1	5.0X 5.7

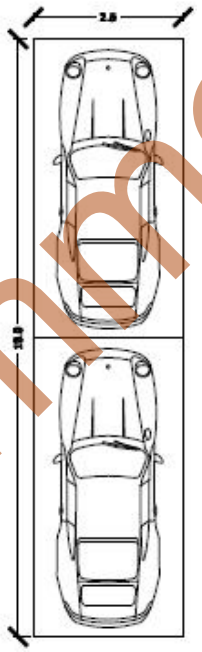
Note: Any large element above 170m m such as columns, walls or ducts constitutes an obstruction.



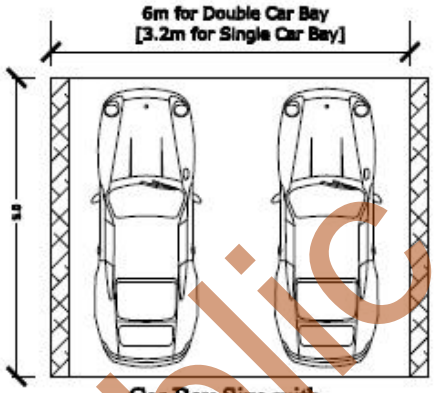
Car Bay Size without obstruction to either side



Car Bay Size with obstruction on one side



Car Bay Size for Parallel Parking



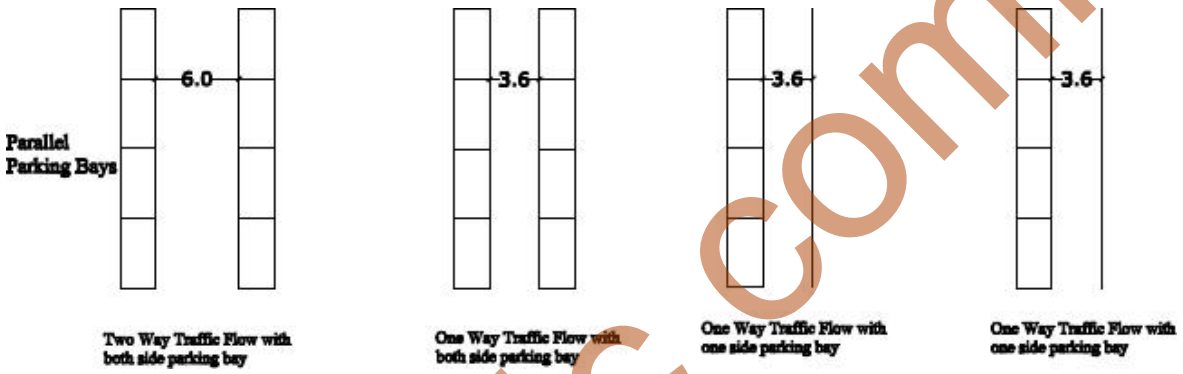
Car Bay Size with obstruction on both side

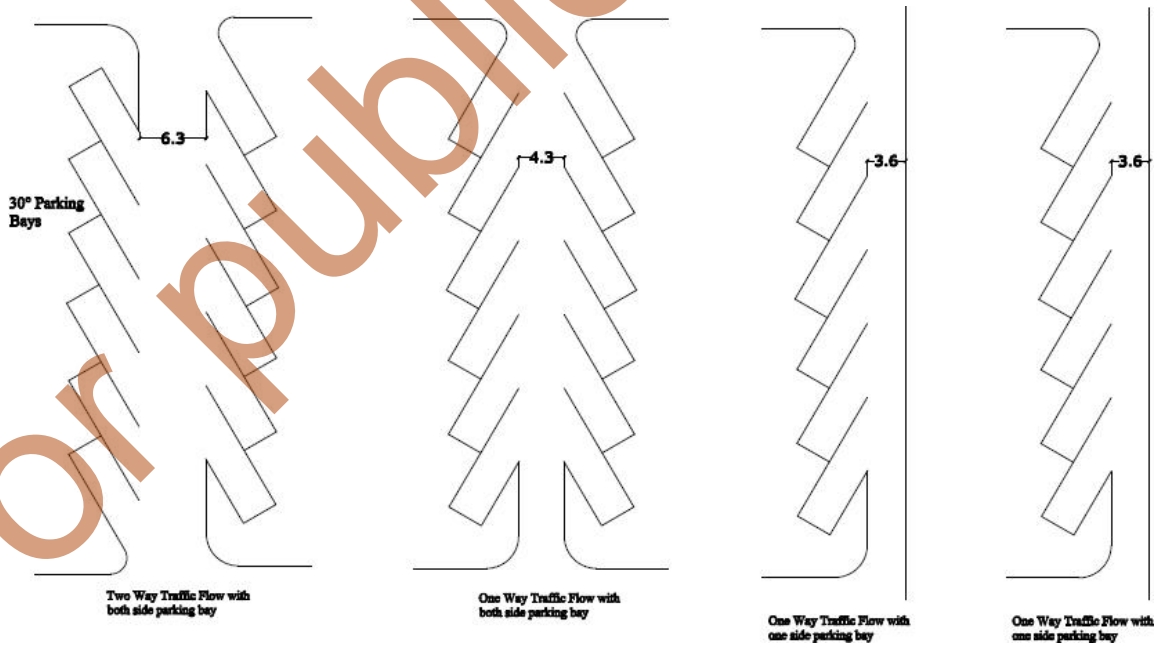
5.3.16. Parking building aisle width shall fulfill the following:

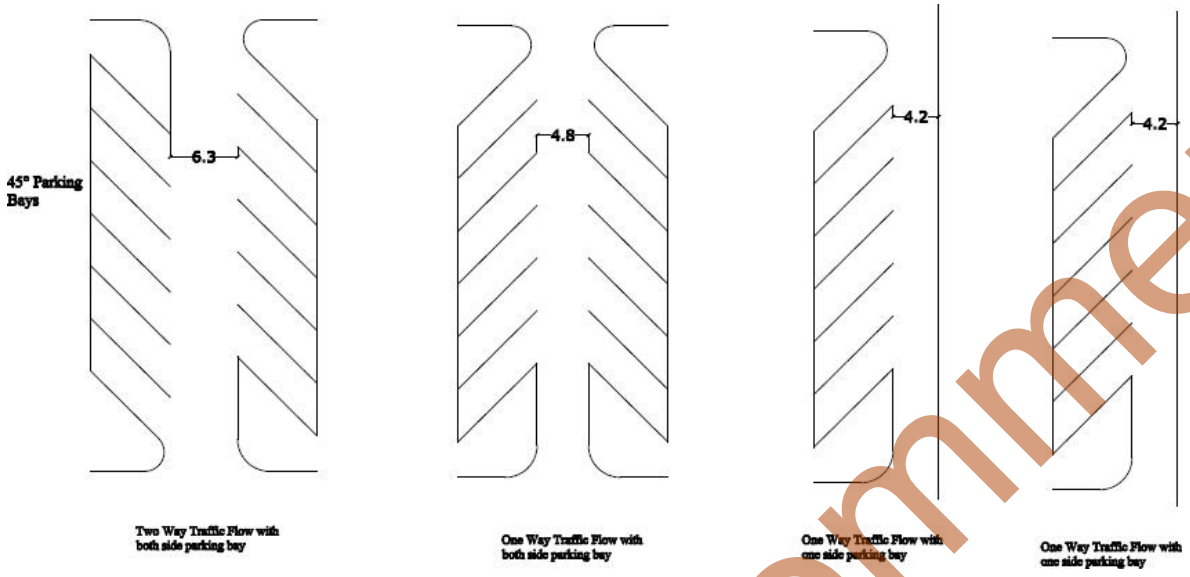
Table 3 Internal building parking aisle minimum width

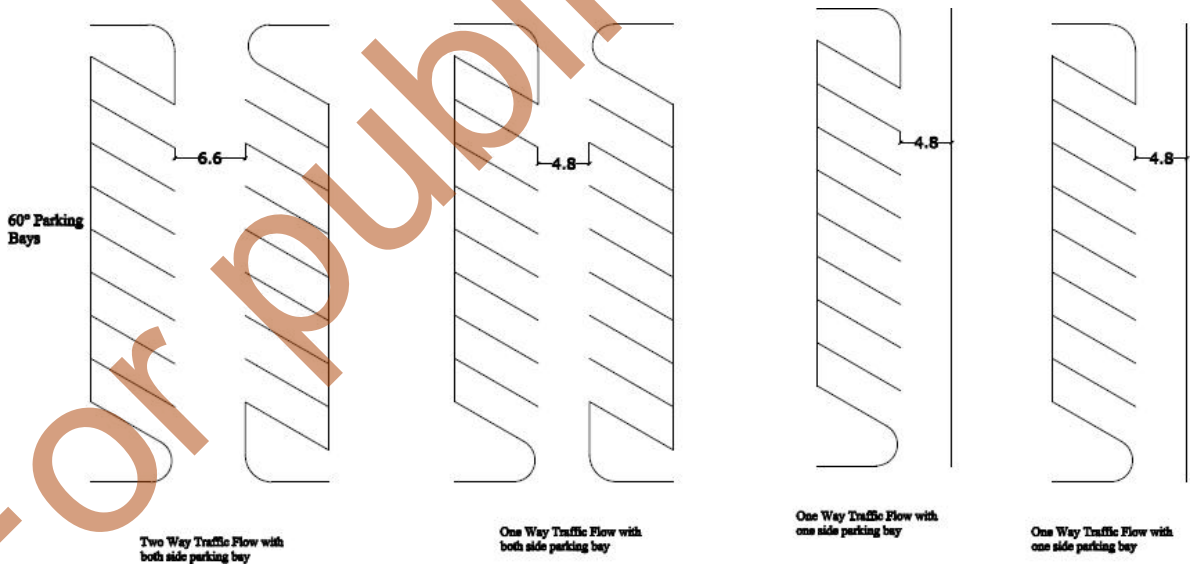
Parked driveway side	Traffic f low direction	Parking an gle (Degree)	Aisle Width(m)
Bays on Both side	One way	Parallel	3.6
		30	4.2
		45	4.8
		60	4.8
		90	6.0
	Two way	Parallel	6.0
		30	6.3
		45	6.3
		60	6.6
		90	6.6

Bays on one side	One way	Parallel	3.6
		30	3.6
		45	4.2
		60	4.8
		90	6.0
	Two way	Parallel	6.0
		30	6.3
		45	6.3
		60	6.6
		90	6.6









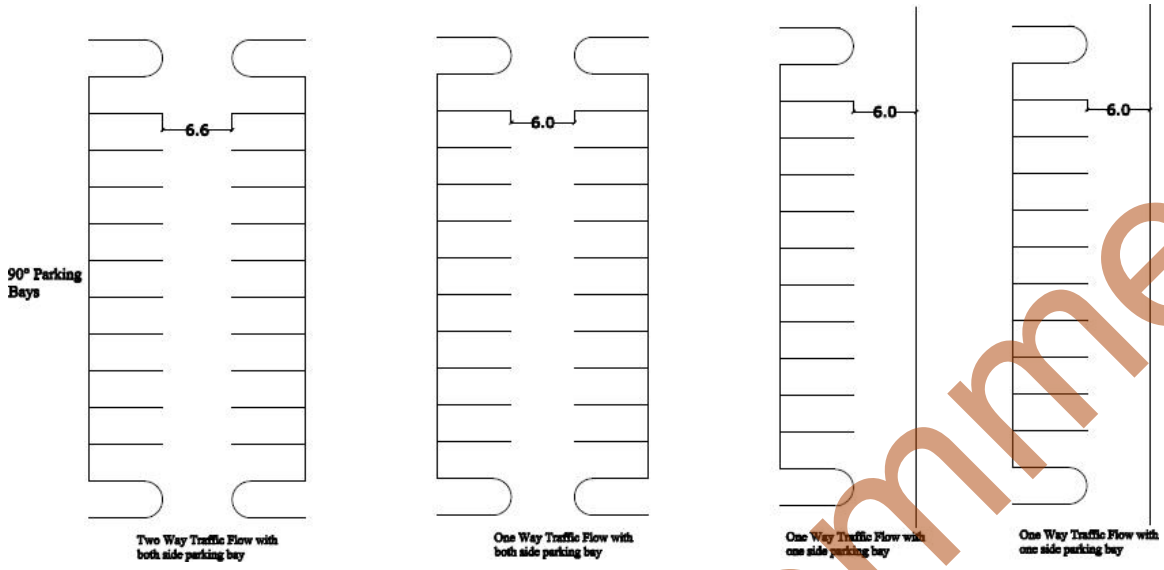


Figure 1 building parking internal layout

6. Safety

6.1.1. Conformity to Design Occupational health and safety with ES 3965:2015

6.1.2. Parking building shall provide accessible emergency exit

6.1.3. Drivers alerting mechanism of incoming vehicles shall be provided for two directional flow curved ramps.

6.1.4. Conformity to Fire precaution during building construction design work and use with ES 3964:2015

6.1.5. Fire protection system shall be installed to address every parking bays and facilities inside parking building.

6.1.6. Shall have emergency alarm system together with a buzzer.

6.1.7. Protective structural walls shall be provided where it is necessary.

7. Facilities

7.1. Ventilation and Mechanical system design of parking buildings hall full fill the following requirements:

7.1.1. Mechanical ventilation and air conditioning shall conform to Ethiopian standard f or Mechanical ventilation and air conditioning in buildings, ES 3962:2015..

7.1.2. Electro mechanical ventilation shall be provided for underground parking levels to control car emissions.

7.1.3. Proper natural ventilation shall be ensured for stories above the ground level.

7.1.4. Building par king lift and escalator design, safety, installation, performance and control shall conform to the corresponding Ethiopian standards.

7.1.5. Building parking shall ensure car lifting mechanisms for malfunctioned vehicles that is capable of lifting down the car to the specified location.

7.1.6. Building parking that use ramps shall have car lifting mechanisms for malfunctioned vehicles that is capable of lifting down the car to the specified location.

7.1.7. Lifting mechanism shall be installed in building parking when there are no ramps which is capable of lifting the cars to the available building circulation area.

7.1.8. Lift motors shall be of A.C geared motor or other equivalent. AC Servo motor and/ or Steeper motor shall use for controlling mechanisms conform to the corresponding Ethiopian standards.

7.2. Security of parking building shall full fill the following requirements:

7.2.1. Parking building a rea security operation shall be assisted with surveillance system.

7.2.2. Parking building shall use barrier gate at the entry and exit of the vehicle.

7.3. Lighting and Electrical of parking building shall full fill the following requirements:

7.3.1. Power shall be of three phases in accordance with the Ethiopian Building Code Standard for electrical works ES 3961:2015, with backup diesel generator and should use solar cells where needed.

7.3.2. All parking building area shall be provided with a minimum illumination level as specified in the corresponding Ethiopian standard for Electrical work, ES 3961:2015.

7.3.3. Parking building area shall use energy efficient lighting.

7.3.4. Parking building s hall use appropriate electric cabling specified in accordance with the Ethiopian Building Code Standard for electrical works ES 3961:2015.

7.3.5. Parking building shall use appropriate electric protective devices and earthing systems specified in accordance with the Ethiopian Building Code Standard for electrical works ES 3961:2015.

7.3.6. Parking building shall use luminaries specified in accordance with the Ethiopian Building Code Standard for electrical works ES 3961:2015.

7.4. Controlling and monitoring of parking building s hall full fill the following requirements:

7.4.1. Parking building shall have car bay detecting systems.

7.4.2. There shall be a monitoring system o f a Parking building that is operated and centrally managed.

7.4.3. Toll collection area should be positioned in t he entry and exit of parking building facilities and be well illuminated.

7.4.4. Parking building payment system ca n be in t he form o f credit card, prepaid card, contactless card, coin/note, ticketing or other appropriate technology.

7.5. Communication system of parking building shall full fill the following requirements:

a) Parking building shall have intercom system.

7.6. Fire protection of parking building s hall full f ill the following requirements:

7.6.1. Parking building shall confirm with Ethiopian standard, Fire precaution during building construction design work and use, ES 3964:2015.

7.6.2. Materials which may be able to cause fire incident shall not be allowed near and in the parking building area.

7.7. Water supply, sanitary and drainage system design.

7.7.1. Conformity to Plumbing services of buildings with ES 3960:2015.

7.7.2. Underground basement catchment shall be totally segregated from the surface water catchment.

7.7.3. Drainage pumps for underground basements shall be installed in accordance with the requirement of Ethiopian standard for pump.

7.7.4. Drainage mechanisms shall effectively discharge to end points.

7.8. Signage and Marking

7.8.1. Ramp walls shall be painted with different color on different levels.

7.8.2. Parking building facility shall have illuminated signs.

7.8.3. Parking building facility shall have large entry and exit illuminated signs written in English and Amharic.

7.8.4. Parking building facility shall have vehicular and pedestrian signs written in English and Amharic.

7.8.5. Height clearance bar shall be used for all par king structures and located at the facility entrance.

7.8.6. Information about direction and location within the par king building shall be displayed to drivers.

7.8.7. Traffic sign and Marking material shall be according to Es xxxx.

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INSTITUTE OF ETHIOPIAN STANDARDS

Organization and Objectives

The Institute of Ethiopian Standards (IES) is the national standards body of Ethiopia. IES is re-named by the proclamation number 1263/2021, from Ethiopian Standards Agency (ESA) to Institute of Ethiopian standards, with the mandate given by the regulation Number, 193/2010 and proclamation number, 1263/2021.

IES's objectives are:

- Develop Ethiopian standards and establish a system that enable to check whether goods and service are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.
- Conduct standards related research and provide training and technical support.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational and research institutes, governmental organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.

Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices). A catalogue of Ethiopian Standards is also available freely and can be accessed from our website.

 International Involvement IES, representing Ethiopia, is a member of the International Organization for Standardization (ISO), International Electro-technical Commission (IEC) and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

For More Information?

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