سازمان نظام صنفی رایانه ای کشور

نظام ممیزی و رتبه بندی مراکزداده

وزارت ارتباطات و فناوری اطلاعات
سازمان فناوری اطلاعات ایران

Overview
Of
ISO/IEC TS 22237

Information Technology
Data Center Facilities and infrastructures

آبان ۱۴۰۰

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شکراله قدیانی

رئیس کمیته تدوین معیارهای ممیزی مراکزداده

ممیز تائید صلاحیت شده نظام ممیزی و رتبه بندی مراکز داده

مدیرعامل

TEKDATA

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آبان ۱۴۰۰

- The International Organization for Standardization (ISO /aɪ ɛs oʊ/) is an international standard-setting body composed of representatives from various national standards organizations.

- Founded on 23 February 1947, the organization develops and publishes worldwide technical, industrial and commercial standards. It is headquartered in Geneva, Switzerland .
- www.iso.org

ISO TODAY

24105

International Standards covering almost all aspects of technology and manufacturing.

166

Members representing ISO in their country. There is only one member per country.

802

Technical committees and subcommittees to take care of standards development.

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TECHNICAL COMMITTEES

ISO/IEC JTC 1

Information technology

ABOUT

SECRETARIAT: ANSI

Committee Manager: Mrs Lisa Rajchel

Chairperson (until end 2023): Mr Phil Wennblom

ISO Technical Programme Manager [TPM]: Mr José Alcorta
ISO Editorial Programme Manager [EPM]: Ms Alison Reid-Jamond

Creation date: 1987

SCOPE

Standardization in the field of information technology.

ISO/IEC JTC 1

ISO/IEC JTC 1/SC 39

Sustainability, IT and data centres

ABOUT

SECRETARIAT: ANSI

Committee Manager: Mr Bill Ash

Chairperson (until end 2021): Mr Jay Taylor

ISO Technical Programme Manager [TPM]: M Stéphane Sauvage
ISO Editorial Programme Manager [EPM]: Ms Alison Reid-Jamond

Creation date: 2012

SCOPE

Standardization of assessment methods, design practices, operation and management aspects to support resource efficiency, resilience and environmental sustainability for and by information , data centres and other facilities and infrastructure necessary for service provisioning

To avoid any duplication of work and to support innovation, SC 39 will engage in active liaison and collaboration with

- other JTC1 entities
- ISO TC 207, ISO TC 242, ISO TC 257;
- IEC TC 100, IEC TC 111, IEC PC 118, SMB SG 4, IEC/TC 57/WG 2 and IEC/TC 9
- ITU-T SG 5; and
- Any other appropriate body including external organizations (e.g. consortia)

ISO/IEC TS 22237

Data centres need to provide

- Modular
- Scalable
- flexible facilities
- environmental point of view (reduction of carbon footprint)
- economical considerations (cost of energy)

ISO/IEC TS 22237

The implementation of data centres varies in terms of:

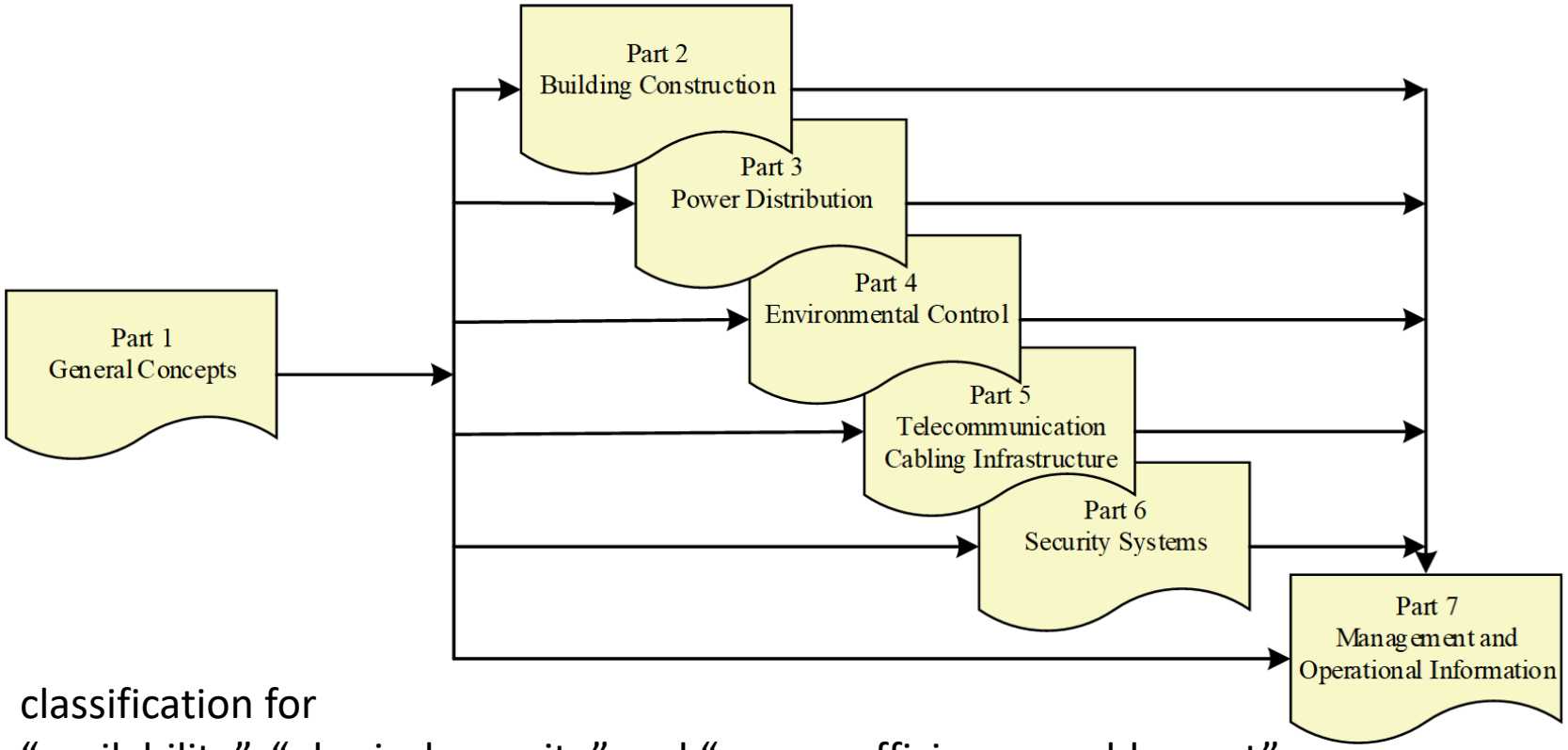
- purpose (enterprise, co-location, co-hosting or network operator facilities);
- security level;
- physical size;
- accommodation (mobile, temporary and permanent constructions).

ISO/IEC TS 22237

Series specifies requirements and recommendations to support the various parties

- owners, facility managers, ICT managers, project managers, main contractors;
- consultants, architects, building designers and builders, system and installation designers;
- suppliers of equipment;
- installers, maintainers.

Schematic relationship between the ISO/IEC TS 22237 series



classification for
“availability”, “physical security” and “energy efficiency enablement”
selected from ISO/IEC TS 22237-1

Part 1-General concepts

Scope

- Business risk and operating cost analysis
- Terminology, parameters and reference models
- the facilities and infrastructures
- Classification system
- General design principles

Outside of the scope

- The selection of information technology and network telecommunications equipment, software
- Safety and electromagnetic compatibility (EMC) requirements.

Conformance

For a data centre design to conform to this part:

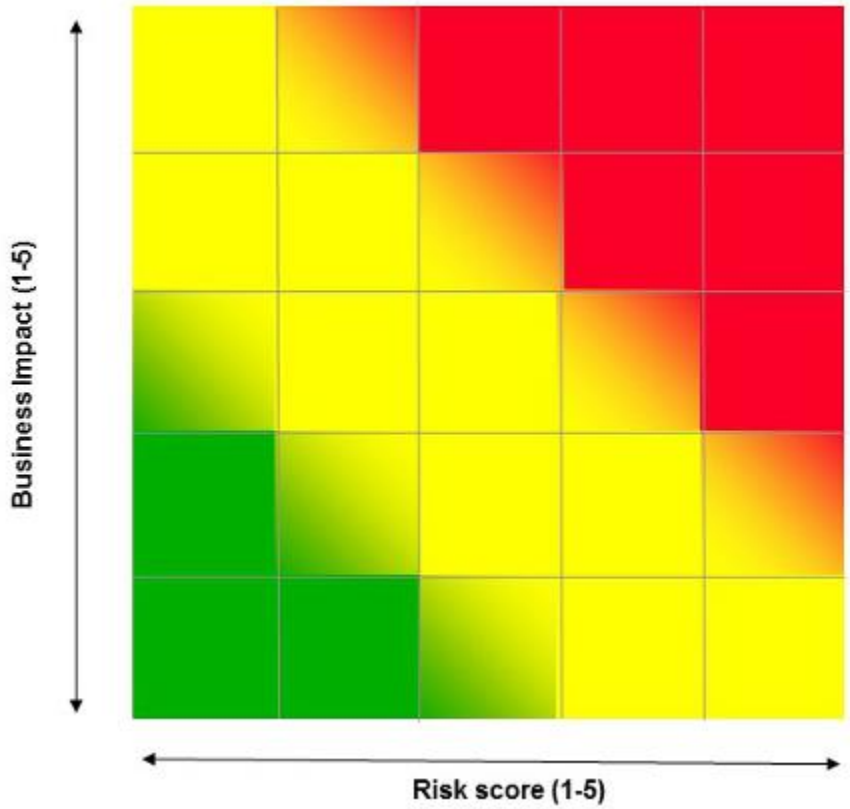
a) a business risk analysis shall be completed;
b) Availability Class shall be selected using a business risk analysis;
c) Protection Class shall be selected using a business risk analysis;
d) energy efficiency enablement level shall be selected;
e) the general design principles in Annex A shall be applied.

Business risk analysis

The design of each of the data centre infrastructures shall take account of their impact on overall availability and the costs associated with the predicted downtime associated with failure or planned maintenance

a) downtime cost analysis
b) Risk analysis(Standards such as IEC 31010 provide useful guidance.)

Classification system in risk map



Business Impact (OI)

Level 5	*> 20% of impact*
Level 4	*15-20%*
Level 3	*10- 15 %*
Level 2	*5 – 10%*
Level 1	*3-5%*

Risk score

Criteria:	*%*
Back up supplier for item	*25%*
Estimated time for switch	*20%*
Difficulty to replace item	*20%*
Safety stock at supplier's side	*15%*
D&B Rating	*10%*
Were there cases of business	*10%*

Classification system for data centres

For the purposes of the ISO/IEC TS 22237 series, data centres are classified with respect to:

a) Availability Classes;

b) Protection Classes;

c) Energy efficient enablement levels.

Availability
Class 1
Class 2
Class 3
Class 4

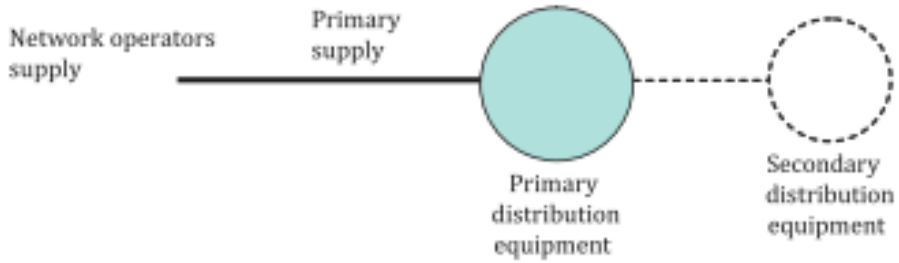
Protection
Class 1
Class 2
Class 3
Class 4

Energy efficient enablement
Level 1
Level 2
Level 3

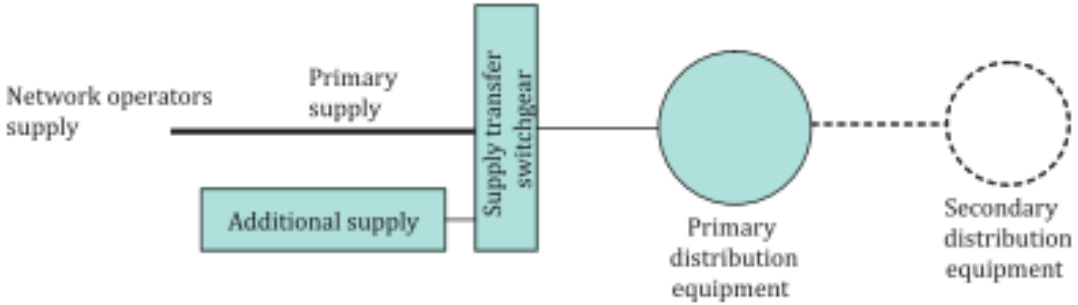
Availability Classes

	ESSENTIAL OBJECTIVES			
	CLASS 1	CLASS 2	CLASS 3	CLASS 4
POWER SUPPLY	Single path to primary distribution equipment - Single source	Single path to primary distribution equipment – Redundant sources	Multiple paths to primary distribution equipment - Redundant sources	Multiple paths to primary distribution equipment - Multiple sources
POWER DISTRIBUTION	Single path	Single path with redundancy	Multiple paths - Concurrent repair/operate solution	Multiple paths - Fault tolerant except during maintenance
ENVIRONMENTAL CONTROL	Single path	Single path with redundancy	Multiple paths - Concurrent repair/operate solution	Multiple paths - Fault tolerant except during maintenance
TELECOMMS CABLING	Single path - direct connections or fixed infrastructure with single access network connection	Single path - fixed infrastructure with multiple access network connections	Multiple paths - Class 2 plus diverse pathways	Multiple paths - Class 3 plus redundant distribution zones and multiple access network connections
	OVERALL CLASS IS DEFINED BY LOWEST CLASS INFRASTRUCTURE			

Examples of Power Supply



single path solution for power supply

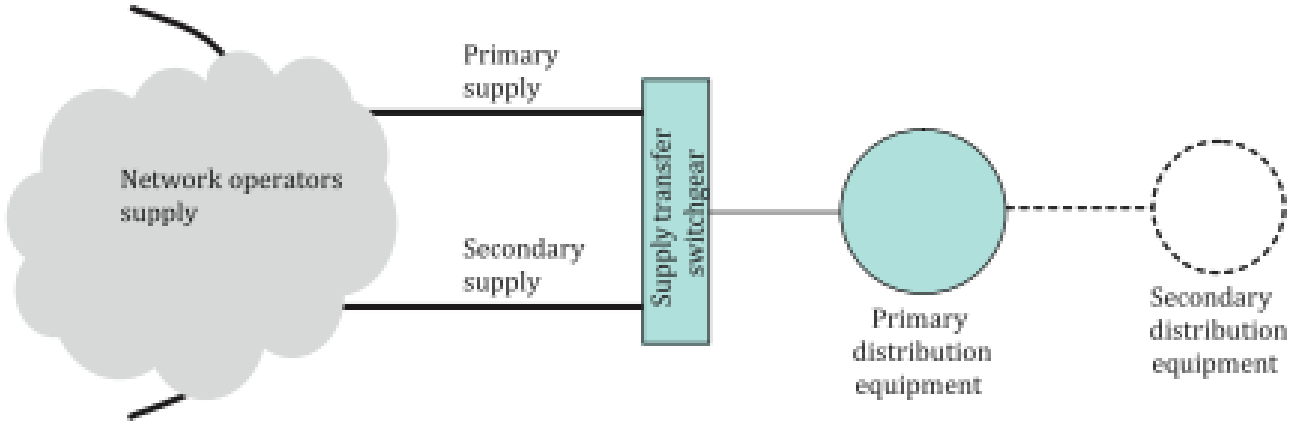


“single path resilient” solution for power supply

Examples of Power Supply

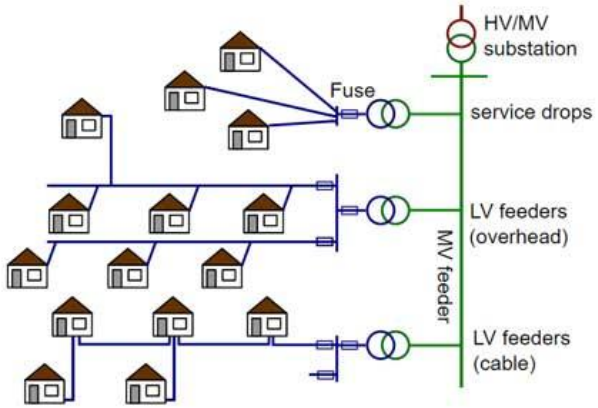
6.2.6.4 Class 3: Multi-path resilience and concurrent repair/operate solutions

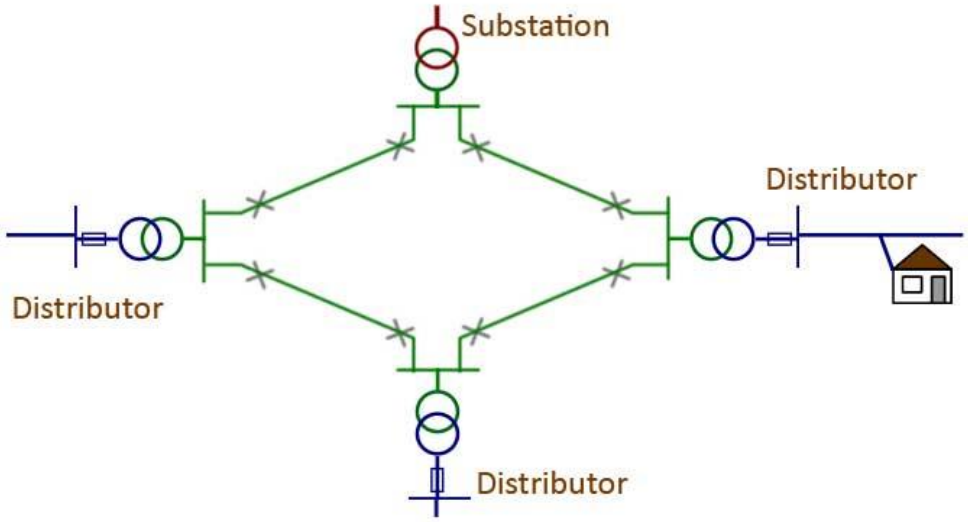
An N + 1 array of MV/LV transformers (either external or internal to the premises) is fed by a MV ring to provide diverse routing of supply



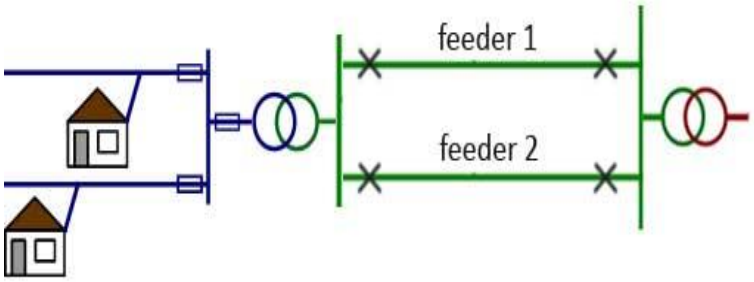
Examples of Power Supply

Radial Distribution System





Parallel Feeders Distribution System

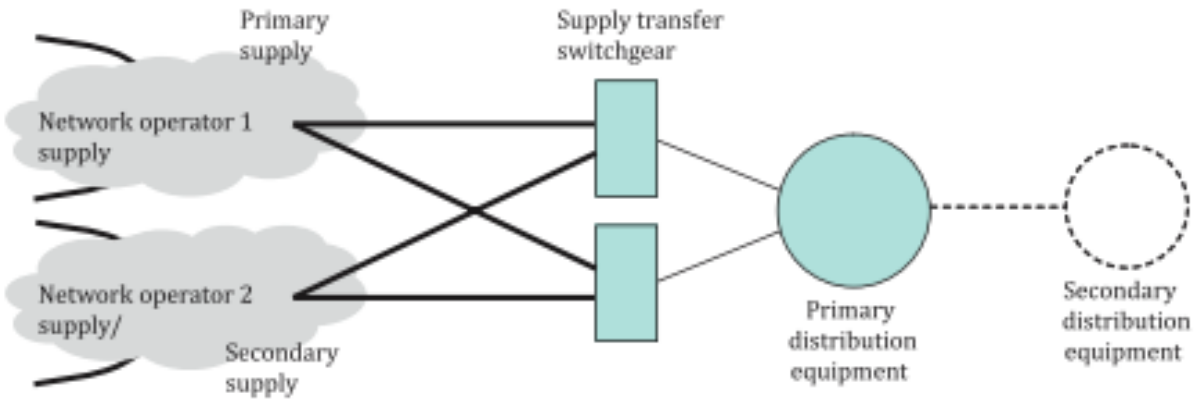


Ring Main Distribution System

Examples of Power Supply

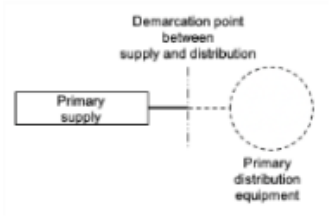
6.2.6.5 Class 4: Fault tolerant solutions

fault tolerant design solution in which two separate and diversely routed MV supplies from two physically diverse transformers (external or internal to the premises), each one of which is fed via a ring, not a radial

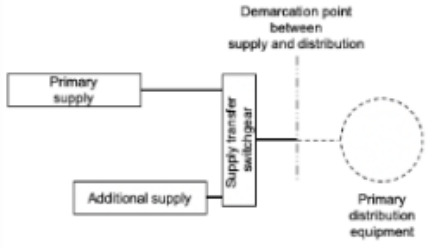


Examples of Power Supply

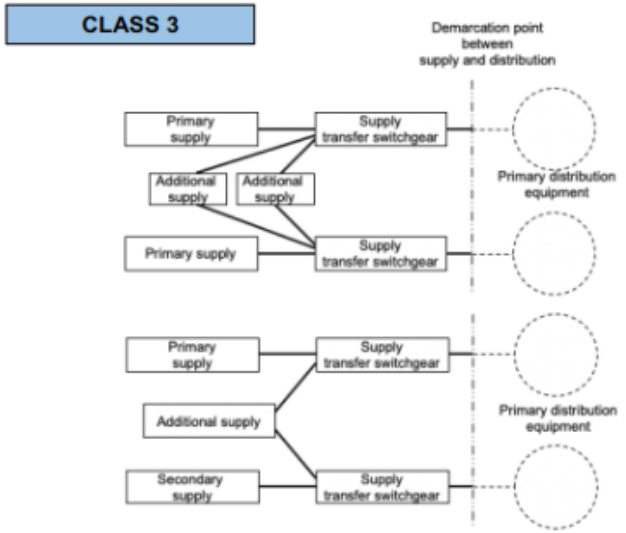
CLASS 1



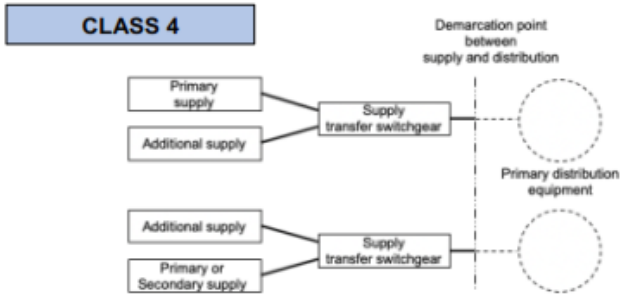
CLASS 2



CLASS 3



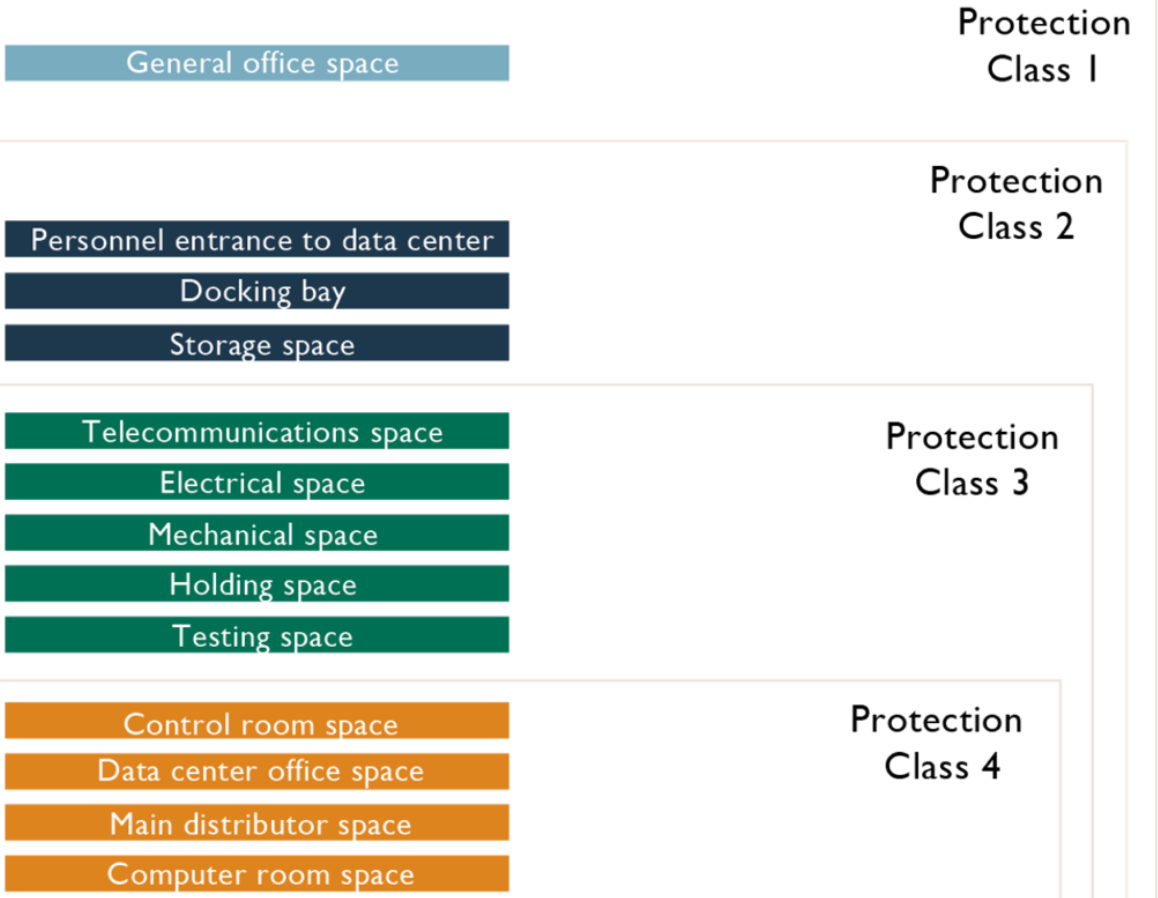
CLASS 4



Protection Classes

Type of Protection	Protection Class 1	Protection Class 2	Protection Class 3	Protection Class 4
Protection against unauthorized access	Public or semi-public area	Area that is accessible to all authorized personnel (employees and visitors)	Area restricted to specified employees and visitors (other personnel with access to Protection Class 2 have to be accompanied by personnel authorized to access Protection Class 3 areas)	Area restricted to specified employees who have an indentified need to have access (other personnel with access to Class 2 or Class 3 areas have to be accompanied by personnel authorized to access Class 4 areas)

Protection Classes

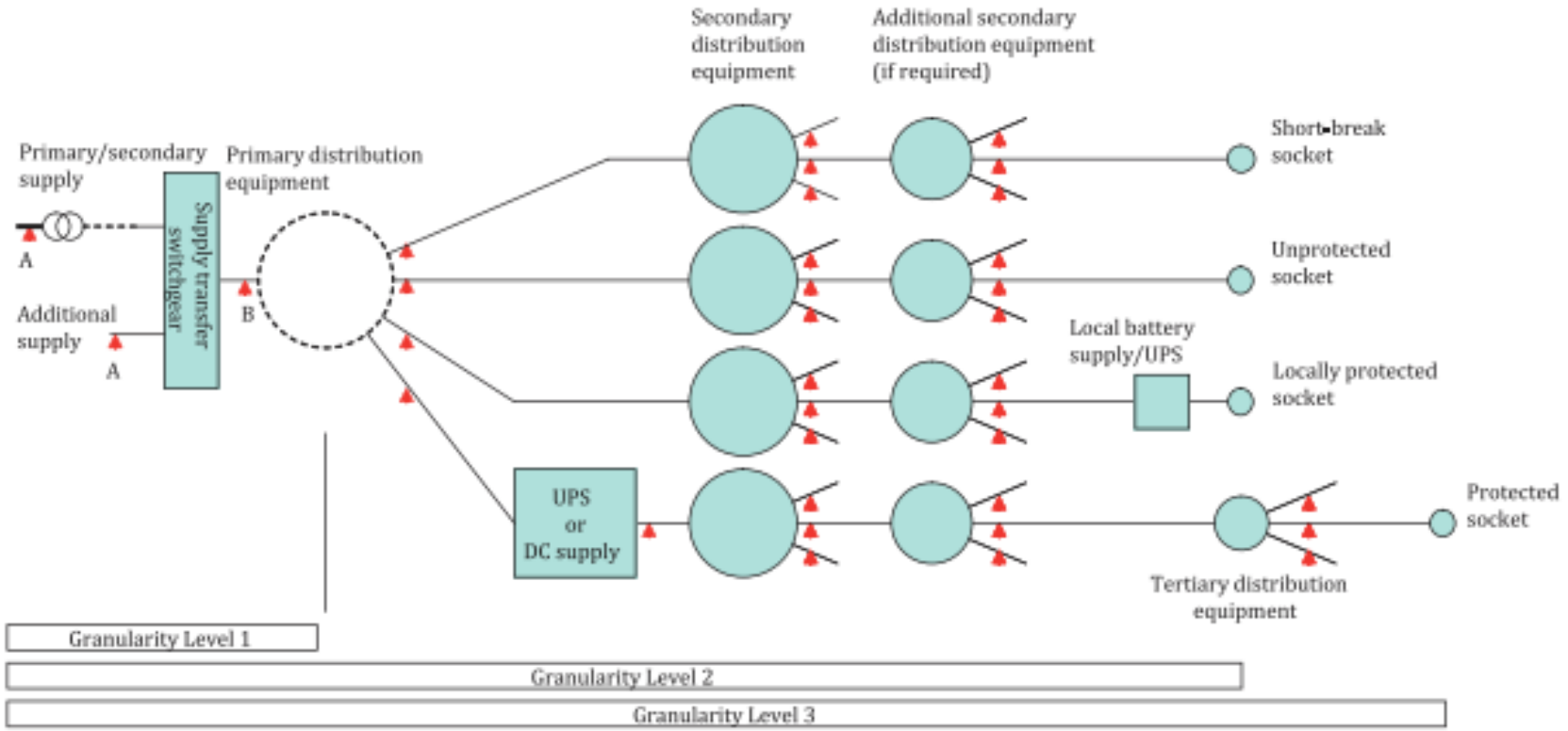


Energy efficient enablement levels

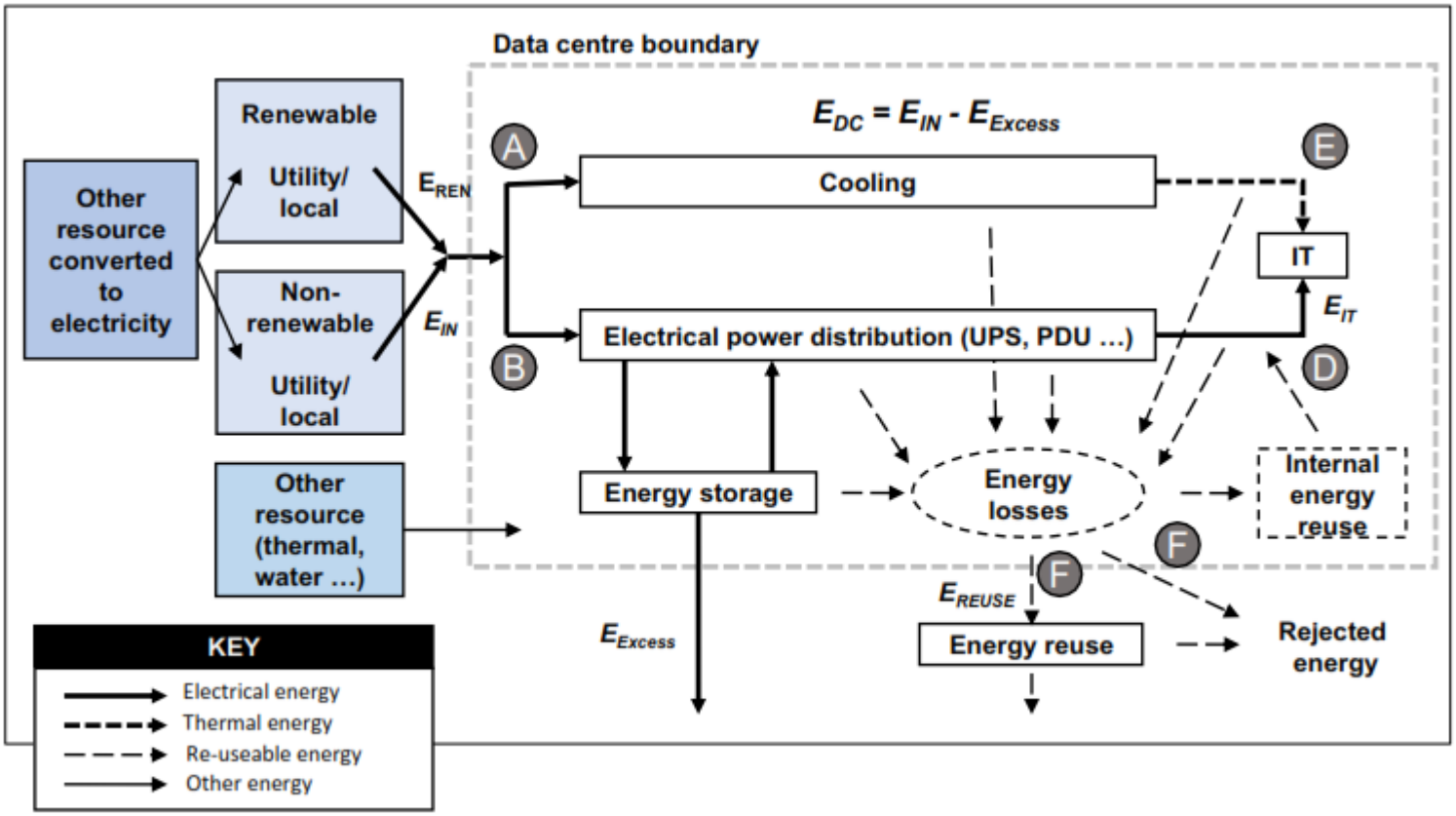
The data centre owner shall define the appropriate energy efficiency enablement level prior to the data centre design.

Energy efficiency enablement
Level 1
Level 2
Level 3

Energy efficient enablement levels



Data Centre Energy Boundaries



Part 2-Building Construction

Part 2-Building Construction

a) location and site selection;

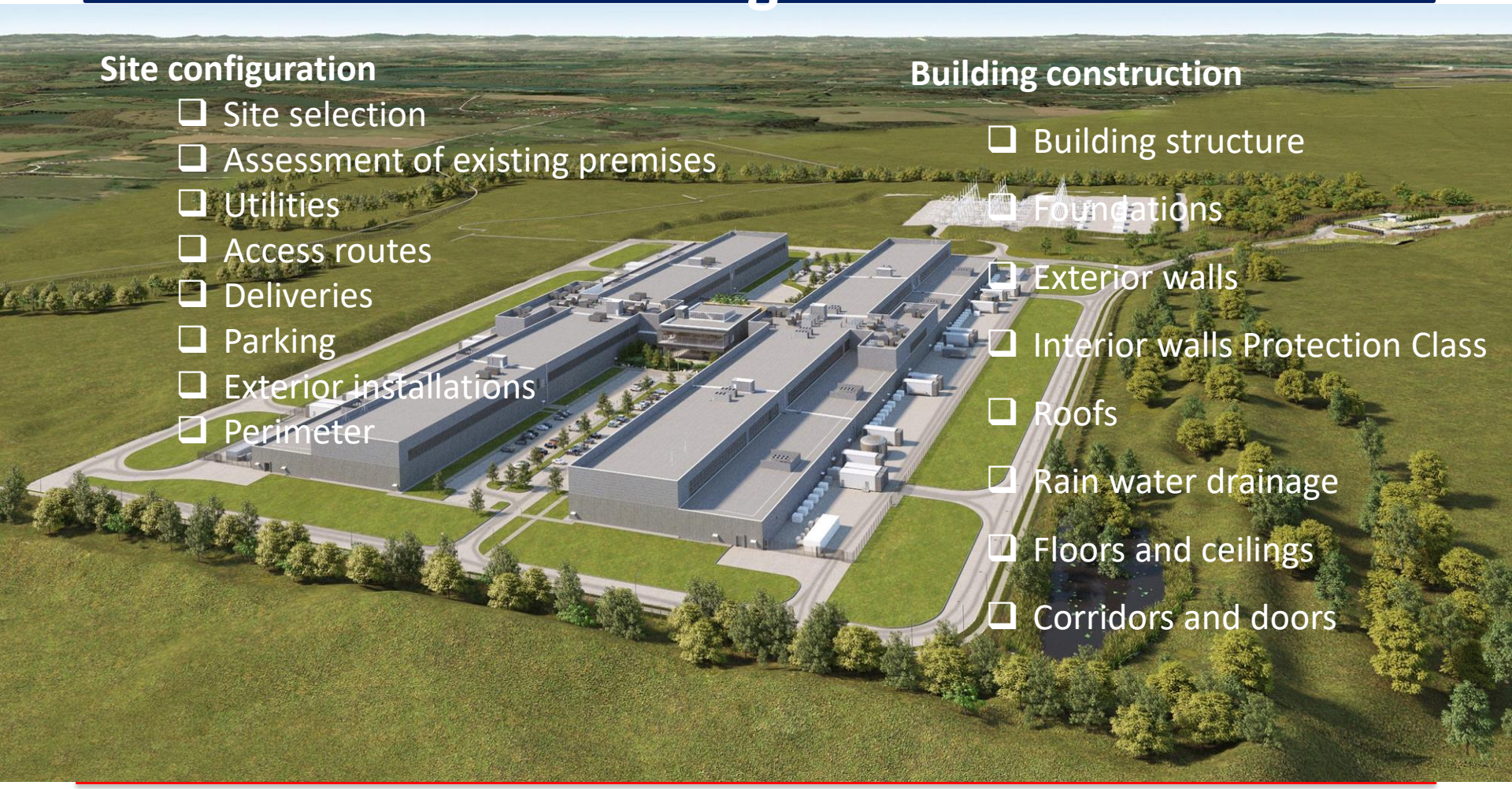
b) building construction;

c) building configuration;

d) fire protection;

e) quality construction measures.

Part 2-Building Construction



Site configuration

- ❑ Site selection
- ❑ Assessment of existing premises
- ❑ Utilities
- ❑ Access routes
- ❑ Deliveries
- ❑ Parking
- ❑ Exterior installations
- ❑ Perimeter

Building construction

- ❑ Building structure
- ❑ Foundations
- ❑ Exterior walls
- ❑ Interior walls Protection Class
- ❑ Roofs
- ❑ Rain water drainage
- ❑ Floors and ceilings
- ❑ Corridors and doors

Part 2-Building Construction

Load capacity guidance		Data centre spaces and access routes to those spaces			
		Other spaces	Electrical and mechanical spaces Computer room	Docking bay	Lifts
Floor loads	Uniform load (min)	5 kN/m^2	12 kN/m^2	20 kN/m^2	-
	Point load (min)	2,0 kN	5,0 kN	7,5 kN	1,5 kN
Ceiling loads	Hanging load (min)	1,5 kN/m^2	2,5 kN/m^2	3,0 kN/m^2	-

Part 2-Building Construction

5.2.1 Requirements
The elevation above sea level can have a direct influence on the performance of technical equipment and shall be considered.

این معیارها در استاندارد مرجع در بند 5.2.1آمده است:

- ارتفاع از سطح دریا می‌تواند تأثیر مستقیمی بر عملکرد تجهیزات فنی داشته باشد و باید مورد توجه قرار گیرد.

Part 2-Building Construction

5.3.1 Requirements

An environmental risk analysis shall be conducted which, as a minimum, considers the following items:

a) flooding;

b) active seismic zones;

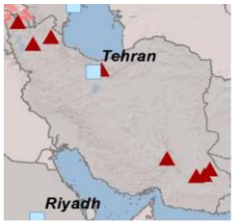
c) high wind velocities;

d) air contamination by natural causes (volcanic activities, etc.);

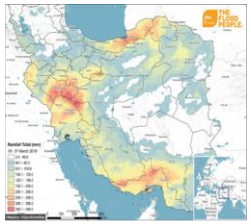
e) near to coast lines;

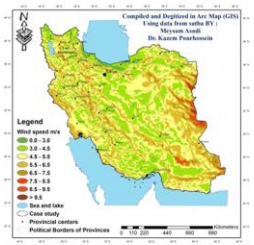
f) lower than sea level;

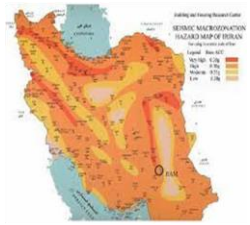
g) on special purpose flood plains.



Volcano


Flood


Wind


Seismic

این معیارها در استاندارد مرجع در بند 5.3.1آمده است:

تجزیه و تحلیل مخاطرات محیطی باید انجام شود که حداقل موارد زیر را در نظر می‌گیرد:

الف) سیلاب

ب) مناطق فعال از نظر زمین لرزه.

پ) سرعت وزش شدید باد.

ت) آلودگی هوا به دلایل طبیعی (فعالیت‌های آتشفشانی و غیره).

ث) نزدیکی به خطوط ساحلی.

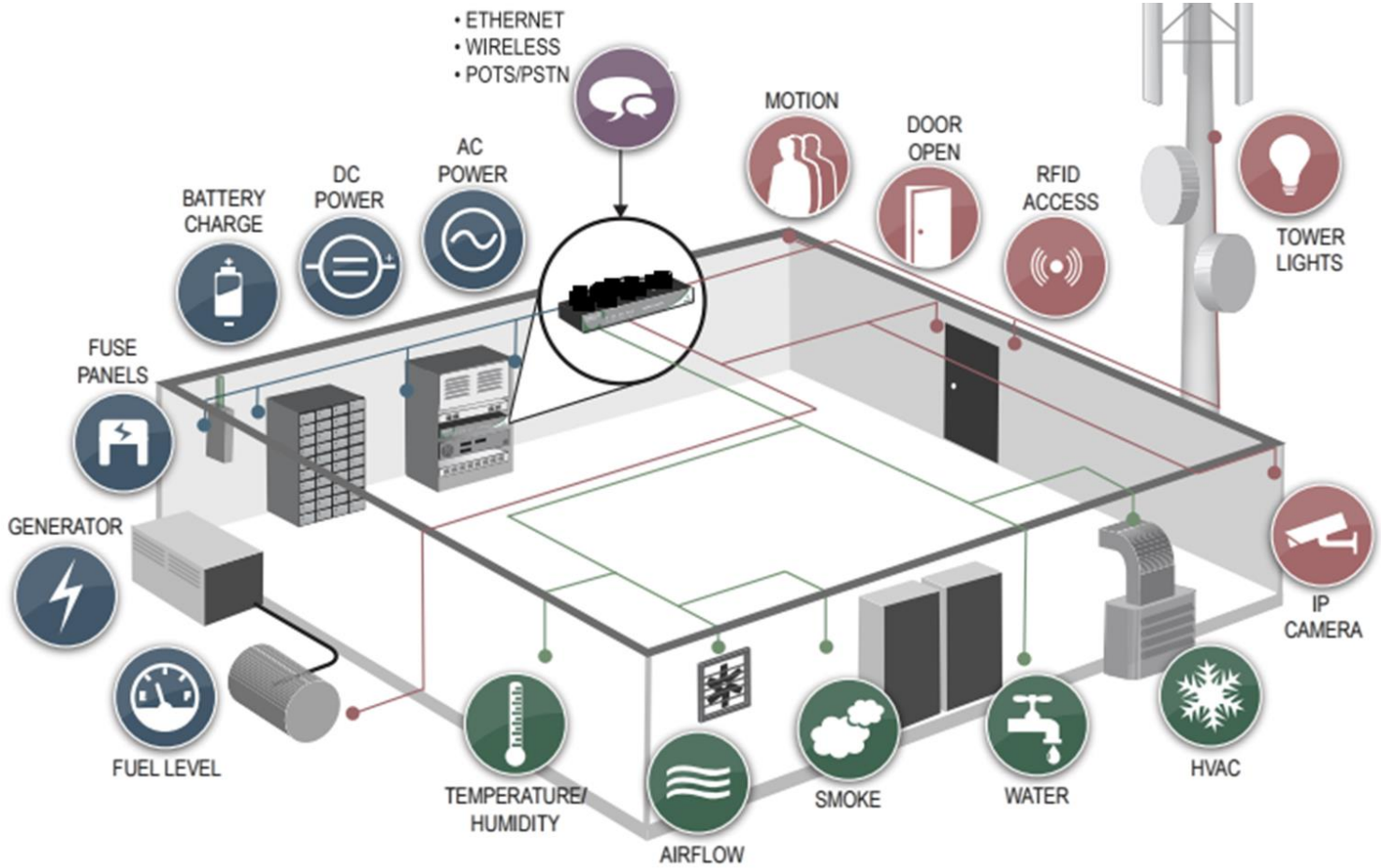
ج) پایین‌تر بودن از سطح دریا.

چ) قرارگیری در دشت‌های سیلابی.
درصورتی که جانمایی یک مرکز داده در مکانی با تأثیرات منفی محیطی اجتناب ناپذیر باشد، باید با اقدامات ساختاری، فنی و یا سازمانی حفاظت‌کننده، این تأثیرات کاهش یابند.

Part 3-Power Distribution

Part 4-Environmental Control

Part 4-Environmental Control



Part 5-Telecommunication Cabling Infrastructure

Part 6-Security Systems

Part 7-Management and Operational Information

Part 7-Management and Operational Information

Elements of operational maturity	Operational levels			
	Level 1	Level 2	Level 3	Level 4
Control facilities and Infrastructures	low	medium	high	Very high
Design and definition (Q = Quality plan, A = Availability, S = Security, *F* = Functionality, E = Efficiency, C = Certification program)	A, S,	Q, A, S, F	Q, A, S, F, E,	Q, A, S, F, E, C
Planning	check of activities which are defined in the quality plan (Q, A)	spot-check of activities which are defined in the quality plan (Q, A,S)	regular control of activities which are defined in the quality plan (Q, A,S,E)	permanent control of all activities which are defined in the quality plan (Q, A,S,F,E,C)
Establishing of building and DC infrastructure				
NOTE These levels correspond to the prioritization defined in A.1.				

Energy efficient enablement levels

Requirement	Granularity Level		
	Level 1	Level 2	Level 3
Supply air temperature	Single sensor in proximity to IT equipment One sensor per cold aisle	Two sensors in proximity to IT equipment One sensor every 5 cabinets or racks in a cold aisle	One sensor per cabinet or rack
Return air temperature	Single sensor in proximity to intake of cooling equipment or One sensor per hot aisle	One sensor in proximity to intake of cooling equipment and a single sensor at rear of one cabinet or rack or One sensor every 5 cabinets or racks in a hot aisle	One sensor in proximity to intake of cooling equipment and a single sensor at rear of each cabinet or rack
Relative humidity	As supply air temperature	As supply air temperature	As supply air temperature
External relative humidity and temperature	One sensor	Two sensors	Two sensors
Air pressure	As required	As required	As required
Coolant flow	As required	As required	As required
Heat removal	As required	As required	As required
Outside air	As required	As required	As required

پایان