De laatste ontwikkelingen op het gebied van NEN-EN 50600 normering de nieuwe norm is compleet

Niek van der Pas

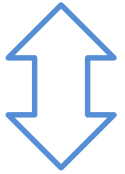Voorzitter NEN commissie: Computerruimten en datacenters

Nederlandse datacenter normering

- Nederland NEN 'Computerruimtes en datacenters'

- Lid van de 'working group on the European Code of Conduct on Data Centre Energy Efficiency'

- Stake holder EU JRC - Best Environmental Management Practice
  - Green Public Procurement Criteria for Data Centres

- NEN is vertegenwoordigd in :
  - CENELEC TC 215, EN 50600 "Electrotechnical Aspects of Telecommunication Equipment" WG 3 "Facilities and Infrastructures"

  - CEN-CENELEC-ETSI Coordination Group on Green Data Centres (CG GDC)

  - ISO/IEC JTC 1/SC 39 WG 1: Resource Efficient Data Centres, KPI's (PUE) WG 3: Sustainable facilities and infrastructures 22237

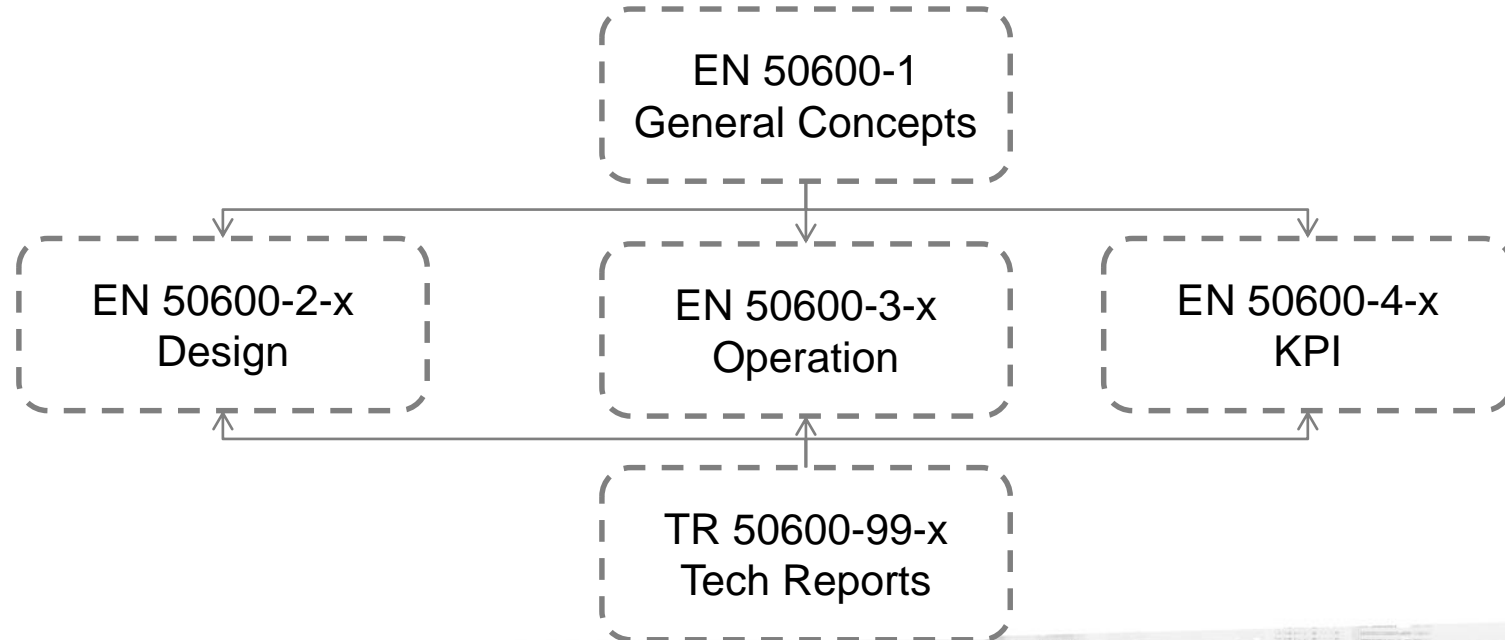 - IEC TC 48D: Mechanical structures for electronic equipment, 19"cabinets, aisle containment

NEN-EN 50600 Series
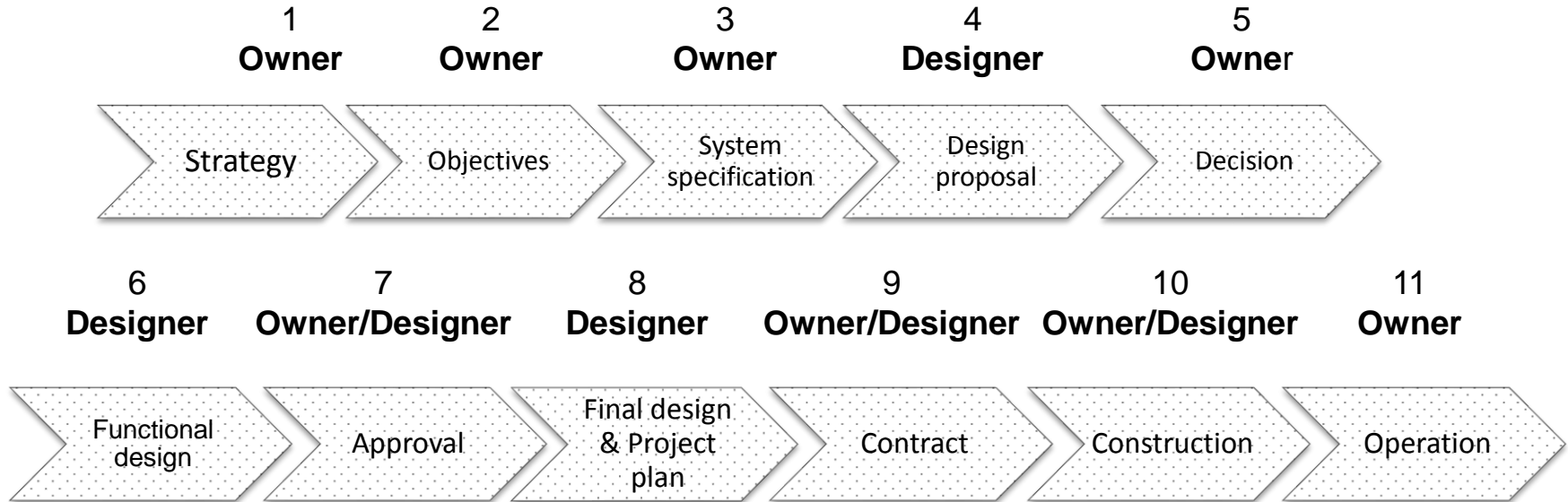## Information technology - Data centre facilities and infrastructures

EN 50600-1
General Concepts

EN 50600-2-x
Design

EN 50600-3-x
Operation

EN 50600-4-x
KPI

TR 50600-99-x
Tech Reports

ISO/IEC TS 22237 Parts 1-7

Ontwikkeling van de NEN-EN 50600 serie

Deel	Titel	Type	Vrijgegeven	Revisie	Onderhanden
99-1	TR Energy management - Recommended practices	Technical Report	Vrijgegeven	Jaarlijks	
99-2	Environmental Impact	Technical Report			ver 1
99-3	How to Use the 50600 Series	Technical Report			ver 1
4-x	Server Energy Effectiveness Metric /Cooling Efficiency Ratio/WUE	Standard			ver 1
4-x	Energy Reuse Factor (ERF)	Standard			ver 1
4-x	IT Equipment Utilization for Servers (ITEUsv)	Standard			ver 1
4-x	IT Equipment Energy Efficiency for Servers (ITEEsv)	Standard			ver 1
4-3	Renewable Energy Factor (REF)	Standard	Vrijgegeven		
4-2	Power Usage Effectiveness	Standard	Vrijgegeven		
4-1	General requirements for key performance indicators	Standard	Vrijgegeven		
3-1	Management and operational information	Standard	Vrijgegeven		
2-5	Security systems	Standard	Vrijgegeven		
2-4	Telecommunications cabling infrastructure	Standard	Vrijgegeven		
2-3	Environmental control	Standard	Vrijgegeven		ver2
2-2	Power distribution	Standard	Vrijgegeven		ver2
2-1	Building construction	Standard	Vrijgegeven		ver2
1	General concepts	Standard	Vrijgegeven		ver2

Design Phases NEN-EN 50600-1

1	2	3	4	5
Owner	**Owner**	**Owner**	**Designer**	**Owner**
Strategy	Objectives	System specification	Design proposal	Decision

6	7	8	9	10	11
Designer	**Owner/Designer**	**Designer**	**Owner/Designer**	**Owner/Designer**	**Owner**
Functional design	Approval	Final design & Project plan	Contract	Construction	Operation

Classification NEN-EN 50600

Availability

| Availability Class 4 |
| Availability Class 3 |
| Availability Class 2 |
| Availability Class 1 |

Security

| Security Class 4 |
| Security Class 3 |
| Security Class 2 |
| Security Class 1 |

Energy Efficiency

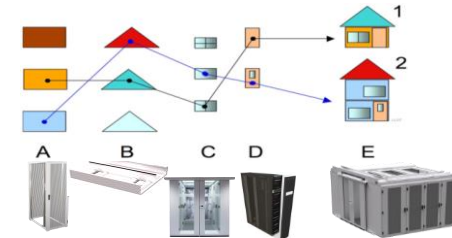| Granularity Level 3 |
| Granularity Level 2 |
| Granularity Level 1 |

Conditions NEN-EN 50600

- Kosten

- Schaalbaarheid

- Modulariteit

- Onderhoudbaarheid

Business risk analysis availability NEN-EN 50600

- ## Downtime cost analysis
  - 98% van de organisaties zegt dat één uur downtime meer dan $ 100.000 kost
  - 81% van de respondenten gaf aan dat 60 minuten downtime hun bedrijf meer dan 300.000 dollar kost
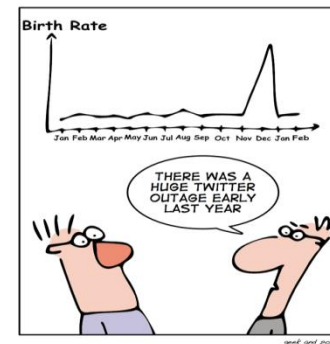 - 33% van deze bedrijven meldde dat de kosten een van uur downtime tussen $ 1-5 miljoen bedroegen

  Bron: ITIC Information Technology Consulting

- ## Risk analysis

IT downtime costs North American businesses $700 billion annually, mostly due to loss of employee productivity

Cost to fix 5%
Revenue loss 17%
Annual aggregate cost: $700 billion
Productivity loss 78%
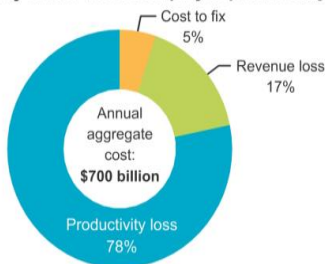
© IHS, IHS Infonetics The Cost of Server, Application, and Network Downtime: Annual North American Enterprise Survey and Calculator; 2016

Risk Plan
Identify Hazards
Assess Risks
Evaluate
Review
Implement
Control
Monitor

Birth Rate

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb

THERE WAS A HUGE TWITTER OUTAGE EARLY LAST YEAR

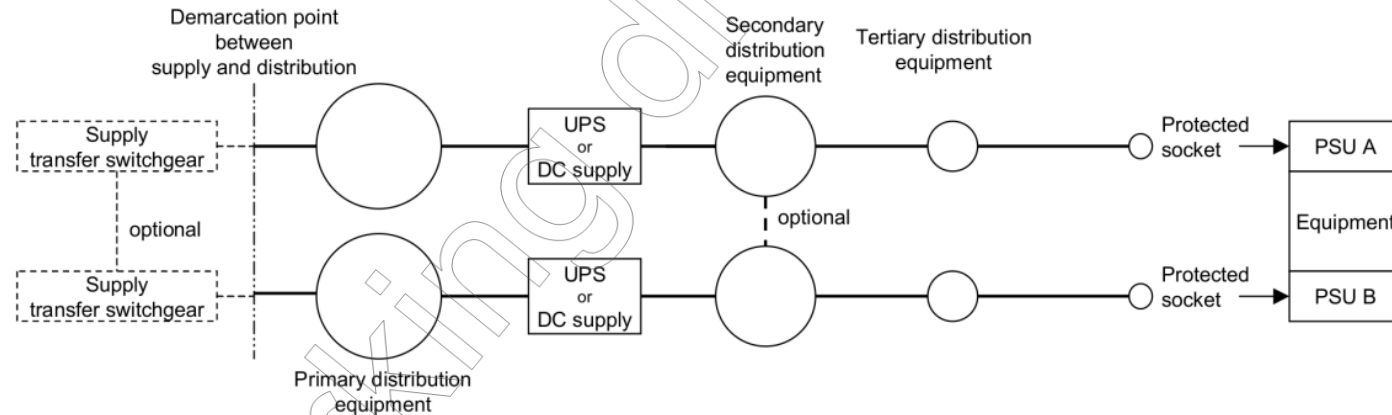Figure 10 shows an example of a design solution providing multi-path resilience.

Figure 10 - Example of multiple paths providing a concurrent/repair operate solution (Class 3)

# Availability NEN-EN 50600-1 ver.2

50600-2-2 Power Source	Class 1	Class 2	Class 3	Class 4
Availability	Low	Medium	High	Very High
Redundant Sources	N	Y	Y	Y
Protected Against Source Failure	N	Y	Y	Y
Redundant Path to Primary distribution	N	N	Y	Y
Protected Against Path Failure	N	N	Y	Y
Compartmentalization	N	N	N	Y
Protected Against Single Functional Element Failure	N	Y	Y	Y
Load Operation During Maintenance	N	N*[1]	Y	Y
Fault tolerant	N	N	Y*[2]	Y

*[1] Depending on the functional element being maintained
*[2] Except during maintenance

Availability NEN-EN 50600-1

- Voeg "redundancy" toe
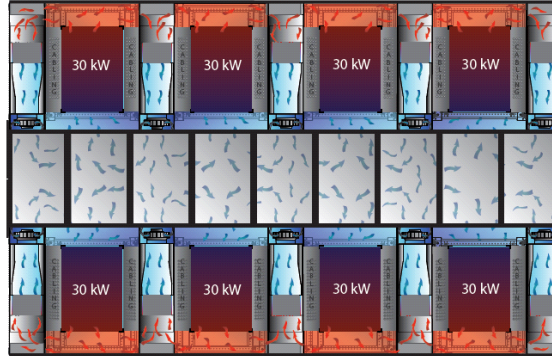
- Verkort de "**M**ean **T**ime **T**o **R**epair"

NEN-EN 50600-2-1 Building Construction

Table 1 — Load capacity guidance

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	-

– 23 –

CLC/TC 215-WG3/Conv0276/DC
September 2017

680   **8.6.2 Recommendations**

681   Ramps intended specifically for the transport of equipment and goods should have a maximum inclination of
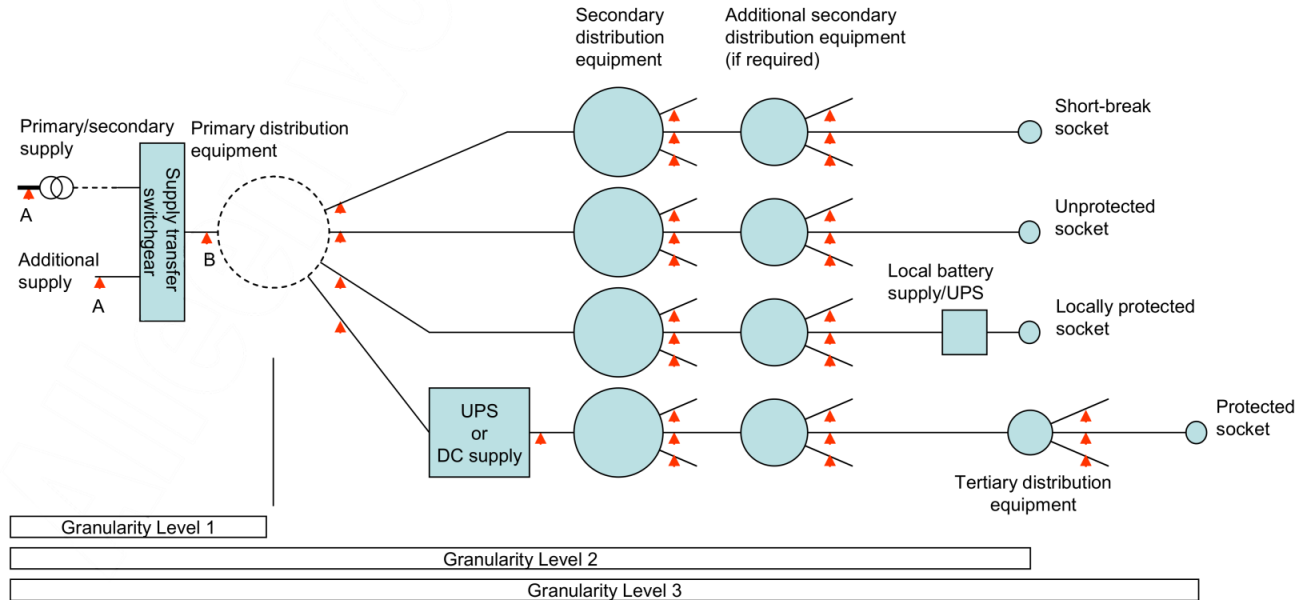682   1:20.

Energy Efficiency NEN-EN 50600-2-2

Figure 12 — Possible measurement points

NEN-EN 50600-2-3 ver.2 Environmental control

688

Table 2 — Measurement requirements and recommendations by Granularity Level

| 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 2 cabinets or racks
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 per isle 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 4 cabinets or racks
Relative humidity	As supply air temperature	As supply air temperature	As supply air temperature
External relative humidity and temperature	One sensor	Two sensors recommended	Two sensors recommended
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
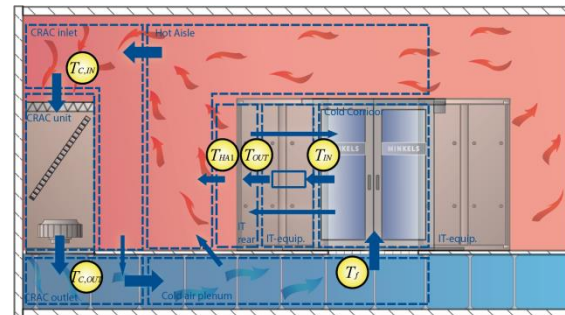
NEN-EN 50600-2-4
Telecommunications cabling infrastructure
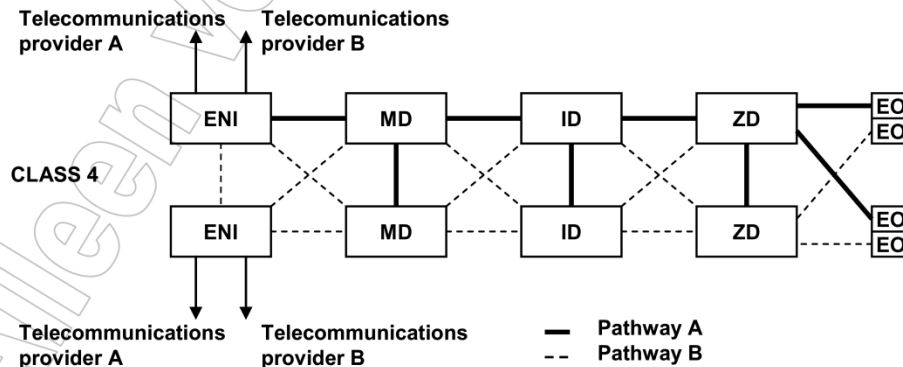
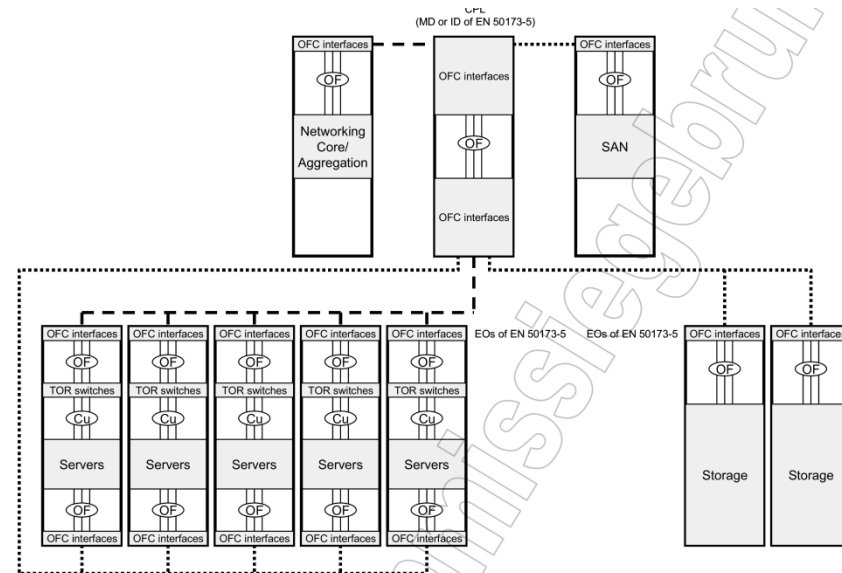Figure 13 - Redundant multipath telecommunication cabling Class 4

Figure A.5 – Example for Class 2 ToR cabling implementation

9 Cabinets and racks for the computer room space

9.1 General requirements

Cabinets and racks shall be selected to:

a) provide a growth path for future technologies and data centre capacity demands;

b) provide adequate cable management and bend radius functionality;

c) provide and support adequate ventilation and cooling for the equipment it will house (see EN 50600-2-3).

Cabinets, racks and frames shall be provided with cable and cord management fittings.

9.2 Requirements for dimensions

The minimum width of the cabinets/racks used for CPL and ZPL shall be 0,8 m with a preference for a larger width (see Clause 7).

The minimum width of the cabinets/racks used for equipment shall cope with the current and future cable management requirements. A width of 0,8 m is recommended.

The minimum depth of the cabinets/racks used for equipment shall cope with the current and future equipment dimensions. A depth of 1,2 m is recommended.

Cabinets and racks shall not be located under piping systems (both for reasons of breakage or aggregation of condensation), except piping systems used for cooling and fire extinguishing systems. This requirement also applies to other data centre spaces. Blanking panels should be installed in unused cabinet positions in order to avoid mixing of hot and cold air.

NEN-EN 50600-2-5 Security systems

- Physical security
  - Protection against unauthorised access

  - internal environmental events: i.e. fire, water

  - external environmental events: i.e. earthquake, flooding
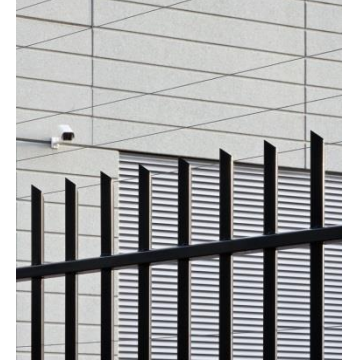
NEN-EN 50600-2-5 Security systems

Table 6 — Elements of systems for the prevention of unauthorized access

Subject	Element	Reference
Personnel	Ensuring that sufficiently qualified personnel are in place and who have received the appropriate training to ensure the security system will function correctly in support of operational needs. Relevant and applicable background checks will have been performed to manage and mitigate insider threats. In situations requiring the highest security level, personnel will require additional vetting to support this assurance.	Further information is provided in EN 50600–3–1
Processes	Relevant operational processes will be designed and operated within the data centre and operational site. The operational processes will support and integrate with all systems necessary for the smooth operation of the site. For example, processes in relation to the management and handling of visitors to the site, and the receipt and processing of deliveries to the site.	Further information is provided in EN 50600–3–1
Physical	Appropriate physical controls will be designed and operated on the site, providing the relevant layers of protection. The nature, number and type of physical controls *in situ* will be determined by the risk assessment, or operational requirements as directed by hosted entities.	Clause 6
Technology	A variety of systems will support the operations of the site, and will include as necessary, automatic access control systems, VSS systems, etc.	10.2

NEN-EN 50600-3-1 Management and operational information

- 6 Acceptance test

- 6.2 Building construction (EN 50600-2-1) tests

- 6.3 Power distribution (EN 50600-2-2) tests

- 6.4 Environmental control (EN 50600-2-3) tests

- 6.5 Telecommunications cabling infrastructure (EN 50600-2-4) tests

- 6.6 Security systems (EN 50600-2-5) tests

- 6.7 Energy efficiency enablement tests

- 6.8 Energy efficiency strategy tests
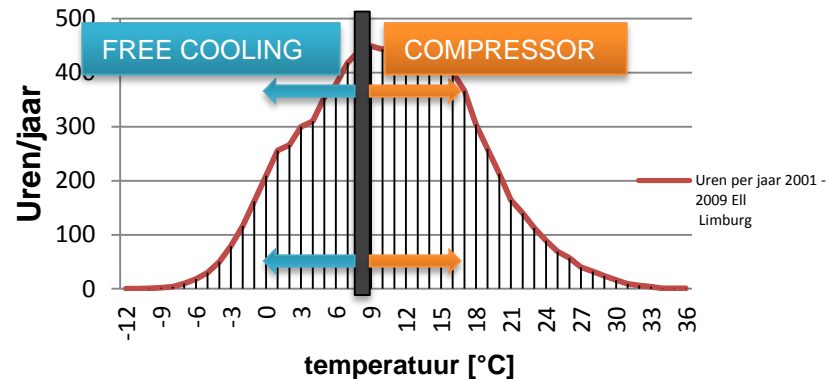
- 6.9 Monitoring tests
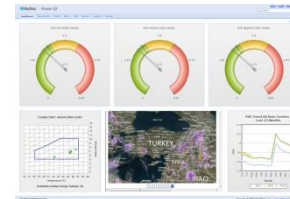
PUE, Designed PUE NEN-EN 50600-4-2

Table C.1 — Example of dPUE calculation

Month		IT equipment		Cooling/ventilation/ humidification		Power distribution	UPS	Lighting	Remaining support	Total data centre in	
Nr	Dura-tion	Avera ge load	Energy used [a]	Average load [a]	Energyus ed	Energy used	Energy used	Energy used	Energy used	Energy used	idPUE
#	Days	kW	kWh	kW	kWh	kWh	kWh	kWh	kWh	kWh	
1	31	50	37 200	6	4 464	221	3 720	248	744	46 597	1,25
2	28	100	67 200	10	6 720	769	4 704	224	672	80 289	1,19
3	31	125	93 000	11	8 184	1 301	5 580	248	744	109 057	1,17
4	30	135	97 200	14	10 080	1 511	5 832	240	720	115 583	1,19
5	31	140	104 160	18	13 392	1 756	5 729	248	744	126 029	1,21
6	30	140	100 800	19	13 680	1 720	5 544	240	720	122 704	1,22
7	31	140	104 160	20	14 880	1 800	5 729	248	744	127 561	1,22
8	31	160	119 040	25	18 600	2 407	5 952	248	744	146 991	1,23
9	30	160	115 200	24	17 280	2 304	5 760	240	720	141 504	1,23
10	31	160	119 040	20	14 880	2 278	5 952	248	744	143 142	1,20
11	30	160	115 200	16	11 520	2 108	5 760	240	720	135 548	1,18
12	31	160	119 040	15	11 160	2 154	5 952	248	744	139 298	1,17
□											dPUE
Σ	365		1 191 240		144 840	20 329	66 214	2 920	8 760	1 434 303	1,20
[a]	Forecasted use or estimate.										

$$PUE= \frac{\text{total data centre energy consumption (annual)}}{\text{IT equipment energy consumption (annual)}}$$

FREE COOLING   COMPRESSOR

Uren/jaar — temperatuur [°C]

Uren per jaar 2001 - 2009 Ell Limburg

- energiebesparing = kostenoptimalisatie

Energy Efficiency NEN-EN 50600-99-1

5 Expected Practices

5.1 Existing data centres

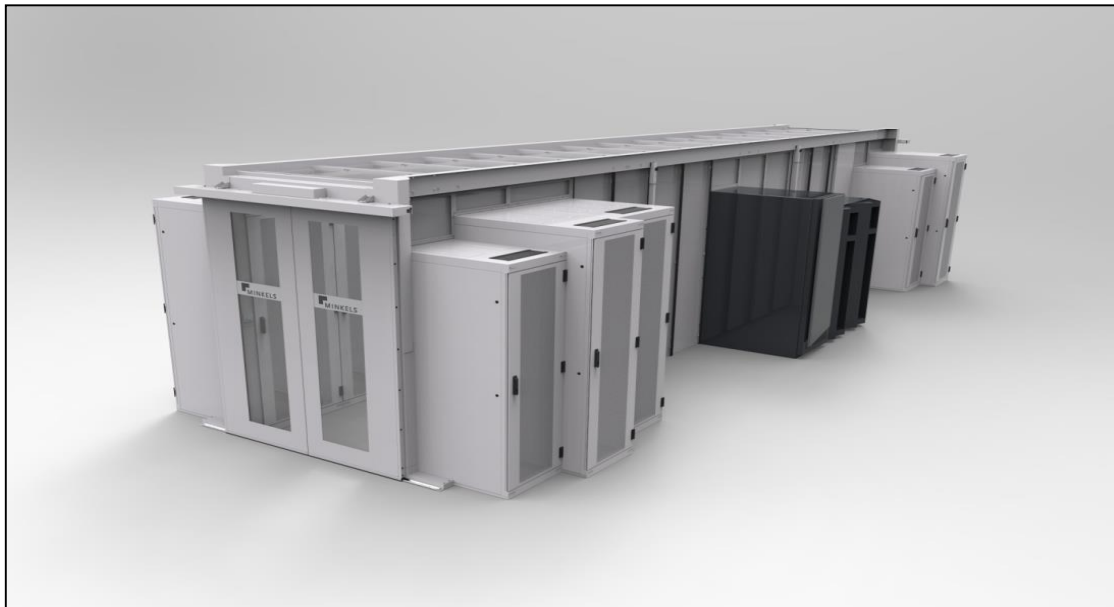| Index	CoC v. 7.1.0 Index	Task set	Description	Value
UTILISATION, MANAGEMENT AND PLANNING: Involvement of organisational groups				
5.16.01	3.1.1	Group involvement	Establish a group containing representatives from all disciplines (software, ICT equipment, mechanical, electrical and procurement) for the approval of any significant decision to ensure that the impacts of the decision have been properly understood and an effective solution reached. *NOTE For example, this could include the definition of standard ICT equipment lists by considering the mechanical and electrical implications of different types of hardware. This group could be seen as the functional equivalent of a change board.*	5

Energy Efficiency NEN-EN 50600-99-1

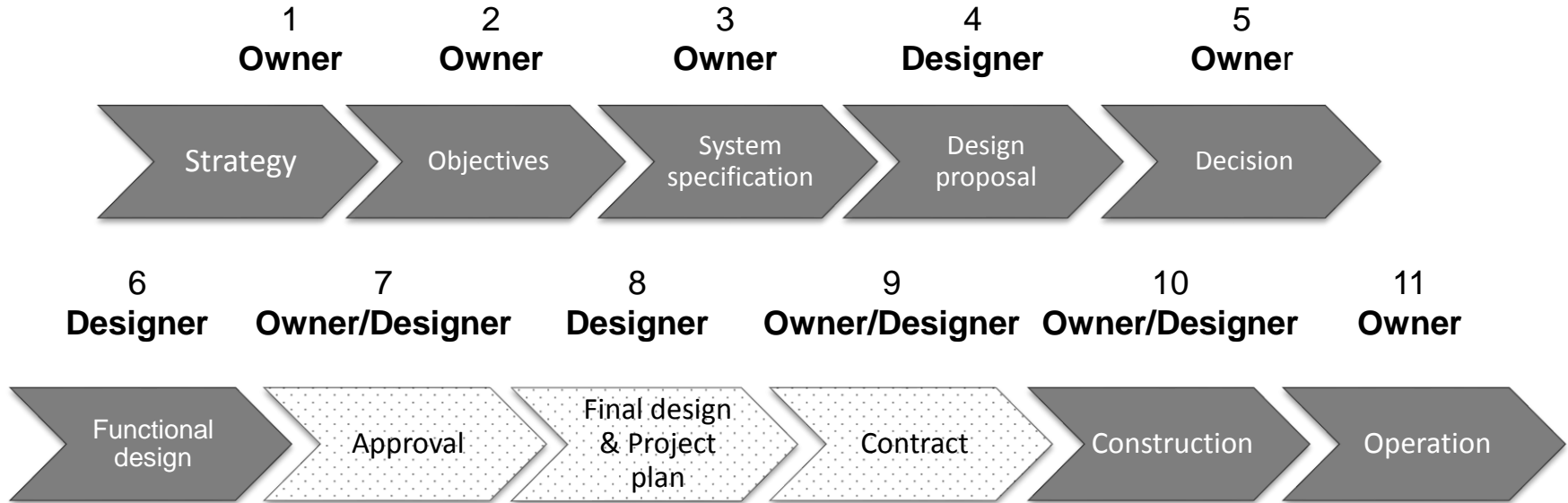| Index	CoC v. 7.1.0 Index	Task set	Description	Value
5.16.07	5.1.4	Cabinet/rack airflow management – Blanking Plates	Install blanking plates in locations within cabinets/racks where there is no equipment. *NOTE This helps to minimise the waste heat from one device contaminating the intake air of another device (re-circulation) which reduces cooling efficiency.*	4
5.16.08	5.1.7	Raised floor airflow management	Review placement and opening percentages of vented tiles to ensure appropriate airflow volume to ICT equipment and to reduce bypass air flow. Close unnecessary apertures in floors where the sub-floor space acts as an airflow pathway. Maintain unbroken rows of cabinets/racks to prevent re-circulated air and reinforce Hot / Cold aisle design with empty but fully blanked cabinets (or solid doors) rather than leaving gaps in aisles. *NOTE Unbroken rows are necessary in hot/cold aisle environments where any opening between the aisles will degrade the separation of hot and cold air. This may be achieved by filling any gaps with fully blanked cabinets/racks.*	3
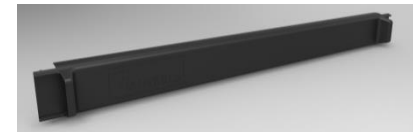
Voorgestelde condities in de NEN-EN 50600

- Schaalbaarheid, Modulariteit & Aanpassingsvermogen

NEN-EN 50600-1 Design Phases

1	2	3	4	5
Owner	**Owner**	**Owner**	**Designer**	**Owner**
Strategy	Objectives	System specification	Design proposal	Decision

6	7	8	9	10	11
Designer	**Owner/Designer**	**Designer**	**Owner/Designer**	**Owner/Designer**	**Owner**
Functional design	Approval	Final design & Project plan	Contract	Construction	Operation

Contactgegevens

- Bedrijfsnaam: Minkels

- Adres: Eisenhowerweg 12

- Telefoonnummer: 0413 311100

- E-mailadres: niek.vanderpas@minkels.com

- Standnummer: 43 & 44

Back-up Slides

EN 50600 Certification

- Manieren van certificatie
  - Zelf certificatie

  - Certificatie door een derde partij

  - Certificatie door een geaccrediteerde partij

EN 50600 Certificatie door een derde partij

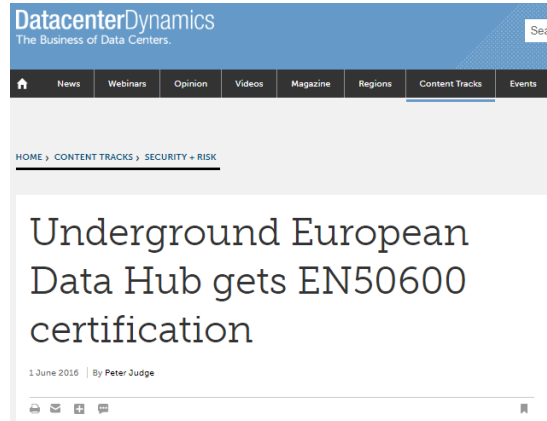# EN 50600 Certificatie door een derde partij

Data Centres News

European Data Hub gets Europe's first EN50600 Class 4e datacentre certification

Post date: Wednesday, 01 Jun 2016

European Data hub, among the largest Tier 4 datacentres located in Luxembourg, has achieved certification to the EN50600 datacentre infrastructure standard to its highest possible availability rating i.e. Class 4 for Building Construction, Power Distribution, Telecommunications Cabling Infrastructure and Class 4e for Environmental Control.

This is believed to be the first instance of a datacentre anywhere being certified, after independent audit, to the highest level of all the published sections of the EN50600 standard.

EN50600 Information technology. Datacentre facilities and infrastructures, is Europe's datacentre infrastructure standard, and unlike some certifications which only focus on power and cooling, EN50600 considers architectural requirements, cabling, security, BMS/DCIM and fire protection systems as well as power and cooling. Soon we will see an EN50600 datacentre management standard along with energy management standards and Key Performance Indicators published.

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CAPITOLINE   DATA CENTRE CONSULTANTS

Home   About Us ▾   Auditing ▾   Operations   New data centre ? ▾   Learning Zone ▾   Training ▾   Ask a Question ▾

EN50600 audit and certificate

The EN50600, European Data Centre standard is the most recent and comprehensive data centre standard to be published. Capitoline is pleased to be able to offer auditing and assessment of designs and facilities against the EN50600 Data Centre standard. Where a design or facility is deemed to meet substantially meet the requirements of the standard a certificate will be issued.

Almost every organisation in the world depends on IT to function. Whether they operate a large data centre or a small computer room, availability is of paramount importance. This has led to a focus on creating fault tolerant data centre design.

DatacenterDynamics
The Business of Data Centers.

HOME › CONTENT TRACKS › SECURITY + RISK

Underground European Data Hub gets EN50600 certification

1 June 2016 | By Peter Judge

Subterranean Luxembourg site gets EN50600 certification to aid differentiation

European Data Hub, based in Luxembourg has been certified to the EN50600 reliability standard, saying this is a way to differentiate itself from the large number of reliable data centers in the tiny European country that are certified to the Uptime Tier IV.

The underground data center, one of the largest facilities in Luxembourg, has become the first site in Europe - and probably the world - to claim compliance with the European EN50600 data center infrastructure standard, at the highest availability rating. The site is managed by commercial real estate company CBRE.

The EDH site already has Tier IV Design certification, but does not have the Constructed Facility certification of the actual built data center, according to information from Uptime Institute, which operates the Tier system for reliability certification. Instead, it has opted for the EN50600 standard, developed by the European standards body CENELEC. The EN50600 standard does not have a formal certificate, but EDH had its site audited by a data center auditing firm Capitoline.

NEN-EN 50600 Certificatie door een geaccrediteerde partij

- Geen geaccrediteerde NEN-EN 50600 certificering mogelijk

- Delen van de NEN-EN 50600 kunnen gebruikt worden voor geaccrediteerde ISO 9001, ISO 14001 en ISO 50001 certificaten

- *Self-declaration versus 3rd Party assessment - a "value judgement"*

There is nothing to stop a 3rd Party from assessing aspects of a data centre against conformance to EN 50600. The same is true for the owner or operator of a data centre. The lack of any true certification system for data centre renders both approaches, and any assessment against alternative 3rd party schemes, as being of equal technical status.

EN 50600 was developed to support the wide variety of business models associated with data centres. Self-assessment or self-declaration of conformance against the requirements outlined above is comparatively simple and may be attractive to enterprise owners - whereas a 3rd Party assessment against those same requirements may be more appropriate for owner-operators of data centres that market their services to others.

Self-declaration, rather than formal "certification", is all that is available. The application of a EuroNorm as the basis for that assessment is clearly a step forward but the choice of self- or 3rd Party assessment has to be based on the apparent and perceived value and application of the resulting assessment versus the cost of the process to be employed.
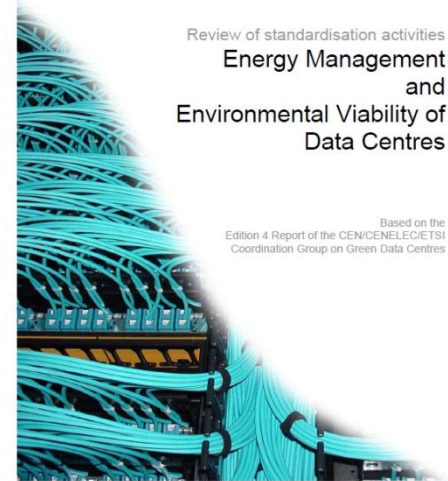
Review of standardisation activities
Energy Management and Environmental Viability of Data Centres

Based on the Edition 4 Report of the CEN/CENELEC/ETSI Coordination Group on Green Data Centres