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FOREWORD



In accordance with the “Special Regulations Nos. 4, 5 and 7” and the “Guide - Design, Construction, Set-up and Dismantling”, this Guidelines presents the general supplies and all the technical information needed to design and plan the technical system for Self-Built Exhibition Spaces. [Detailed specifications will be provided in dedicated Technical Dossier for each lot.](#)

This Guidelines intend to help Participant with various elements and requirements that must be considered while preparing the project of the Exhibition space.

This document provides Participant with references to relevant legislation for each item.

TECHNICAL SYSTEM

For each Participant's Self-built Exhibition Space, the Organizer will supply, for the six-months Event, the below listed utilities, in compliance with modalities indicated in this document.

List of Technical System

- Electrical system
- Condensation water for HVAC system (air conditioning water)
- Potable water system
- Service water system (non-potable for toilets, urinals, irrigation, facilities cleaning)
- Fire-fighting system
- Sanitary sewer system
- Stormwater sewer system
- Fire Detection and Fire Alarm system
- Emergency voice alarm communication (EVAC) system
- Supervision and control system
- Closed-Circuit Television(CCTV) system
- Access control system
- Anti-intrusion system
- Telecommunication and data transmission system

No natural gas supply is provided.

It will be the Participant's duty to ensure that all technical systems on its lot are properly designed, installed, tested, inspected and certified. A copy of the associated documentation must be provided to Expo 2015 S.p.A. (hereinafter "Organizer") prior to final operational start-up. Countries shall submit to the Organizer in digital format (.xls, .dwg, .doc) the final architectural and technological systems design for their pavilions. As explained in detail in the Technological Services Guide, despite the common areas of the Exhibition Site in which the Organizer will be directly responsible for the technology solutions deployed, within Self Built and Cluster Exhibition spaces, the Participant will be responsible of technology solutions. To support Participants in the design and implementation of technical services, the Organizer has included some of the services which will be highly integrated into the Expo 2015 technical infrastructure in the Basic Package of the Technology Services Guidelines and, as such, these services will be provided by Expo Official Partners. The

Organizer with its Official Partners defined a number of technology solutions aimed at addressing specific needs and requirements of Participants. The technology solutions proposed to Participants are designed to be seamlessly integrated with the Expo Milano 2015's technology frameworking order to guarantee integration of service operation an a continuity of the Visitor Experience inside/outside Exhibition spaces. The Organizer believes that this approach will enable a high level of features, quality, efficiency, and support service required to smoothly operate the Exobiton site during the six months of the event.. Moreover, the Organizer will directly guarantee the quality and the efficiency of technology solutions implemented by providing a single face reference point to interact with during the whole Event lifecycle and for all technologies involved. To guarantee the continuity of both the Visitor Experience and the site and service operations, the Organizer decided to guide the deployment and the integration of some basic technological solutions generally already foreseen by Participants within their Exhibition Space. In the Technological Services Catalogue annexed to the Technological Services Guide, the Organizer has developed a mandatory offer for Participants in order to build with all of them the first layer of Basic technological services that enable Participants to be fully integrated with Expo Milano 2015 Smart City Expo, in detail:

- Security & Access
- Basic Smart Energy
- Network, Internet & Cloud
- WI-FI
- Fixed Voice

Technical System Noise Level Requisites

Each Participat has to ensure the respect of noise level limits specified by D.P.C.M. 14 November 1997, "Limit values for noise sources", for Class III land use. According to DPCM 14-11-'97, maximum noise emission level at noise receptor, measured as equivalent continuous sound level (L_{eq} in dB(A)), can't exceed:

- 55 dB(A) from 6:00 a.m. to 10:00 p.m.
- 45 dB(A) from 10:00 p.m. to 6:00. a.m.

Anti-Seismic Requisites for All Technical System

Any element of a technical system that exceeds 30% of the total dead load on the floor where it is installed, or 10% of the total dead load of the entire structure, requires specific anti-seismic anchorage. Technical system elements not exceeding the above threshold levels must be designed in compliance with the requirements laid out in NTC 2008, section 7.2.4.

Furthermore, Participating Countries shall ensure compliance with all additional instructions for technical systems specified in the explanatory circular no. 617 of 2009 ("Instructions for the Application of New Technical Standards and Regulations for Buildings per Ministerial Decree of 14 January 2008").

ELECTRICAL SYSTEM

Electricity Distribution

Electricity will be supplied to lots at medium voltage (23 kV) or low voltage (400 V) via cable lines.

The MV cable line will arrive from an underground secondary distribution substation located in the green area of the lot, along the Decumanus, near the foundations for the canopy pillars.

The LV cable line will arrive from a secondary distribution substation located in the nearest Service Area. An amount of extra usable cable not less than 10 metres will be provided at the delivery point.

Power will be provided in relation to the lot area as follows:

- lots up to 1,000 sqm: 105 to 147 kW;
- lots from 1,000 to 2,000 sqm: 157 to 391 kW;
- lots from 2,000 to 3,000 sqm: 394 to 510 kW;
- lots greater than 3,000 sqm: 594 to 746 kW.

If Participants require additional power, this shall be generated through the use of appropriate ecological and sustainable devices that will represent innovation in pavilion design. However, even if power requirements remain within the limits specified above, Participants are encouraged to use ecological and sustainable systems and devices wherever and whenever possible.

Characteristics of Medium Voltage (MV) power supply:

- supply voltage 23kV \pm 5 %
- frequency 50 Hz
- distribution isolated neutral
- means of supply buried cable
- short circuit current 16 kA

Characteristics of Low Voltage (LV) power supply:

- supply voltage: three phases, 400V \pm 10%
phase-neutral or phase-earth, 230 V
- frequency 50 Hz
- distribution neutral solidly earthed
- earthing system TN-S

The electrical system, devices and materials have to meet IEC and/or EN standards.

Participating Countries have to provide an Uninterruptible Power Supply (UPS) to ensure continuity of electrical current in the event of a power outage. The UPS have to be properly sized to provide at least 1 hour of autonomous power to ensure safe evacuation of visitors, if necessary.

Power for the smoke detection system (including fire dampers, smoke evacuators, and other safety systems), emergency communication system, emergency lighting circuits and portions of the power outlet circuits have to be backed up by an UPS in order to ensure continuity of service if the mains supply is temporarily lost.

The Participant also has to provide a technical room that will contain the necessary MV and LV equipment (transformer, electrical panels, UPS, etc., depending on specific needs). The technical room have to be outfitted with a fire detection system that activates an alarm on the main supervision system and on the pavilion smoke detection system. Manuals and related diagrams, the general single-line wiring diagram and all necessary safety and control user points and equipment shall be located in the technical room. The technical room have to be ventilated or air conditioned, if necessary, to ensure that internal temperature remains below 30°C.

All points where cables enter or exit the technical room have to be sealed with appropriate REI 120 fire resistant barriers that are fully certified in terms of materials and installation.

A perimeter earth collector made of flat copper bar will be installed in the technical room. All structural conducting metalwork in the room will be connected to this collector using green-yellow ground wire of appropriate section. The metal structures, board foundation plate, and board grounding plate of electrical panels and the substation grounding system and all other relevant components will be connected so as to ensure equipotential of all conductive metalwork.

A release button on the UPS will allow disconnecting electrical power in emergency situations.

All release buttons will be clearly labelled and clearly specify which services they deactivate. Any use of the release buttons will be signalled on the main supervision and control system.

The cable lines for the electrical system and special systems have to be clearly and separately identified.

It has to be noted that the provision of MT lines and system are part of the basic Technology Service offered by Expo Partner.

Functional and Safety Earth System

A general grounding system shall be provided for the building, both to limit step and contact potentials and to ensure equipotentiality. This system will be connected to Expo general grounding system in several points.

Equipotential Connections and Earth Connections

The metal pipes, metal conduits, principal concrete reinforcement rods and main metal frame members will all be connected to the building grounding system.

Atmospheric Discharge Protection

Verification in accordance with standards (see CEI EN 62305) have to be performed by Participants for protection against atmospheric discharges.

Distribution of LV electricity - Cables and Conductors

Cables for electricity distribution and special systems (public address, smoke detection, CCTV, etc.) will consist of a copper conductor with cross linked elastomeric or rubber insulation.

Electrical cables have to bear a quality certification marking and be appropriately sized and coordinated with protection measures as specified in relevant IEC standards. They shall be self-extinguishing and fire retardant (CEI 20-35/EN60332, CEI 20-37, EN50267, CEI 20-38 and CEI 20-22) for ordinary installations and fire resistant (CEI 20-45) for emergency and safety systems such as Emergency Voice Alarm Communication (EVAC) systems, emergency lighting systems, main power to the fire detection system, power to forced smoke and heat evacuation systems, emergency controls, alarm panels and signalling systems (e.g., fire damper controls, Air Handling Units (AHU) shutdown, EVAC interfacing systems, etc.), and generally for all security and safety systems that require fire resistant electrical power cables.

All the cables (both for ordinary installations and fire resistant) shall be halogen-free rated for ultra-low emission of smoke and toxic gases and without corrosive gases.(CEI 20-37 , EN 50267,CEI 20-38).

Non metallic pipes and accessories must be self-extinguishing and halogen-free.

Monomodal fibre-optic cables shall be used for signal transmission to and from the supervision and remote control systems.

All cables and wires will be appropriately coded and marked so as to ensure unambiguous identification.

Ordinary Lighting

Normal lighting system shall ensure lighting levels as specified by applicable standards (UNI EN 12464).

Outdoor lighting

Outdoor lighting systems must be designed using appropriate criteria and methods for preventing light pollution and upward light dispersion, with particular emphasis on eco-sustainability and maximization of energy savings and safety levels (e.g. equipment for the reduction of the luminous flux and remote control).

It is prohibited, for merely purposes of reference, to have light beams facing upwards.

Outdoor lighting installations shall be designed and constructed in compliance with LR 17/2000 and s.m.i. and D.G.R. Lombardia n.VII/6162 of 20/09/2001.

It has to be noted the Outdoor lighting is part of the basic technology package offered by Expo 2015 Official Partner.

Security Lighting and Signaling

Security lighting and signaling system shall provide minimum lighting levels during power outages and shall indicate the emergency exits by means of luminous signs.

Security lighting shall be installed along emergency exit routes and in external areas. In general, the system shall meet the requirements of the UNI EN 1838 standard. Power to the security lighting and signaling system shall be ensured by an UPS with at least 1 hour autonomy.

Power cables for security lighting and signaling systems shall be fire resistant.

Laws, codes and standards

The list below contains the principal applicable laws and technical codes and standards for the design, installation, and testing of special systems present on the lot:

- D.P.R. no. 547 of 27 April 1955 - "Legal provisions in force regarding accident prevention, fire protection, and the construction of equipment and systems";
- C.E.I. (Comitato Elettrotecnico Italiano - Italian Electrotechnical Committee);
- U.N.I. (Ente Nazionale Italiana di Unificazione - Italian Unification Authority) - U.N.E.I. (Unione dell'Elettricità Italiana - Italian Electricity Union);
- Standards for technical specifications and special standards for utility systems and materials;
- Special regulations issued by local Fire Departments, local authorities, ISPESL (Superior Institute for Workplace Health and Safety), ASL (Local Healthcare Agency), or local electricity authority;
- D.M. no 37 of 22 January 2008 - Regulation regarding the enactment of Article 11-quaterdecies, subsection 13, letter a) of Law no. 248 of 2005 reorganizing provisions for installation of systems in buildings.
- Law no. 626 of 5 March 1990 - "Standards and regulations regarding

improvements in workplace health and safety” and associated variants.

- European Directive 96/92/EC of 19 December 1996 regarding shared standards for the European electricity market.
- D.L. no. 79 of 16 March 1999 - Enactment of European Directive 9/92/EC regarding shared standards for the European electricity market.
- Resolution no. 91/99 of the Electricity and Gas Authority. Definition of method for identifying and verifying suitable clients and creation of the list of suitable clients.
- Resolution no. 66/01 of the Electricity and Gas Authority. Modification of method for verifying the quality of suitable clients as referred to in Resolution no. 91 of 30 June 1991 of the Electricity and Gas Authority.
- UNI EN 1838 - Application of illumination engineering. Emergency lighting
- UNI EN 12464 – “Workplace Illumination”
- CEI 20-22 - Electrical cable fire tests
- CEI 20-36 - Electrical cable fire resistance tests, Part 4 and Part 5
- CEI 20-37 - Shared cable fire test methods. Tests of gases emitted during combustion of electrical cable materials
- CEI 20-38 - Halogen-free electrical cables with fire-retardant rubber insulation for nominal voltages U0/U not exceeding 0.6-1 kV.
- CEI 20-45 - Electrical cables with fire resistant, fire retardant, halogen-free (LS0H) mixed elastomeric insulation for nominal voltages U0/U of 0.6-1 kV.
- EN 50200 – Fire resistance test methods for unprotected emergency circuit wiring.

- Electromagnetic Compatibility

Conformity to European Directive 2008/108/EC (“EMC Directive”), which must be referenced in the Technical Booklet of the products and components used.

The products and components used must meet the requirements of applicable EMC standards; Levels of electromagnetic disturbance must comply with the EMC product and context standards (the assumed contexts are residential, commercial, and light industry).

The main reference codes and standards are:

- EN 61000-6-3 Electromagnetic Compatibility. General emission standards. Part 1: Residential, commercial and light-industry spaces.
- EN 61326-1 Electrical metering, monitoring and laboratory equipment. Electromagnetic compatibility regulations. Part 1: general rules.
- EN 55014-1 Electromagnetic Compatibility. Requisites for household electrical appliances, electrical tools, and similar devices. Part 1: Emission.

- EN 55022 Measurement methods and limits for radio interference caused by information technology devices.
 - EN 61000-3-2 Electromagnetic compatibility, Part 3: Limits Section 2: Harmonic current emission limits (equipment with input current $\leq 16\text{A}$ per phase).
 - EN 61000-3-3 Electromagnetic Compatibility. Part 3: Limits Section 3: Voltage fluctuation and flicker limits in low-voltage system for equipment with nominal current $\leq 16\text{A}$.
 - CEI EN 50160: Characteristics of voltage provided by public electricity grids.
- Outdoor lighting
 - L.R. Lombardia 17/2000
 - D.G.R. Lombardia no. VII/6162 of 20 September 2001

MECHANICAL SYSTEM

Air Conditioning Cooling Water Distribution Network

Cooling water from the canal surrounding the Expo Site will be provided to each lot for air conditioning purposes (assume a canal water temperature of $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for system design). This water will be distributed via a dedicated network of supply and return pipes. The minimum pressure available to the buildings is 100 kPa.

Quantities of cooling water will be determined in accordance with lot size:

- lots up to 1,000 sqm: from 2.5 to 3.8 l/s;
- lots from 1,000 to 2,000 sqm: from 4.3 to 7.4 l/s
- lots from 2,000 to 3,000 sqm: from 7.8 to 10.5 l/s;
- lots over 3,000 sqm: from 11.1 to 18.0 l/s.

Cooling water will circulate through a heat exchanger inside the buildings on each lot. The heat exchanger and circuit must be designed to allow variable flow rate to ensure the temperature increase of the cooling water does not exceed 10°C .

The quantity of water circulating in the system will be user-regulated by means of a 2-way modulating valve. The Organizer will have control of an additional valve installed in a dedicated inspection pit located along the secondary side routes. Under normal conditions, this valve will be closed. However, if the temperature of the heat exchanger return water exceeds set limits (i.e., if the temperature increase is more than 10°C) this valve will be opened.

The heat exchanger will be connected to a chiller for the production of the cooling fluid that will circulate in the pavilion HVAC system. The heat exchanger and chiller will be provided and maintained by Participants or association(s) to whom the lot is assigned.

The test pressure of this network is 16 bar: pipework and valves must therefore be suitably dimensioned to handle such pressure.

All lots will be served by the external main utilities ("piastra") cooling water network: hook-up points shall be located in inspection pits.

In accordance with the estimated cooling power needs for each lot, the chillers shall have:

- an Energy Efficiency Ratio (EER) ≥ 4 for chillers with cooling power not exceeding 100 kW;
- an EER ≥ 5 for chillers with cooling power exceeding 100 kW.

Heat pumps must comply with the prescriptions contained in D.G.R. Lombardia 8745 of 22 December 2008 and specifically with the limit values in Table A.5 as follows:

A.5 Limit values for heat pump energy performance

<i>Heat pump</i>	<i>Type</i>	<i>Nominal operating conditions</i>	<i>COP- GUE</i>
Electrical			
	air - water	7°-35°	≥ 3.00
	water - water	10°-35°	≥ 4.50
	soil - water	0°-35°	≥ 4.00
	soil - air	0°-20°	≥ 4.00
	water - air	15°-20°	≥ 4.70
	air - air	7°-20°	≥ 4.00
Endothermic			
	air - water	7°-30°	≥ 1.38
	water - water	10°-30°	≥ 1.56
	soil - water	0°-30°	≥ 1.47
	soil - air	0°-20°	≥ 1.59
	water - air	10°-20°	≥ 1.60
	air - air	7°-20°	≥ 1.46
Absorption			
	air - water	7°-50°	≥ 1.30
	soil - water	0°-50°	≥ 1.25
	water - water	10°-50°	≥ 1.40

Coefficient of Performance (COP) and Gas Utilization Efficiency (GUE) limit values for electrical, endothermic, and absorption heat pumps

It is recommended to exploit the excess heat produced by the air conditioning equipment as a heating source for sanitary water. We recommend not to use electric boilers.

The electricity supplied to each lot includes a portion dedicated to climate control.

The connection of booster pumps to the cooling water network is not allowed. The addition of additives of any type to the cooling water loop is strictly forbidden.

Pipes should be insulated to prevent condensation.

The cooling water pipes must be white on the outside to clearly identify them. The pipework layout and controls should be designed so as to allow easy inspection and maintenance.

The air conditioning systems must comply with all laws and regulations in force in Italy and in the Region of Lombardy.

Water consumption will be monitored for each exhibition space by means of water meters installed at the supply points for each lot.

Potable Water Network

The minimum pressure available for the building will be 2 bar. Quantities will vary depending on lot area:

- lots up to 1,000 sqm: 0.36 to 0.50 l/s (litres per second);
- lots from 1,000 to 2,000 sqm: 0.50 to 0.82 l/s;
- lots from 2,000 to 3,000 sqm: 0.82 to 1.32 l/s;
- lots over 3,000 sqm: 1.32 to 2.59 l/s.

The network test pressure will be 16 bar: the installed pipework and valves must be suitable for such pressures.

All lots will be served by the external Potable water network in the main utilities system ("piastra"): the hook-up points shall be inspectable. At each point of supply the following devices will be installed in the listed order: a butterfly valve, a water meter, a backflow preventer, and a butterfly valve operated by a servo motor (allowing the water supply to each building to be shut off remotely).

There will also be a bypass line with butterfly valve to ensure supply continuity during operation maintenances on the meter or on the backflow preventer.

The design of the Potable water system shall comply with UNI EN 806 standard "Specification For Installations Inside Buildings Conveying Water For Human Consumption" and UNI 9182 "Hot and Cold Water Supply and Distribution Installations – Design, Testing, and Management Criteria".

Only devices supplying Potable water may be connected to the Potable water network. This may include components such as faucets, showers, kitchen sinks, beverage vending machines, etc.

Participants are asked to observe point NC-2009 WEC3 (LEED certification) for Water Use Reduction. Specifically, it is recommended that participants adopt strategies that will reduce their water consumption by at least 30%.

The connection of booster pumps to the network is not allowed.

Pipes should be insulated to prevent condensation.

Pipes for Potable water pipes must be blue on the outside to clearly identify them.

The pipework layout and controls should be designed so as to allow easy inspection and maintenance.

Water consumption will be monitored for each exhibition space by means of water meters installed at the supply points for each lot.

Service Water Network (toilets, urinals, irrigation, facilities cleaning)

The minimum pressure available for the building will be 2 bar. Quantities will vary depending on lot area:

- lots up to 1,000 sqm: 1.10 to 1.26 l/s;
- lots from 1,000 to 2,000 sqm: 1.26 to 1.82 l/s;
- lots from 2,000 to 3,000 sqm: 1.82 to 2.34 l/s;
- lots over 3,000 sqm: from 2.34 to 3.33 l/s.

The network test pressure will be 16 bar: the installed pipework and valves must be suitable for such pressures.

All lots will be served by the external piastra (main utilities network) service water network: the hook-up points shall be inspectable and include, in the following order: a butterfly valve, a water meter and a servo-motor operated butterfly valve allowing water to be shut off to each building remotely. There will also be a bypass line with butterfly valve to ensure continuity of supply in the event of maintenance operations on the meter. Service water pipes must be green on the outside to clearly identify them.

Only devices using sanitary water for non-Potable purposes shall be connected to the service water network. These include toilets, urinals, cleaning water spigots, irrigation systems, and any other equipment that uses non-potable water.

Participants shall make all efforts to reduce consumption of irrigation water by 50%, in spite of the fact that the use of water from the sanitary water network fully meets the NC-2009 WEc1 requirement (LEED certification) for Water Efficient Landscaping.

For specific detail concerning irrigation water for food production, please kindly observe Point NC-2009 WEc3 (LEED certification) for Water Use Reduction. Specifically, Participants shall adopt strategies that provide a minimum 30% reduction in water consumption.

The connection of booster pumps to the network is not allowed.

Pipes should be insulated to prevent condensation.

The estimated sanitary water needs are based on the use of tank toilets.

The pipework layout and controls should be designed so as to allow easy

inspection and maintenance.

Water consumption will be monitored for each exhibition space by means of water meters installed at the supply points for each lot.

Laws, codes and standards

The list below contains the principal applicable laws and technical codes and standards for the design, installation, and testing of special systems present on the lot:

- D.P.R. 459/96 Regulation for the enactment of Directives 89/392/EEC, 91/368/EEC, 93/44/EEC and 93/68/EEC on the approximation of the laws of Member States regarding machinery;
- Utility system maintenance law;
- D.P.R. no. 547 of 27 April 1955 - Standards for workplace accident prevention
- D.G.R. Lombardia no. 8-8745 of 22 December 2008 – Resolutions regarding legal provisions for energy efficiency in buildings and building energy certification
- D.Lgs. no. 115 of 30 May 2008 - Enactment of European Directive 2006/32/EC regarding energy end-use efficiency and energy services and repealing European Directive 93/76/EEC.
- D.Lgs. no. 192 of 19 August 2005 - “Enactment of European Directive 2002/91/EC on the energy performance of buildings”
- D.Lgs. no. 311 of 29 December 2006 - “Corrections and supplemental provisions to D.Lgs. no. 192 of 19 August 2005, enacting European Directive 2002/91/EC on the energy performance of buildings”.
- D.L. of 26 January 2010 - Update of D.L. of 11 March 2008 regarding energy upgrades of buildings (Official Bulletin no. 35 of 12 February 2010).
- D.P.R. no. 412 of 26 August 1993 – “Regulation providing standards for the design, installation, operation and maintenance of building heating/cooling plants in order to reduce energy consumption in application of Article 4, Subsection 4 of Law no. 10 of 9 January 1991”.
- D.P.R. no. 59 of 2 April 2009 - Enactment regulation for Article 4, Subsection 1, Letters a) and b) of D.Lgs. no. 192 of 19 August 2005, regarding the enactment of European Directive 2002/91/EC on energy performance of buildings.
- D.M. no. 37 of 22 January 2008 Ministry of Economic Development - Regulation regarding the enactment of Article 11-quaterdecies, Subsection 13, Letter a) of Law no. 248 of 2 December 2005, reorganizing provisions regarding installation of utility systems in buildings - (Official Bulletin no. 61 of 12 March 2008).
- UNI 9182 STANDARD- “Hot and cold water supply and distribution systems. Design, testing and operating criteria.”
- UNI EN STANDARD 806 - “Specifications of drinking water supply systems in buildings”.

- UNI STANDARD 10339 – “Air handling systems for occupant wellbeing. General information, classification and requisites. Rules for bid requests, proposals, orders and supply.”
- UNI EN STANDARD 13779 – “HVAC performance requisites”
- EN 1366-2:1999 – “Service plant fire resistance tests – Fire dampers”

Fire Fighting system

All lots will be connected to the Fire fighting network in the main utility system (“piastra”) and supplied by two De110 offtakes.

Water is supplied to the Fire fighting network from four double groundwater wells located south of the Expo Site.

The system test pressure is 16 bar.

The maximum flowrate for each lot is 6.0 l/s.

The hook-ups are located in inspection manholes installed in the roadway around the lot. Each offtake will be equipped with a gate valve to regulate flow to the individual building.

The system shall be designed in compliance with D.P.R. n. 151 of 1 August 2011 – Simplified regulation of procedures regarding fire prevention per Article 49, subsection 4-quater, of Italian Legislative Decree no. 78 of 31 May 2010, implemented with amendments by Italian Law no. 122 of 30 July 2010.

The pipework must be dimensioned to allow a flow velocity of approximately 1 m/s and must be suitable to withstand the test pressure of 16 bar.

Measures must be taken to ensure that the water does not freeze inside the pipes (insulation or other means).

The fire water pipes must be red on the outside to clearly identify their use.

Portable or trolley-mounted fire extinguishers and proper fire fighting system signalling devices must be provided in compliance with fire regulations in force.

The final design must incorporate Fire Department requirements regarding the Fire Prevention Certificate (Certificato Prevenzione Incendi – CPI).

The pipework layout and controls should be designed so as to allow easy inspection and maintenance.

The Contractor must observe Italian D.P.R. of 1 August 2011 as regards fire prevention in all phases of the project, from obtainment of the Preliminary Feasibility Authorization (Nullaosta di fattibilità – NOF) to the completion of the CPI and the Certified Declaration of Work Start-up (Segnalazione Certificata di Inizio Attività –SCIA) and must, for this purpose, engage the services of a certified professional registered with the Italian Ministry of the Interior per Italian Law no. 818 of 7 December 1984.

Laws, codes and standards

The list below contains the principal applicable laws and technical codes and standards for the design, installation, and testing of special systems present on the lot:

- UNI STANDARD 10779 (July 2007): "Fire extinguishing systems. Hydrants. Design, installation and operation"
- D.M. n. 81 of 10 March 1998: "General criteria for workplace fire safety and emergency management"
- D.P.R. no. 151 of 1 August 2011 - Simplification of fire prevention regulation procedures per Article 49, Subsection 4-quater of D.L. no. 78 of 31 May 2010, amended and enacted into Law no. 122 of 30 July 2010.

SEWER SYSTEM

Sanitary sewer

The sanitary sewer system in each exhibition space comprises the internal collection system receiving wastewater from sanitary facilities (toilets, urinals, sinks, etc.) and secondary ventilation of the toilet discharge system.

All sanitary wastewater will flow into the Expo Site sanitary sewer system, which is connected to the Milan sanitary sewer system, which sends wastewater to the Nosedo and San Rocco wastewater treatment plants.

The sanitary sewer for each lot shall be made using PVC SN8, PE100 or vitrified clay pipes laid with an inclination assuring a minimum flow velocity of 0.5 m/s at average daily flowrate (see Circular of the Ministry of Public Works no. 11633).

It must be possible to inspect the pipework at specific points inside and outside the buildings. Properly sized inspection pits must be planned at every junction and change of direction, approximately one every 30 metres as a general rule.

An inspection trap must be installed immediately upstream of every point where the pavilion sewer system joins the Expo Site sanitary sewer network, external to the building lots. If the building is outfitted with kitchen facilities, an oil trap must be installed in the kitchen wastewater collection system.

No contaminants of any sort may be introduced into the sanitary sewer.

The sanitary sewer pipes must be black on the outside to clearly identify their use.

Stormwater sewer

The stormwater sewer system will collect all rainwater coming from building roofs, paved areas, and paved walkways in the outdoor exhibition areas.

All rainwater collected on the lot will flow into the Expo Site stormwater

sewer. Water in the Site stormwater sewer flows through an oil trap and settling basin, then into the phytopurification basins and is then released into the perimeter canal.

The stormwater sewer shall be dimensioned accounting for 10-year precipitation events (the threshold of severity that may be expected to occur only once every 10 years) as derived from a local rainfall chart.

The water shall flow through pipes made of PVC SN8, PE100 or prefabricated reinforced concrete. The pipeline must be outfitted with appropriately sized inspection pits at every inflow point and/or change of direction, generally one every 30 metres.

No contaminants of any sort may be introduced into the stormwater sewer. The stormwater sewer pipes must be grey on the outside to clearly identify their use.

Laws, codes and standards

The list below contains the principal applicable laws and technical codes and standards for the design, installation, and testing of special systems present on the lot:

- D.Lgs. no. 152 of 3 April 2006 - "Environmental standards"
- L.R. Lombardia no. 62 of 27 May 1985 – "Regulation of discharges from civil developments and public sewers".
- City of Milan - Local hygiene code, (R.I.)
- Regional Water Recovery Plan (P.R.R.A.) of the Region of Lombardy,
- Water Use and Protection Program (P.T.U.A.)
- Regional Regulations nos. 2, 3 and 4 of 24 March 2006.
- UNI EN 12056-1-5:2001 Gravity-fed discharge systems in buildings
- Circular of the Ministry of Public Works no. 11633
- UNI EN 752:2008 Wastewater discharge connections and sewer intakes outside of buildings.
- UNI EN 476:2011 General requisites for components used in wastewater discharge pipes, connections and sewer intakes for gravity-fed discharge systems.

SPECIAL SYSTEM

The following special systems are provided to each lot:

- Emergency voice alarm communication (EVAC) system
- Smoke/fire detection system
- Closed-Circuit Television (CCTV) system
- Access control system
- Anti-intrusion system
- Supervision and control system

Emergency Voice Alarm Communication (EVAC) System

An emergency evacuation public address system is planned for the external common areas and walkways on the Expo Milano 2015 Site.

Cable lines have been planned between the nearby Service Areas and the various pavilions to allow information transfer between the main supervision and control system and the internal pavilion evacuation systems.

The battery limit is represented by the special systems inspection pit located outside of the pavilion.

The EVAC system is obligatory both inside and outside of the pavilions and must be certified in compliance with the relevant standards and regulations (EN 54-4, EN 54-16, EN 54-24).

The EVAC system must be powered via an uninterruptible power supply (UPS) with fire resistant power cable with CEI 20-45 certification.

EVAC system speakers in every zone shall have two speakers lines (Line A and Line B), both using halogen-free fire resistant cables with ultra-low fume and toxic gases emission and without corrosive gases per CEI 20-45 standard.

The EVAC system shall notify for each speakers line any fault condition, as open circuit, and short circuit, and shall show the line number where fault conditions are present.

This system shall be installed in compliance with the UNI 72-40 standard, Part 19.

The EVAC system shall have clean (voltage-free) contacts to communicate conditions of alarm and malfunctioning to the main supervision and control

system.

The method and procedure of interaction between the pavilion EVAC system and the EVAC system in the common areas and walkways, will be determined during the pavilion design phase. It has to be noted that the EVAC system is part of the Technology service Basic Package and it will be provided and integrated by the Expo Official Safe City and Main Operation Center Partner.

Smoke/fire detection system

Smoke/fire detection system must be provided in compliance with the most recent edition of the UNI 9795 standard (currently the 2010 edition) and with fire department requirements.

All devices and equipment must be certified per EN 54 parts 2 and 4.

The central unit of the smoke/fire detection system must be powered via an uninterruptible power supply (UPS) with fire resistant power cable with CEI 20-45 certification. The same power system and cable must be used for all components of the system that are not directly powered by the central unit, such as the audible/visible notification appliances.

Regarding connections for the smoke/fire detection system components (sensors, call buttons, input/output modules), the UNI 9795 standard calls for cables that resist flames for a minimum of 30 minutes per CEI EN 50200 standard and that ensure ultra-low fume and toxic gases emissions and without corrosive gases.

Power to the smoke/fire detection system central unit, forced smoke/heat evacuation systems, fire dampers, emergency controls and signals (e.g., fire dampers closed, AHU stopped), interface between the smoke/fire detection unit and the EVAC system, acoustic/visual notification appliances, and other similar safety systems must be provided via halogen-free fire resistant cables that ensure ultra-low fume and toxic gases emission and without corrosive gases per CEI 20-45 standard.

The system shall be analogical with individually addressable sensors.

The smoke/fire detection system must be provided with a network connection so that it can be integrated with the Expo Site supervision and control system via an open protocol.

The control unit shall have clean (voltage-free) contacts to communicate conditions of alarm and malfunction to the main supervision and control system.

The battery limit is the special systems inspection pit outside of the pavilion.

The control unit must be powered as follows:

- a. integrated power unit with option of cascade connection and battery charging, with surveillance function meeting the EN 54-4 standard.
- b. power from batteries in emergency conditions / power outage.

The final design must account for fire department requirements for the Fire Prevention Certificate (Certificato Prevenzione Incendi – CPI) as well as any instructions or requirements from local or national public security authorities. It has to be noted that the Smoke detection system is part of the Technology service Basic Package and it will be provided and integrated by the Expo Official Safe City and Main Operation Center Partner.

CCTV

The videosurveillance system of Participants Exhibition Spaces together with the common areas external videosurveillance system will be integrated into the Expo Site video surveillance system provided by the Safe City and the Operation Center. Participants shall adopt Closed-Circuit Television Cameras with IP capability. Please refer to the Technology Services Guide, basic service package.

The battery limit for the Site security network connection is a special systems inspection pit outside of the Exhibition Space.

The method and procedure for interaction between the pavilion CCTV system and the common area videosurveillance system will be determined during the design phase.

Access Control System

On request, each Participant will have the option of communicating alarm or malfunction signals from the local access-control system in the Participant's pavilion to the main Site supervision system to ensure monitoring of anomalous conditions.

The means for achieving this will be defined during the design process.

Anti-intrusion System

On request, each Participant will have the option of communicating alarm or malfunction signals from the local anti-intrusion system in the Participant's pavilion to the main Site supervision system to ensure monitoring of anomalous conditions.

The means for achieving this will be defined during the pavilion design process.

Supervision and Control system

The main Expo Site supervision and control system will monitor the following consumption rates for each pavilion:

- Electrical power
- Potable water
- Sanitary water
- Cooling water

The meters that monitor this consumption will be installed by the Organizer in the point-of-delivery inspection pit for the lot and the data will be transmitted to the main supervision and control system via a PLC installed by the Organizer in the inspection pit.

As a further guarantee of fire safety, Participant shall install a pressure sensor in the firewater system and shall transmit the data to the main Expo fire supervision and control system.

Pressure sensors shall also be installed on the supply lines for Potable water, sanitary water, and cooling water and the data transmitted to the main Expo Site supervision and control system.

Voltage detection devices must also be installed on the MV and LV terminal blocks in the pavilion electrical panels, and this datum also shall be communicated to the main supervision and control system.

Any other possible status monitoring, measurements, or other needs shall be communicated to the Organizer when the project is presented.

The battery limit is the special systems inspection pit outside of the pavilion.

Laws, codes and standards

The list below contains the principal applicable laws and technical codes and standards for the design, installation, and testing of special systems present on the lot:

- EN 54-4, EN 54-16, and EN 54-24 STANDARDS for emergency public address/auditory alarm system.
- D.P.R. no. 246 Regulation enacting European Directive 89/106/EEC regarding construction products (CPD).
- D.P.R. no. 499 of 10 December 1999 "Regulation enacting European Directive 89/106/EEC.
- D.L. of 5 March 2007 Application of European Directive 89/106/EEC regarding construction products (CPD).
- UNI Standard 72-40, Part 19 "Fixed fire detection and alarm systems - Part 19: Design, installation, activation, operation and maintenance of voice alarm systems for safety purposes."
- UNI Standard 9795:2010 as subsequently amended" Automatic fixed fire detection and alarm systems. Design, installation and operation."
- EN 54 Standard for all sub-parts of fire-fighting legislation.

- UNI Standard 11224 "Preliminary check and maintenance of fire detection systems".
- EN 12094 Standard with all sub-parts
- CEI EN Standard 50131-1/IS2 "Alarm systems – Intrusion and robbery alarm systems".
- CEI Standard 79/2 "Breaking-and-entering, intrusion, and theft prevention systems and personal protection systems - Special standards for breaking-and-entering and intrusion prevention systems (N.B. For CCTV systems see Annexes A and B).
- CEI Standard 79/3 V1 "Breaking-and-entering, intrusion, and theft prevention systems, and personal protection systems - Special standards for breaking-and-entering and intrusion prevention systems (N.B. For CCTV systems see Section 6 "Requisites", Section 8 "Testing", and Section 9 "Maintenance")
- EN50132 Standard for CCTV systems.

VERTICAL CIRCULATION SYSTEM

Lift, Escalator and Travelator Systems

Should escalators, lifts or freight elevators be necessary inside the Exhibition Space, they must comply with the safety regulations and requirements for elimination of architectural barriers listed below.

The lifts must be equipped with return-to-floor systems in the event of a power outage. The lift cabin must have a user accessible emergency button and a telephone line connecting to the organization in charge of maintenance of the systems.

Laws, codes and standards

The list below contains the principal applicable laws and technical codes and standards for the design, installation, and testing of special systems present on the lot:

- European Directive on Lifts 95/16/EC, enacted into Italian law as D.P.R. no. 162 of 30 April 1999
- D.M. of 18 September 1975 "Technical safety standards for the construction and operation of escalators for public use".
- UNI EN Standard 115:2005 "Safety rules for the construction and installation of escalators and moving walkways (travelators)."
- D.P.R. no. 162 of 30 April 1999 - Regulation for enacting the European Directive on Lifts 95/16/EC and simplifying procedures for obtaining authorization and operating licences for lifts and freight elevators.
- L. no. 13 of 9 January 1989 - "Provisions to promote the elimination or circumvention of architectural barriers in privately owned buildings."
- D.M. no. 236 of 14 June 1989 - "Technical provisions for guaranteeing the accessibility, adaptability, and visitability of privately owned buildings and subsidized or facilitated public residential buildings in order to overcome or eliminate architectural barriers."
- L.R. Lombardia no. 6 of 20 February 1989 "Standards and technical implementation provisions regarding the elimination of architectural barriers".
- D.P.R. 459/96 Regulation for the enactment of Directives 89/392/EEC, 91/368/EEC, 93/44/EEC and 93/68/EEC on the approximation of the laws of Member States regarding machinery.
- D.P.R. no. 547 of 27 April 1955 - Standards for workplace accident prevention

Legal abbreviation and acronyms



L. (Legge - Law)

D.L. [Decreto Legge – Law Decree]

D.Lgs. [Decreto legislativo – Legislative Decree]

D.M. [Decreto ministeriale – Ministerial Decree]

D.P.R. [Decreto del Presidente della Repubblica – Presidential Decree]

L.R. Lombardia [Legge Regionale, Regione Lombardia – Regional Law, Lombardy Region]

D.P.G.R. Lombardia [Decreto del Presidente della Giunta Regionale Lombarda - Decree issued by the Chairman of the Regional Committee -Lombardy Region]

D.G.R. Lombardia [Deliberazione della Giunta Regionale, Regione Lombardia - Regional Committee Resolution, Lombardy Region]

V.I.A. [Valutazione di Impatto Ambientale - EIA Environmental Impact Assessment]

s.m.i. [successive modifiche e integrazioni – subsequent amendments]

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