Grupa LOTOS S.A.	**TECHNICAL SPECIFICATION**	Spec. N° 5210
	Internal systems and connections to external systems	

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1 Subject of specification

This specification used in conjunction with other technical specifications of LOTOS Group S.A., establishes minimal requirements regarding designing and execution of technical equipment of buildings in scope of building engineering systems and equipment: sanitary, heating, gas, ventilation, electrical, telecommunication and fire protection systems, and their connections to external systems.

2 Scope of validity

This specification shall be used when preparing both quotations and Purchase Orders concerning planned LOTOS Group S.A. new investments and modernizations.

It shall also be a base for preparation of other detailed specifications and quotations relevant for package units or other equipment deliveries.

2.1 Deviations

Any deviations from this specification and relevant specifications, standards and documents, including the bidder's proposals indicating a more economic design or solution, shall be submitted in writing for checking and approval by LOTOS Group S.A. No deviation or modification shall be permitted unless confirmed in writing by LOTOS Group S.A.

The bidder shall present in written form any ambiguity in this standard or any other LOTOS Group S.A standards as well as conflict with referenced documents/standards, and shall receive LOTOS Group's written explanation.

2.2 Exclusions

Scope of this specification does not include detailed requirements for components of building engineering systems and equipment, specified in technical regulations and Polish Standards concerning such systems, as well as in appropriate technical specifications.

Scope of this specification does not cover technical and material solutions, either, which should be determined on design documentation elaboration stage.

3 Hierarchy of documents

In case of conflicts existing between this specification and other documents, the following order of precedence shall govern:

- The current Polish legislation
- Terms of purchase order / contract and other requirements agreed in writing with GLSA
- Data Sheets approved by GLSA
- This specification
- Other Specifications
- Drawings and other documents
- Standards

4 General requirements

4.1 Technical documentation

Scope of developed technical documentation for building engineering systems, and equipment in buildings includes:

- *in order to obtain building permission:*
  - building project worked out according to the Law [1)], in the scope and form determined in detail by the order [3)];
  - information concerning safety and health protection in relation to specifics of designed building object and conditions for execution of works, being taken into account in safety and health protection plan, elaborated according to the order [5)];

Caution: according to art. 29 of the Law [1)], the following activities do not require permission, but only notification of appropriate body:

a) construction of connections: power engineering, water supply system, sewerage, gas, heating and telecommunication ones,

b) execution of construction works consisting in refurbishment of existing building objects and equipment (i.e. among others, system connections and equipment);

- *for works realization purposes:*
  - realization project, constituting independent study, containing drawings along with descriptive explanations, supplementing and detailing of building project (in scope and to degree necessary for works take-off, investor cost estimate, preparation of offer by contractor and realization of construction and installation works).
    Requirements related to form of realization projects are adopted as for building project accordingly.
- *in order to obtain permission for utilization of object / system:*
  - as-built documentation, i.e. construction documentation with plotted-in changes that have been introduced in course of works' realization, as well as indispensable geodetic as-built measurements, and set of required acceptance reports for connection systems as well.

Technical documentation should be elaborated according to currently valid norms and regulations (the schedule in p. 7 of this specification), as well as according to technical knowledge principles, with consideration given to additional technical requirements and standards in force within LOTOS Group S.A. area.

Any changes in technical documentation, introduced in course of object realization, should be taken into account in as-built documentation.

4.2 Other issues

- All proposed solutions and measures used should, first of all, fulfil basic requirements determined in art. 5 of the Law [1)].
- According to art. 5 of the law [2)], during execution of works one should use building products, which are CE marked, building mark „B" marked, or included in schedule of products specified by European Commission.

- Realization of construction works can proceed after obtaining of building permission, if required, on the grounds of technical documentation and project of works' organization, while keeping to safety conditions determined in „Safety and Health Protection Plan".
- Introduction of significant changes in course of construction (deviation) from approved building project, or other conditions of the building permission, requires approval of LOTOS Group S.A. as well as author of building project.
- If binding regulations and standards impose more stringent requirements than this specification, which increase safety, utilitarian virtues and durability of installation conduits and equipment, priority should be given to such requirements.

5 Basic data

In order to:

- minimize costs of operation and management
- increase job comfort,
- increase property, personal and information safety

all installation systems should be designed in a way enabling full synchronization of their operation, through uniform system of equipment control and monitoring in whole building.

5.1 Internal systems

- *Water supply system*

Water supply system should be designed and executed in a way providing water source in the building, according to its destination, and should meet requirements determined in Polish Standard related to water supply systems designing, as well as technical conditions contained in the order [6)].

Water supply system for cold water should meet requirements specified in separate regulations relating to fire protection, and in Polish Standard relating to fire water supply systems.

Hot water supply system should be designed and executed in such a way, so that amount of thermal energy necessary for preparation of this water would be maintained on reasonable low level.

- *Sewerage and rainwater system*

Sewerage system of building should enable carrying away of liquid wastes, and also rainwater from this building, if it is not carried away on plot area, as well as should meet requirements determined in Polish Standards, regarding these systems.

Sewerage system of building, to which liquid wastes are carried away that do not meet conditions regarding protection of earth and waters, as well as conditions of carrying away liquid wastes to sewerage system determined in separate regulations, should be provided with equipment serving for their purification to state that complies with these regulations.

- *Heating systems*

A building, which considering its destination requires heating, should be provided with heating system or other heating equipment.

Water heating system should be designed in such a way, so that amount of make-up water demand would be possible to maintain on reasonable low level.

Heating systems should be provided with adequate control and measuring instruments, ensuring their safe and effective utilization.

Enclosure of heating system conduits should enable replacement of the system without spoiling the building structure.

- *Gas systems*

Provision of buildings with gas and with gas systems should correspond to utilitarian needs and conditions resulting from physical and chemical properties of gas, as well as to technical conditions of connection to gas network, specified by gas supplier.

Gas systems supplied with liquid gas can be made only in low buildings.

Gas systems supplied with gas of density greater than that of air, cannot be used in rooms where floor level is situated below surrounding area, and in which telephone manholes or installation and revision pits are located below floor level.

Gas equipment can be installed only in rooms fulfilling conditions regarding their height, cubature, ventilation and flue gases exhaust, as well as combustion air inflow, determined in order [6)], Polish Standards and separate regulations.

Conduits of gas system should be located, in relation to conduits of other systems constituting building infrastructure, in a way ensuring safety of their usage and possibility of maintenance work performing.

- *Electrical installations*

Buildings should be provided with the following installations: lighting, plug-in sockets, earthing and lightning protections.

Electrical installations and equipment, while keeping to provisions of order [6)], separate provisions related to delivery of energy (Energy Law), fire protection, environment protection, as well as health and safety at work provisions and Polish Standards relating to these systems, should provide:

1) delivery of electric energy featuring adequate technical parameters, according to user needs,
2) protection against electric shock, switching and atmospheric overvoltages, fire break, explosion and other damages,
3) protection against vibrations and noise emission exceeding allowable level, as well as against harmful influence of electromagnetic field.

Routing of installation and arrangement of electrical appliances in building, should ensure lack of conflicts with other systems as regards distance and mutual situation.

Electrical conductors and cables should be routed in a manner enabling replacement without need for spoiling of building structure.

Power engineering conductors routed within underfloor space of raised floor, used for room ventilation or heating, should be guarded or encased with enclosure of fire resistance at least EI30, and in building with fire zone of fire load density above 4000 MJ/m2 – at least EI60.

In fire zones with cubature exceeding 1000 m^3 or containing explosion hazard zones, fire breaker switches should be used.

Lightning protection system should be executed according to Polish Standard concerning lightning protection of building objects.

- *Telecommunication systems*

  According to needs, buildings should be provided with the following installations and systems:

  - standard telephony,
  - radiotelephone communication,
  - sound amplification,
  - public addressing (wire broadcasting system),
  - fire detection and signalling,
  - CCTV (supervision)
  - access control
  - burglary signalling.

Method of installation routing should be adapted to conditions in buildings, so as to provide easy access for technical service staff and possibility for modernization or extension of installation systems.

Telecommunication systems should be routed in separate trains, maintaining adequate distances of approaches and crossings with other building systems.

Culverts cannot impair fire resistance of walls and ceilings.

- *Ventilation and air-conditioning*

Ventilation and air-conditioning should ensure adequate quality of interior environment, while keeping to separate regulations and requirements of Polish Standards regarding ventilation, as well as conditions of fire safety and acoustic requirements, specified in order [6)], and effective energy consumption.

Mechanical or gravitational ventilation should be provided in rooms destined for stay of persons, in rooms without opened windows, and in other rooms, in which for hygienic, technological or safety reasons, provision of air exchange is required.

Air-conditioning should be employed in rooms, in which for utilitarian, hygienic or technological reasons, necessity exists for maintaining of adequate internal air parameters, specified in separate regulations and in Polish Standard regarding analytical parameters of internal air.

In case when building contains technical and office rooms, air-conditioning systems should constitute separate, independent systems.

Air-conditioning or ventilation cannot bring about draughts, excessive cooling or overheating of work rooms (this doesn't apply to emergency ventilation).

Equipment being installed in a room, and in particular that consuming air, cannot produce interferences limiting effectiveness of ventilation functioning.

The equipment or its components, from which harmful gases, vapours or dusts can evolve, should be air-tight sealed. Should this is impossible, the equipment shall be provided with local exhaust hoods.

In rooms, which should be protected against influence of contaminants from adjacent rooms and from external environment, positive pressure mechanical ventilation should be employed.

In case when windows, door, balcony door and other closures of external openings of high air-tightness are used in rooms, which makes impossible of external air infiltration in volumes necessary for ventilation purposes, then forced mechanical ventilation should be foreseen, or adequate pressure ventilation equipment, according to p. 2.3.2 of Annex N° 2 to order [6)].

Equipment of mechanical ventilation and air-conditioning, such as: central air-condition, air-conditioning units, heating and cooling – ventilation units, should be installed with provision for its periodical inspection, maintenance, repair or replacement possibility.

Ventilation and air-conditioning machine rooms in building of height above two overground storeys, should be separated by means of walls featuring fire resistance class at least EI60, and closed with door of fire resistance class at least EI30; this does not apply to enclosure of equipment installed over roof of the building.

Conduits leading from explosion endangered room cannot be connected with conduits from other rooms in ventilation and air-conditioning systems.

Ventilation conduits and inspection door, used in ventilation ducts and conduits, should be made of non-combustible materials.

Ventilation and air-condition conduits, in place of passage through fire separation elements, should be furnished with fire cut-off door of fire resistance (EI) equal to fire resistance of the element of fire separation, or should be encased with elements featuring resistance class as mentioned above.

- *Smoke exhaust ventilation system*

Smoke exhaust system should be closely integrated with fire safety system of building. Smoke exhaust system should be designed and realized with consideration given to requirements specified in valid technical construction regulations and Polish Standards, with regard to the following conditions:

1) automatic make-up air inflow to building with small speed, that is the speed, which shall not cause mixing of smoke with clean air layer and „pulling it" downward (1 m/sec is assumed as limit value);
2) openings serving for smoke removal cannot be endangered on such wind influence, which would restrict smoke removal effectiveness through smoke door, built-in roofs of significant inclination, as well as on roofs built in vicinity of higher buildings or building part;
3) for mechanical smoke exhaust systems, adequate resistance to high temperature should be ensured for smoke carrying conduits, smoke removing fans, supply cables, as well as suspensions of smoke removing conduits.
4) electric supply of the systems must be routed with bypassing of fire breaker switch
5) provision of gradual starting of fans (in mechanical smoke exhaust system, in which fan forced draught is used), in order to limit requirements for conduits and supply system, connected with high starting currents of their motors;
6) mouths of smoke exhaust fans should be such positioned, so that hot fire fumes and gases would not cause ignition of roof insulation.

Smoke door (or smoke – ventilation door) should be made in a manner ensuring reliable operation for multiple uses. In case of two-function door, multiple opening of door to ventilation position cannot influence method and speed of the door opening to position, in which it acts as smoke removal device.

It is recommend to use smoke exhaust system by means of electrical drives, which simultaneously realizes smoke removal, ventilation and remote closing of smoke door functions.

Time necessary to fully open of door during alarm should not exceed 30 seconds.

Maximum length or diameter of door should be not greater than 2.5 m.

Height of door base measured from surface of finished roof should be not less than 0.3 m.

5.2 Building Management System (BMS)

Need of effective management of building resources, increasing its safety and provision of high work comfort for its users, decides on necessity to use in some buildings, indicated by LOTOS Group, integrated systems of building monitoring and management (BMS), which ensure central control and monitoring – by means of control modules or through independent and separated central units – of all technical systems in a building.

In selected buildings, control of heating, ventilation and air-conditioning, as well as electrical systems should be foreseen.

Considering safety of users and the sub-systems themselves, integrated building management system (BMS) should not interfere in operation of safety systems (detection and signalling of fire, burglary and assault, access control, sound amplification for evacuation purposes, etc.), but only monitor them, acquiring operating data from them for purposes of their analyse and visualisation.

BMS systems must be fully flexible – they have to allow for configuration change and system extension, corresponding to changing needs.

5.3 Connections to external systems

Passages of systems through external walls of building, located below ground area, should be protected against possibility of gas penetration into building interior.

Containment system penetrations with diameters in excess of 4 cm in outer walls, for which fire resistance class requirement is at least EI60 or REI60, should have EI fire resistance class of these elements.

Technical rooms, where connections and system equipment for central heating, watermeter, etc., are located, should have walls made in a manner ensuring maintaining of cleanness, non-slippery floors, washable; catch basin grate and a valve with hose union should be installed in the room.

Technical room, where noise or vibrations generating equipment is installed, can be located in immediate neighbourhood of permanent work rooms on condition, that constructional and material solutions used would ensure protection of these rooms against arduous influence of that equipment, according to requirements of order [6)] and Polish Standards, regarding allowable noise and harmful vibration level in rooms.

5.4 Handy fire fighting equipment

Objects should be equipped with extinguishers (handy extinguishing equipment) fulfilling requirements of Polish Standards. Type of extinguishers should be adapted to those group of fire extinction, specified in Polish Standards regarding division of fires, which can happen in specific objects, as well as to area of fire zone in building, category of hazard for people, value of fire load and explosion hazard.

The following conditions should be met for arrangement of extinguishers (handy extinguishing equipment):

- the equipment should be located in easy accessible and visible places: at outdoor exits
- rooms, at passages and corridors, at entrances to building and staircases,
- places of extinguishing equipment storage should be marked according to Polish Standard,
- access of width at least 1 m should be provided to extinguishing equipment,

- extinguishers (handy extinguishing equipment) should be located in places not endangered with mechanical damages and influence of heat sources,
- access distance to equipment should not be longer than 30 m.

6 Internal systems in buildings – additional requirements

6.1 Control room

In order to ensure proper quality of internal environment, including: air exchange volume, its cleanness, temperature, relative humidity and motion speed, control room should be equipped with central air-condition unit, situated in immediate vicinity of control room premises.

In control rooms located next to process plants, monitored positive pressure maintaining is required. Fresh air should be delivered from safe zone, and its quality monitored by sensors of dangerous gases.

Control room premise should be fully isolated from technical rooms, e.g. cable room, and should meet requirements contained in p. 4.1 of specification N° 5200.

No pipelines can be routed through control room premise, while cold water and condensate drain conduit should be fed to air-conditioning unit.

Control room should be equipped with fire signalling system and extinguishers (handy extinguishing equipment), adapted to extinguishing of electric appliances.

6.2 Power engineering stations

High voltage and low voltage switchgears should have ventilation provided, sufficient for carrying away of heat emitted by transformers, supported by mechanical exhaust. Fresh air inflow should be adjusted by air grates (shutters) mounted in walls and in floor; air outflow through roof ventilators.

Switchgears should be heated by electrical heaters to temperature +5ºC.

Switchgear rooms should be provided with fire signalling system and extinguishers (handy extinguishing equipment): carbon-dioxide and dry chemical extinguishers, as well as fire blankets, according to regulations in force in this scope.

6.3 Administration building

Administration building, considering its utilitarian functions, should be equipped with water and sewage systems, central heating systems, as well as ventilation and air-conditioning systems (depending on needs).

The building should be equipped with *domestic hot water* system, prepared centrally or locally, in electrical heaters. The system of domestic hot water should enable heat consumption measurement, if required by local conditions.

Water and sewage systems can be made of steel, PVC and PE pipes. Cut-off valves should be provided upstream group of appliances, enabling dismantling and repair of the appliances.

Sewage system should enable both carrying away of liquid wastes and rainwater from this building. Drain sewage conduits (soil pipes) should be led above roof, as ventilation conduits.

Heating appliances and system should have peak power output determined according to Polish Standards regarding calculation of heat demand by rooms, and also calculation of heat resistance and overall heat transfer coefficient for building partitions.

Heaters and other consumers, receiving heat from heating system, should be provided with heat input regulators.

Mechanical ventilation or/and *air-conditioning system* should be used in rooms, in which provision of adequate envinronment quality by means of gravitational ventilation is impossible.

Ventilation conduits should be made of con-combustible materials, and combustible thermal and acoustic insulations may be used only on their outer surface in a way ensuring fire retardation.

Administration building should be furnished with adequate *fire water systems* – fire hydrants, fire signalling system and extinguishers (handy extinguishing equipment). Staircases and horizontal evacuation routes in the building should be provided with equipment preventing fumigation, or serving for smoke removal.

6.4 Fire pumping station

Pumping station room should be provided with organized gravitational ventilation, taking into account operation of equipment – heat gain from motors of pumps, possible air demand for combustion engine.

A valve with hose union for floor rinsing should be installed in pumping station room, and catch basin grate in the floor, serving for gathering of leakages from pumps and liquid wastes from floor washing.

6.5 Compressor station

In case when compressor station constitutes building of fully cased walls, then it should be equipped with forced – induced mechanical – gravitational ventilation.

Internal systems should be made in adequate explosion protection class, according to directions contained in specification N° 1020.

The objects should be equipped with extinguishers (handy extinguishing equipment).

6.6 Department Laboratory

In the laboratory work rooms, air exchange should be ensured resulting from utilisation needs and functions of these rooms, heat balance and humidity, as well as solid and gaseous contaminations.

In these work rooms of the laboratory, in which substances harmful to health are released, such air exchange should be provided, so that the highest allowable concentrations of these substances would not be exceeded.

Laboratory building should be equipped with gas detection system, signalling – through sensors installed in work rooms – concentration of dangerous gases (combustible, explosive, toxic).

In work rooms, where highly flammable or dangerous - in terms of explosion hazard - dusts, gases or vapours are present, maximum temperature of blown-in air should conform to regulations regarding fire protection.

In case of air-conditioning or mechanical ventilation application, it is necessary to provide:

- adequate maintenance of air-condition and ventilation equipment and systems, in order to preclude their defect,
- usage of measures aiming at reduction of noise and vibrations intensity and spreading, resulting from operation of air-conditioning and ventilation equipment.

Hygiene and sanitary rooms should be ventilated according to technical and constructional regulations and Polish Standards.

All rooms of the laboratory should be equipped with forced – induced bottom ventilation.

Plug-in sockets and electrical switches, as well as cocks on water, gas and air etc., conduits should be located outside the chemical exhaust hoods.

Petroleum products liquid wastes should be drained to tank placed outside the building, with use of hydraulic seals.

Main valve, cutting-off gas supply to the object, should be installed on the pipeline supplying gas to the laboratory. Location of main gas valve should be adapted to gas type (town gas, propane – butane).

Gas system in laboratory building should have cut-off valves installed on branches of main gas raiser. The valves should be located in accessible places.

The laboratory building should be furnished with extinguishers (handy extinguishing equipment).

7 Relevant documents

The following specification of LOTOS Group S.A. apply:

- 1020 – Classification of explosion hazard zones
- 1180 – Fire protection
- 3520 – Detectors of gases
- 3640 –DCS/PLC control systems
- 3710 – Data transmission systems
- 3720 – Telecommunication systems
- 3810 – Fire detection and signalling
- 3860 – Closed Circuit Television system
- 3870 – Access control
- 3880 – Burglary signalling system
- 4300 – Lighting
- 4500 – Lightning protection, earthing, electrostatic protection systems
- 4600 – Electric shock protection
- 5200 – Buildings

8 Codes and standards

[1)] The Law of 7 July 1994 – Building Law (Journal of Laws No 207, of 2003, pos. 2016 with later amendments)

[2)] The Law of 16 April 2004, on building products (Journal of Laws N° 92, pos. 881)

[3)] Minister of Infrastructure order of 3 July 2003 on detailed scope and form of building design (Journal of Laws No 120, pos. 1133), and

a) Minister of Internal Affairs and Administration order of 16 June 2003, on arranging of building project in respect of fire protection (Journal of Laws No 121, pos. 1137),
b) Minister of Health order of 29 November 2002, on experts for sanitary and hygiene issues (Journal of Law No 210, pos. 1792)
c) Minister of Labour and Social Policy order of 29 May 1996, on authorities of health and safety at work experts, principles of opinions giving for projects of building objects, where work rooms are foreseen [.....] (Journal of Laws No 62, pos. 290).

[4)] Minister of Infrastructure order of 2 September 2004, on detailed scope and form of design documentation, technical specification of building works completion and acceptance, as well as of functional and utilitarian program (Journal of Laws No 202, pos. 2072, with later amendments)

[5)] Minister of Infrastructure order of 23 June 2003, on information regarding safety and health protection, as well as safety and health protection plan (Journal of Laws No 120, pos. 1126).

[6)] Minister of Infrastructure order of 12 April 2002, on technical conditions that buildings and their location should comply with (Journal of Laws No 75, pos. 690, with later amendments)

[7)] Minister of Infrastructure order of 21 November, 2005, on technical conditions that bases and stations of liquid fuels, long-reach pipelines for petroleum and petroleum products transportation, and their location should adhere to (Journal of Laws No 243, pos. 2063).

[8)] Minister of Internal Affairs and Administration order of 16 June 2003, on fire protection of buildings, other building objects and terrains (Journal of Laws No 121, pos. 1138).

[9)] Minister of Internal Affairs and Administration order of 16 June 2003, on fire water provision and fire roads (Journal of Laws N° 121, pos. 1139)

- PN – B-01706 — Water supply systems. Designing requirements. (along with amendment PN-B-01706:1992/Az1:1999)
- PN – B-02865 — Fire water provision. Fire water system.
- PN – EN 12056-1:2002 — Gravitational ventilation inside buildings. Part 1: General provisions and requirements.
- PN – B-03430 — Ventilation in collective inhabitation buildings. Requirements (along with amendment PN-B-03430/Az3:2000)
- PN – B- 02877-2 — Gravitational systems for smoke and heat removal. Smoke door. Requirements and testing methods.
- PN – B- 02877-4 — Gravitational systems for smoke and heat removal. Principles of designing.

9 Record of changes

No.	Date	Description	Introduced by
1		This specification replaces in whole previous standard of LOTOS Group S.A. No PR 07 521, of the same title.	M. Puzio
2	30-11-2013 (rev. 1)	Review, update, standardize and changes to the Standard within scope of order No. OK/990/2012	Editorial board coordinated by T.Wróbel
-	31-08-2015	Page layout corrections, no contents changes.	T. Wróbel