Grupa LOTOS S.A.	**TECHNICAL SPECIFICATION**	Spec. N° 5300
	Roads, Paving and other Paved Areas	

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1 Subject of specification

This specification Grupa LOTOS S.A., sets minimal technical requirements, terms and conditions regarding design and construction of plant internal roads, paving , as well as other paved areas (including parking lots).

2 Scope of validity

This specification applies to the preparation of RFPs and contracts for newly planned investment and modernization of Grupa LOTOS S.A.

It shall also be a base for the development of detailed specifications and inquiries for the equipment deliveries and package units supply.

2.1 Deviations

Any deviation from this specification and the relevant specifications, standards and related documents, including proposals, which the bidder claims to be economically and / or technically superior solutions, must be submitted in writing for review and approval by Grupa LOTOS S.A. Non-approved exceptions are not acceptable by Grupa LOTOS S.A.

The supplier must report in writing any ambiguity in this or any other specifications of Grupa LOTOS SA or non-compliance with the referred documents / standards and obtain a written explanation from Grupa LOTOS S.A.

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 technical documentation for roads, paving and other paved areas includes:

- *in order to obtain building permit:*

- Building Permit documentation developed in accordance Law [1)], the extent and form of specifically defined by Regulation [2)];
  in particular:
- technical description
- information concerning the health and safety due to the nature of the new facility/structure, taken into consideration in the plan of safety and health, developed in accordance with Regulation [4)];
- necessary drawings
  - *for construction :*
- Detailed Design documentation, which shall be self-development, containing drawings with descriptive explanations, complementary and detailing the Building Permit documentation (of scope necessary to produce a bill of quantities, cost estimation, preparation of tender by the contractor and the execution of works);
  - *in order to obtain occupancy permit:*
- as-built documentation, that shall include the full construction documentation, Building Permit documentation with marked on all changes made during execution of works, as well as geodetic as-built measurements.
  - *in case of necessity – development of Replacement Building Permit documentation (in accordance with the Law [1)] requirements)*

The technical documentation shall be developed in accordance with current standards and regulations (list in par. 5 of this specification), as well as the principles of technical knowledge, taking into consideration additional technical requirements and standards in force in Grupa LOTOS S.A.

All changes in the technical documentation made during construction shall be included in the as-built documentation.

4.2 Other

- All proposed solutions and means used, first of all shall fulfil basic requirements, specified in art. 5 of the Law [1)].
- Only applicable construction products marked with CE mark, marked with building mark B and included in the list of products set by European Commission shall be used for the construction, according to art. 5 of the Law [10)]

5 Roads

5.1 General requirements

All roads and related elements shall be designed on the basis of the relevant provisions of the law, notably in accordance with the regulations. [5)], [6)], [7)], [8)].

Internal roads are divided into main roads, secondary roads, access roads and fire roads.

The Plant must have at least one main road, connected to a public road and passing along or across the entire Plant.

All roads shall form a closed communication system and provide access for fire brigade units by the shortest possible routes to all objects, according to Regulation [7)]. Road system shall provide access to all facilities from two sides, while in case of high objects access shall be provided from all sides of. If for some reason it is not possible, the adequate areas for turning round of vehicles shall be ensured, to meet the requirements of the Regulation [7)].

Process units shall have granted access to facilities for activities related to their maintenance, taking into account required clearance for the largest equipment.

In the area of process installations, tank farms and liquids loading bays, roads shall be designed in such way, that possible spillage of petroleum products will not endanger the traffic.

All plant roads, parking lots, and other paved areas subjected to the vehicle traffic shall have hardened pavement, and shall be lightened and drained according to appropriate regulations. All types of pavement shall be designed based on the Regulation [5)] and catalogues [A) B) C)].

Traffic loads of non-standard vehicles shall be taken into account while defining the pavement structure on all routes where this kind of vehicles are expected.

Selection of pavement structure, arrangement of layers, their thickness and defining the bituminous mixture type or concrete mix type shall be determined in the project documentation; however the choice of materials to compounding and design of its composition belong to their manufacturers.

Roads with bituminous pavement shall have a cross-section of a street (road limited on both sides by kerbs) and shall be drained by ensuring proper longitudinal and transverse falls to rain sewage system. Cement concrete roads may be drained into the surrounding terrain (no kerbs).

In the areas of intersections of designed roads with existing underground utilities systems an adequate protection against their damage caused by traffic load must be provided.

5.2 Materials

Materials for roads and other paved areas construction shall be selected depending on the function, pavement type, traffic category, specific conditions of traffic load, climatic conditions, anti-slip proof properties and possible special requirements of Grupa LOTOS S.A.

When choosing materials for individual pavement layers an adequate drainage of rainwater penetrating the surface shall be provided. Particularly one should avoid such an arrangement of layers in which drainage of water from intermediate layer between watertight layers will be made difficult. The arrangement of layers in which a binding layer of partially open structure is placed over a watertight layer may make it difficult to drain the penetrating water. It may cause a phenomenon of bubbles creation due to evaporation of water encased in free spaces inside the binding layer.

Materials shall meet the requirements of standards or certificates of admission for use in road construction (mark B and mark CE).

5.3 Technical and functional parameters of roads

Main roads, units access fire roads, designed for two-way traffic shall have:

- minimum width ..... 6 m
- pavement designed for allowable axle load..... 125 kN

Fire roads and remaining roads of one-way traffic, shall have:

- minimum width ..... 4.5 m
- pavement designed for allowable axle load..... 125 kN

On the crossroads, the angle of roads' axes intersection shall be close to 90°, with allowable deviation not greater than 30°, provided the requirements of visibility on the crossroad are met. In place of crossroads, the internal edge of traffic lane for vehicles turning right shall be formed by horizontal curve with radius not smaller than 6.0 m, and for crossroads with main road or fire access road 11.0 m. In case of expected atypical vehicles, the radius shall be examined individually on the basis of turning capacity of considered vehicle.

On the routes (besides the crossroads areas) the minimal horizontal curve (along roadway axis) shall be 20.0 m, but when the angle of turning is close to 90° - minimum 12.0 m.

The vertical alignment slope of new road shall be between 0.3 -10.0%. Single-lane access roads for battery-electric cars shall have width of at least 2.5 m and maximum gradient of 8%.

The distance between road edge and the following objects shall be at least equal:

- 1.5 m - for perimeter security barriers along the main external fence of the plant
- 1.5 m - for the remaining fencelines (internal) if in the space

  between the fence and the road edge no equipment is located
- 1.5 m - for building external wall without entrances
- 7 m – for building external wall with entrances

Distance of external roadway edge to axis of embankment crown or protecting wall of Ist and IInd class storage tanks for petroleum or petroleum products, should be in accordance with requirements of the order [6)] and equal at least:

- 10 m – for tanks with horizontal main axis
- 20 m – for tanks with vertical main axis and capacity up to 1000 m^3
- 30 m – for tanks with vertical main axis and capacity over 1000 m^3

Fire roads in the surrounding of storage tanks with protective walls, should be situated at least 0.3 m above tanks' foundation terrain level.

Bridges, pipe racks, footbridges and other similar structures situated over roads, should have horizontal clearance of width equal to that of road increased by 0.5 m on both sides, and vertical clearance not less than 5.5 m. The vertical clearance should be adequately enlarged in case of non-standard vehicles traffic.

Each case shall be considered individually, every parameter of vehicle that may affect the vertical and horizontal clearance shall be taken into account.

- *Crossroads*

If there is a junction of roads from railway track it is necessary to provide second, additional railway crossing.

- *Passing places*

On single lane roads passing places should be located at distances dependent on horizontal and vertical visibility, as well as on traffic intensity.

- *Parking lanes*

It is necessary to design parking bays in places, where longer time of vehicles parking is foreseen. Width of parking lane should be adjusted to fit vehicle types and method of locating them on this lane.

Length of parking lane should be also adjusted to achieve requirements of road traffic safety.

- *Parking lots*

Parking places on the parking lots should be adjusted to fit the vehicles that are foreseen to be using them, as well as meet the requirements of the Regulation [8)].

- *Slopes*

Slopes of road embankment shall be designed with a 1:1.5 slope gradient.

- *Sidewalks*

Main lines of sidewalks should be at least 1.5 m wide (each additional pedestrian traffic lane should have 0.75m), while secondary sidewalks – at least 1 m.

Longitudinal grade of sidewalks should not exceed 6%; transverse grade 1 – 3%, depending on pavement type.

Vertical clearance over sidewalk should not be less than 2.5 m.

- *Road markings*

Road markings on internal roads, which provide safety and efficiency of vehicles' traffic, shall be used in the scope limited to essential needs.

- *Manoeuvre and storage areas*

A suitable type of pavement structure should be provided in places of:

- vehicles manoeuvring for reloading activities,
- turning around (in case of the blind end of the road),
- parking places.

For turning around of trucks it is necessary to design squares of minimum dimensions 12.5 x 12.5 m, while for fire roads such turning around square should have dimensions in accordance with the Regulation [7)].

Gradation of pavement on squares should be 0.8 – 2.5%.

Parking places and loading/unloading bays for truck tankers should have leakproof and hardened pavement, protecting ground against possible leakages of petroleum products.

- *Trays*

In places and surroundings of process equipment and instruments installed on open squares, that pose risk of toxic and harmful to environment liquids' spillages, it is necessary to make leakproof, hardened and washable paving, with edges raised 0.15 m over paving level. The curbed area surface must be protected with use of adequate products resistant to the substances, for which there is a danger of leakage.

Distance of curbed area edges from projecting elements of equipment should be at least 1 m.

Curbed paving should be drained to industrial sewerage system.

6 Related documents

Any "Technical Specification" issued by GRUPA LOTOS S.A. listed in Contract Files.

7 Regulations, codes and other standards

Together with this specification, other regulations, codes and standards, at least in range listed below are to be used.

Legal provisions (laws and regulations together with later changes):

[1)] The Law of 7 July 1994 – Building Law (Journal of Laws N° 89, pos. 414)

[2)] Minister of Transport, Construction and Marine Economy Regulation of 25 April 2012, on detailed scope and form of building project (Journal of Laws N° 0, pos. 462) and: Minister of Internal Affairs and Administration Regulation of 16 June 2003, on making agree of building project in regard of fire protection (Journal of Laws No 121, pos. 1137)

[3)] Minister of Infrastructure Regulation of 2 September 2004, on detailed scope and form of design documentation, technical specifications of building works execution and acceptance, as well as functional and application plan (Journal of Laws N° 202, pos. 2072).

[4)] Minister of Infrastructure Regulation of 23 June 2003, on information regarding safety and health protection as well as plan of safety and health protection (Journal of Laws N° 120, pos. 1126).

[5)] Minister of Transport and Marine Economy Regulation of 2 March 1999, on technical conditions that public roads and their location should conform to (Journal of Laws N° 43, pos. 430).

[6)] Minister of Economy Regulation 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).

[7)] Minister of Internal Affairs and Administration Regulation of 24 July 2009, on fire water supply and fire roads (Journal of Laws N° 124, pos. 1030).

[8)] Minister of Infrastructure Regulation of 12 April, 2002, on technical conditions that buildings and their location should conform to (Journal of Laws No 75, pos. 690).

[9)] Minister of Transport and Marine Economy Regulation of 26 February 1996, on technical conditions that intersections of railway lines with public road and their location should conform to (Journal of Laws No 33, pos. 144).

[10)] The Law of 16 April 2004, on building materials (Journal of Laws No 92, pos. 881).

[11)] Minister of Infrastructure Regulation of 11 August 2004, on conformance assessment systems, requirements that notified entities taking part in conformance assessment should meet and method of marking the building materials with mark CE (Journal of Laws No 195, pos. 2011).

[12)] Minister of Transport, Terrain Economy Administration and Environmental Protection Regulation of 10 February 1977, on health and safety at work during execution of roads and bridges construction works (Journal of Laws N° 7 pos. 30).

[13)] Minister of Infrastructure Regulation of 6 February 2003, on health and safety at work during execution of construction works (Journal of Laws N° 47 pos. 401).

[14)] Minister of Infrastructure Regulation of 23 September 2003, on detailed conditions of road traffic management and supervision over that management (Journal of Laws N° 177 pos. 1729).

Standards:

PN-S-02204:1997	Automotive roads. Roads drainage.
PN-S-02205:1998	Automotive roads. Earthworks. Requirements and tests.
PN-S-06102:1997	Automotive roads. Subbase made of mechanically stabilized aggregate.
PN-S-96012:1997	Automotive roads Subbase and subgrade made of cement stabilized soil.
PN-S-96013:1997	Automotive roads. Subbase made of weak concrete. Requirements and tests.
PN-S-96023:1984	Road structures. Subbase and surface course made of crushed rock.
PN-EN 13043:2004 PN-EN 13043:2004/AC:2004 PN-EN 13043:2004/Ap1:2010	Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas
PN-EN 13108-1:2008	Bituminous mixtures - Material specifications - Part 1: Asphalt Concrete
PN-EN 13108-2:2008	Bituminous mixtures - Material specifications - Part 2: Asphalt concrete for very thin layers
PN-EN 13108-3:2006	Bituminous mixtures - Material specifications - Part 3: Soft Asphalt
PN-EN 13108-3:2006/AC:2008	Bituminous mixtures - Material specifications - Part 3: Soft Asphalt
PN-EN 13108-4:2006	Bituminous mixtures - Material specifications - Part 4: Hot Rolled Asphalt
PN-EN 13108-4:2006/AC:2008	Bituminous mixtures - Material specifications - Part 4: Hot Rolled Asphalt
PN-EN 13108-5:2008	Bituminous mixtures - Material specifications - Part 5: Stone Mastic Asphalt

PN-EN 13108-6:2008	Bituminous mixtures - Material specifications - Part 6: Mastic Asphalt
PN-EN 13108-7:2008	Bituminous mixtures - Material specifications - Part 7: Porous Asphalt
PN-EN 13108-8:2008	Bituminous mixtures - Material specifications - Part 8: Reclaimed asphalt
PN-EN 13924:2009	Bitumen and bituminous binders - Specifications for hard paving grade bitumens
PN-EN 12591:2010	Bitumen and bituminous binders - Specifications for paving grade bitumens
PN-EN 12970:2003	Mastic asphalt for waterproofing - Definitions, requirements and test methods
PN-EN 12271:2009	Surface dressing - Requirements
PN-EN 12273:2011	Slurry surfacing - Requirements
PN-EN 13877-1:2007 PN-EN 13877-1:2007/Ap1:2010	Concrete pavements - Part 1: Materials
PN-EN 13877-2:2007	Concrete pavements - Part 2: Functional requirements for concrete pavements
PN-EN 13877-3:2007	Concrete pavements - Part 3: Specifications for dowels to be used in concrete pavements
PN-EN 14188-1:2010	Joint fillers and sealants - Part 1: Specifications for hot applied sealants
PN-EN 14188-2:2010	Joint fillers and sealants - Part 2: Specifications for cold applied sealants
PN-EN 14227-1:2007	Hydraulically bound mixtures - Specifications - Part 1: Cement bound granular mixtures
PN-EN 14227-2:2007	Hydraulically bound mixtures - Specifications - Part 2: Slag bound granular mixtures
PN-EN 14227-3:2007	Hydraulically bound mixtures - Specifications - Part 3: Fly ash bound granular mixtures
PN-EN 14227-4:2005	Hydraulically bound mixtures - Specifications - Part 4: Fly ash for hydraulically bound mixtures

PN-EN 14227-5:2007	Hydraulically bound mixtures - Specifications - Part 5: Hydraulic road binder bound granular mixtures
PN-EN 14227-10:2006	Hydraulically bound mixtures - Specifications - Part 10: Soil treated by cement
PN-EN 14227-11:2006	Hydraulically bound mixtures - Specifications - Part 11: Soil treated by lime
PN-EN 14227-12:2006	Hydraulically bound mixtures - Specifications - Part 12: Soil treated by slag
PN-EN 14227-13:2006	Hydraulically bound mixtures - Specifications - Part 13: Soil treated by hydraulic road binder
PN-EN 14227-14:2006	Hydraulically bound mixtures - Specifications - Part 14: Soil treated by fly ash
PN-EN 1340:2004 PN-EN 1340:2004/AC:2007	Concrete kerb units - Requirements and test methods
PN-EN 1338:2005 PN-EN 1338:2005/AC:2007	Concrete paving blocks - Requirements and test methods
PN-EN 13249:2002 and A1:2006	Geotextiles and geotextile-related products - Required characteristics for use in the construction of roads and other trafficked areas
PN-EN 13251:2002 and A1:2006	Geotextiles and geotextile-related products - Required characteristics for use in earthworks, foundations and retaining structures
PN-EN 15381:2010	Geotextiles and geotextile-related products - Characteristics required for use in pavements and asphalt overlays
PN-B-02480:1986	Construction soils. Denotations, symbols, division and description of soils.
PN-EN 1990:2004 PN-EN 1990:2004/Ap1:2004 PN-EN 1990:2004/AC:2008 PN-EN 1990:2004/Ap2:2010 PN-EN 1990:2004/NA:2010	Eurocode 0: Basis of structural design
PN-K-92009:1998	Public transportation. Clearance gauge of buildings.
PN-EN 1997-1:2008 PN-EN 1997-1:2008/AC:2009 PN-EN 1997-1:2008/Ap1:2010	Eurocode 7: Geotechnical design – Part 1: General rules

PN-EN 1997-1:2008/Ap2:2010
PN-EN 1997-1:2008/NA:2011

PN-EN 1997-2:2009
PN-EN 1997-2:2009/Ap1:2010
PN-EN 1997-2:2009/AC:2010
Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing

PN-B-06050:1999 Geotechnics. Earthworks. General requirements.

PN-C-96173:1974 Petroleum products. AUN - liquified asphalts for roads pavement. --

Other standards:

A) Catalogue of typical flexible and half-rigid pavement structures. (elab. by Road and Bridge Research Institute - IBDM)
B) Catalogue of strengthening and refitting of flexible and half-rigid pavements.
C) Catalogue of typical rigid pavement structures. (elab. by Road and Bridge Research Institute - IBDM)

8 Record of changes

No.	Date	Description	Introduced by
1		This specification entirely replaces the former LOTOS Group S.A. standard No. PR 07 530 with 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