Grupa LOTOS S.A.	**TECHNICAL SPECIFICATION**	Spec. N° 1150
	Sewerage systems	

Contents

1 Subject of specification 2
2 Scope of validity 2
2.1 Departures 2
3 Hierarchy of documents 2
4 Definitions and designations 2
4.1 Draining sewerage system 2
4.2 Clean rainwater sewerage system 3
4.3 Sanitary sewerage system 3
4.4 Rainwater sewerage system sporadically oil-polluted 3
4.5 Tank farm rainwater sewerage system 3
4.6 Process sewerage system 3
4.7 Lye sewerage system 3
5 Technical and design requirements for sewerage systems 4
5.1 Draining sewerage system 4
5.2 Clean rainwater sewerage system 4
5.3 Sanitary sewerage system 4
5.4 Rainwater sewerage system sporadically oil-polluted 5
5.5 Tank farm rainwater sewerage system 5
5.6 Process sewerage system 6
6 Relevant documents 6
7 Standards and regulations 7
8 Record of changes 7

This document is the property of Grupa LOTOS SA.. Coping and giving it to other are forbidden without express written authority by Grupa LOTOS SA

1 Subject of specification

This specification used in conjunction with standard technical specifications of Lotos Group S.A., establishes minimal requirements regarding designing and execution of sewerage 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 Departures

Any deviation from this specification and the specifications, standards and related documents including proposals, which according to the supplier of equipment or works show a more economically and / or technically superior solutions must be submitted in writing for review and approval by Grupa LOTOS SA. Unacceptable are no exceptions approved in writing by Grupa LOTOS SA.
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 SA.

3 Hierarchy of documents

In case of conflicts existing between the requirements of each document must adhere to the following order of priority:
- 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 Definitions and designations

4.1 Draining sewerage system

Designation on general plan ———— 1 ——·————

Draining sewerage collects underground water from whole area, in which hydrocarbon pollutions can be present. This sewerage lowers level of underground water. Collected water can be directed to water treatment plant, thus preventing hydrocarbons getting through to underground water outside of Refinery area.

4.2 Clean rainwater sewerage system

Designation on general plan ———— 2 ————

This system carries rainwater gravitational away from areas that are not endangered with penetration of hydrocarbon pollutants (roads, yards, green yards) through catch basins. This water, after removing suspended matter from them in decanter, is carried away to receiver. The water is not directed to water treatment plant.

4.3 Sanitary sewerage system

Designation on general plan ———— 3 ————

Gravitational system that collects sanitary sewages from buildings and carries them away to biological treatment plant. Other sewages, containing hydrocarbons or chemicals must not be directed to this system. This system is not equipped with catch basin grates in open area.

4.4 Rainwater sewerage system sporadically oil-polluted

Designation on general plan ———— 4 ————

This system collects rainwater that can be contaminated with hydrocarbons from units' areas, as well as it can carry away rainwater from trays of pumps or other drains through funnels. Parameters cannot exceed values given in point 5.4Sewers are routed to the wastewater treatment.

4.5 Tank farm rainwater sewerage system

Designation on general plan ———— 5 ————

This system carries away rainwater from embanked area of tank farm. wastewater from the farm tanks are routed in a manner controlled by wells gate (gate closed permanently) to the wastewater system.

4.6 Process sewerage system

Designation on general plan ———— 6 ————

Process sewerage system collects water gravitational or under pressure from technological processes, such as washing of products, clarifiers, equipment. Sewages are carried away to refinery sewage treatment plant. Whereas sewages containing dissolved gases in excess, cannot be directed immediately to sewage treatment plant. Allowable percentages of pollutants in sewages being carried away, are determined in point 5.5

4.7 Lye sewerage system

Designation on general plan ———— 7 ————

Lye sewerage system collects sewages which pH exceed 9, and carries them away to intermediate tank, which is storing sewages that flow in. Sewages from this tank are carried away to sewage treatment plant in amounts serving pH regulation in treatment process.

5 Technical and design requirements for sewerage systems

Volumes of sewages being carried away from projected Units to individual systems should be agreed with User (Owner) of these systems, or they should constitute subject of legal civil agreement.

5.1 Draining sewerage system

This sewerage system is designed in area of production units and storage tanks, from drainage pipes laid along communication roads. The sewerage should maintain stable level of underground water. In points of connections to headers inspection chambers should be provided, furnished with gas-proof water seals that prevent migration of flammable and explosive gases along headers. The water seals should ensure liquid seal (hydraulic) of 0.25 m water head. Covers of inspection chambers should be marked with white colour.

5.2 Clean rainwater sewerage system

It should be designed according to general principles of rainwater network designing. Covers of inspection chambers should be marked with green colour.

5.3 Sanitary sewerage system

Sanitary sewerage carries away sanitary sewages to first inspection chamber next to building, to which internal sanitary sewerage installations are brought in. The sanitary sewerage should be designed according to general principles of sanitary sewerage designing. Connections of gully from building, which floor level lies below ordinate of surrounding ground, should be provided with cut-off one way gate valves outside the building. Covers of inspection chambers should be marked with red colour.

5.4 Rainwater sewerage system sporadically oil-polluted

Calculations are the same as for clean rainwater sewerage system, but considering potential draining and checking of conduits for volume of water coming from fire extinguishing. In case of exceeding allowable temperature of sewages, cooling wells should be foreseen. In order to prevent migration of flammable and explosive gases along headers, it is necessary to design traps (0.25 m of water head) on connections to inspection chambers. Inspection chambers of sewerage system located in explosion endangered area should be equipped with airtight manholes, and furnished with vent system brought out of explosion hazard area and terminated with backfire preventer. Venting pipeline made of DN80 steel pipes. In a view of higher temperature and presence of hydrocarbons possibility, the system should be such designed that air-tightness and flexibility of joints is ensured. Considering possibility of higher temperatures and higher hydrocarbons contents, headers must not be made of concrete and stoneware as well as plastic materials, that are nor resistant to these parameters. Distance from inspection chamber and other sewerage equipment to furnace should be at least 15 m. In case of shorter distances, cut-off gate valves should be provided on pipe and traps should be install in inspection chambers, agreed with User and process engineer. Maximum distance between traps on main collectors should not exceed 200 m. Sewerage system is to be made of steel seamless tubes, protected externally with PE. Covers of wells should be marked with yellow colour.

Allowable parameters of sewages being brought into sewerage system sporadically contaminated with oil

Item	*Type of contaminant – parameter*	*Unit*	*Allowable value*
1	pH		6-9
2	Temperature	°C	<45
3	Sulphides	mg/dm3	5-10
4	Phenols	mg/dm3	<10
5	COD	mg/dm3	<600
6	Suspended matter	mg/dm3	<125
7	Hydrocarbons	mg/dm3	<1000
8	Benzene	mg/dm3	<5
9	Ammonium nitrate	mg/dm3	<8

5.5 Tank farm rainwater sewerage system

Rainwater sewerage should be designed according to point 5.4, while taking into consideration connection to sewerage system outside the tank park through valve well. Connection into oiled sewerage system equipped with traps Hydraulic lock of 0.25 m water column. Gate valve in valve well should be closed, while open after rain and checking of sewage parameters. Pumping out of water which parameters exceed allowable values should be possible from valve well. Wells should not be designed between embankment and hydraulic seal. Sewerage system made of seamless steel tubes, protected externally with PE.

5.6 Process sewerage system

Sewages carried away to treatment plant with this sewerage system, must correspond to following parameters:

Item	*Type of contaminant – parameter*	*unit*	*Allowable value*
1	pH		6-9
2	Sulphides	mg/dm3	50-100
3	Phenols	mg/dm3	<10
4	COD	mg/dm3	<1500
5	Suspended matter	mg/dm3	<250
6	Hydrocarbons	mg/dm3	<1000
7	Benzene	mg/dm3	<40
8	Ammonium nitrate	mg/dm3	<15
9	Temperature	^{o}C	<35

In case of sewages containing desorbing amounts of dissolved gases, they should be steam stripped. For sewages that do not meet the parameters given in above table, it is necessary to foreseen on design stage preliminary purification of such stream, on equipment specifically projected within framework of newly projected units.

The sewerage system is designed as underground, gravitational system, connected to above ground drainage pipelines by flanged joint. Cleanouts should be designed on the sewerage system. The system made of seamless steel tubes, protected externally with PE.

Wells should be equipped in hermetic covers.

6 Relevant documents

- Specification N° 1190 – Anti-corrosion protections – in case of steel pipes use
- Specification N° 5210 – Internal systems and connections to external systems

7 Standards and regulations

- Water lines and sewerage – Designing, Assembly, Operation, Modernization; team of authors, edited by Waldemar Żuchowski – Dashofer Holding Ltd. & Wydawnictwo Verlag Dashofer Sp. z o.o., 2003.
- PN-EN 476:2001 General requirements regarding elements used in gravitational systems.
- PN-EN 752-1:2008 External sewerage systems – General terms and definitions.
- PN-EN 752-4:2001 Hydraulic calculations of external sewerage systems. Hydraulic calculations and impact on environment.
- PN-EN 10216-2 Seamless steel pipes.
- Minister of Infrastructure order of July 20th 2002, on method of execution of industrial sewages supplier's obligations and conditions of introducing sewages into sewerage system equipment.

8 Record of changes

No.	Date	Description	Introduced by
0		This specification replaces in whole previous standard of LOTOS Group S.A., N^{o} PR 07 124 of the same title.	B. Kowalewski
1	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