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1 Subject of specification

This specification used in conjunction with other technical specifications of LOTOS Group S.A. establishes the minimum requirements for the design, construction of instrument air system.

2 Scope of validity

This specification applies to the preparation of tender documents, inquiries and contracts concerning new investments and modernization projects planned by LOTOS Group S.A.

It shall also be a basis for preparing both detailed specifications and inquiries for individual or package unit supplies.

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 SA. 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 SA.

2.2 Exclusions

- compressors
- drying station

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 Definitions and descriptions

- **GLSA** – Grupa Lotos S. A.
- **transfer pipeline** – a pipeline running from drying station to plant battery limit.
- **header** – a pipeline distributing instrument air within plant
- **sub-header** – a pipeline supplying instrument air from main header to air distributor or individual instrument

- **air distributor** – short sub-header of special design, equipped with defined number of branches with shut-off valves for consumers connections and draining system.
- **consumer** – supplied instrument
- **air supply source** – here: drying station

5 Description

5.1 General

5.1.1 Purpose of the system

The purpose of instrument air distribution system is supplying of clean air of low humidity to control valves and other instruments that require conditioned air.

Air distribution system has to be totally closed and separated from other systems.

5.1.2 Required parameters of instrument air:

Parametr		Instrument Air	Service air
Pressure MPa (g)	min.	0,5	0,0
	norm.	0,6	0,7
	maks.	0,7	0,8
	Des.	1,0	1,0
Temperature °C	min.	-25	
	norm.	mambient	ambient
Dew point °C		below -39 at pressure 0,7 MPa (g)	+3

Contamination with oil and dust:
Filters removing oil and water must have 99,98% efficiency for particles below 0,1 μm.
End filter of instrument air station, downstream the dryer, must have at least 99,95% efficiency for particles below 1 μm.

5.2 Instrument air distribution system

5.2.1 Requirements

Materials used for main transferring pipes – from drying station to battery limit – shall be compliant with material class – carbon steel, not galvanized.

Materials for headers and sub-headers within plant limits shall be compliant with material class – carbon steel galvanized or stainless steel. In detail design technology of connections and sealing (for example sealing with oakum and special paste) shall be included.

Stainless steel is preferred as material for main transfer pipes and headers as well sub-headers inside battery limit of installations.

All transfer pipes and headers shall be equipped with draining system in the lowest point.

All headers must be supplied via redundant filters equipped with air-dryer and located on the battery limit. Particles above 40 μm have to be filtered.

All headers shall be equipped with a valve of a diameter, which equals pipeline diameter, and blind for cleaning and possible pipeline extension purposes.

If a header supplies more than one plant, it shall form a loop, supplied from two sources. In this case shut-off valve shall be provided between the plants, enabling cutting-off air supply to one of them.

Each sub-header shall be connected to main header from the top, through full-bore valve equal to sub-header diameter.

A pipeline, which supplies four and more instruments shall be considered as sub-header and connected directly to header through shut-off valve.

Minimum diameter of sub-header ¾".

On each plant at least 20% spare valves shall be installed on header.

All pipelines of air distribution system shall be run with slopes towards air distributors. Condensate traps in piping system shall be avoided.

5.2.2 Dimensioning of headers and sub-headers

Diameters of air distribution system pipelines shall be such dimensioned, that pressure drop between source (drying station) and most distant consumer shall not exceed 35 kPa at maximum air consumption.

For distances shorter than 600 m diameters of pipes shall be selected according to table N° 1.

Table N° 1.

Number of consumers	Pipe diameter
1 – 9	¾''
10 – 15	1''
16 – 80	1 1/2''
81 – 150	2''
151 – 300	3''

5.2.3 Air distributors

Air distributors shall be delivered as the complete sets with all necessary valves and connections.

Air distributor must be furnished with drain valve, equipped with a plug.

Valves for consumers connection shall be ball type with tube compression end fittings, and secured with cap. Valve dimension shall be the same as pipe dimension.

Air distributors shall be made of steel and galvanized, or made of AISI304 SS, and valves made of AISI 316 SS.

Air distributors are to be located within reach range possible from ground or permanent platforms.

Consumer connections with air distributors shall be made with PVC coated copper tube, or SS tube, with diameter adequate to requirements (8 mm as minimum).

Air consumers (for example: blowing consumer/blower) must to have the simple measurement (e.g. rotameter).

The filter shall be mounted at air distributors feed inlet, furnished with by-pass and valves enabling cartridge replacement.

5.3 Air consumption calculations

5.3.1 Consumption at steady state

All consumers in steady operating condition and taking into consideration one stroke of valves every 8 hours shall be base for calculation of instrument air consumptions.

Air consumption for consumers shall be calculated basing on vendor documentation. If such documentation is missing, consumption calculation shall be done according to Table N° 2.

Table N° 2

Equipment type	Air consumption
Valve with diaphragm actuator	0,3 Nm^3/h
Valve with piston actuator	1,5 Nm^3/h
Pneumatic converter	0,3 Nm^3/h
Panel with pneumatic instruments	1 Nm^3/h

For plant, where valves are opened/closed according to defined algorithm, with frequency resulting from process requirements (for example, Drying Station), air consumption shall be calculated for such operating conditions accordingly.

In cases of continuous purging, air consumption shall equal to maximum value of the variable area flow meter range.

5.3.2 Additional consumption

In order to compensate leakages and incidental air consumption for other purposes, it is necessary to add 20% to air consumption calculated according to paragraph 5.3.1.

Total air consumption

Total consumption determined for Drying Station outlet point is a sum of consumption determined in 5.3.1 and 5.3.2 points.

5.4 Reserve of instrument air

Provision of required pressure parameters is realised in Air Generation Plant by pressure control system, and by starting stand-by compressor if necessary.

5.5 Measurements and safety devices

For each plant (plant system) pressure measurement shall be installed, with transmission of readings to control room, and PSL = 550 kPa signalling.

6 Relevant documents

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

7 Standards and regulations

Designing, manufacturing and assembly shall comply with latest editions of standards and regulations given below.

API RP550 - Manual on installation of Refinery Instrument and Control Systems.

ISA70.001 - Quality standards for instrument air

8 Record of changes

No.	Date	Description	Introduced by
1		This specification entirely replaces the former LOTOS Group S.A. standard No. PR 07 382 with the same title.	M. Domaniewski
2	4.05.2011	1.Correction of item 2.1. 2.Preferences for stainless steel are added - item 4.2.1. 3.Slope for transfer pipes and headers are deleted – item 4.2.1. 4.Redundant filters on the battery limit are added – item 4.2.1. 5.Measurement of the air consumers/blowers are added – item 4.2.3. 6.Plan shut-off are deleted – item 4.5.	M. Baryła
3	30-11-2013 (rev. 2)	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