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1 Subject of specification

The specification used in conjunction with standard technical specifications of LOTOS Group S.A. defines designating and numbering procedure of instrument equipment, such as junction boxes, control panels, supporting structures, air distributors, control rooms, control cabinets, cables and terminal strips. Instruments identification are included in Technical Specification No. 6120 „Process identification 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.

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 designations

GLSA – Grupa Lotos S. A.

Sensor, detector – element of control systems, converting measured physical quantity to electric signal, transmitted in turn to transmitter or directly to DCS, ESD system. The sensor may, but need not be physically integrated with signal transmitter. Transmitter is used when value of measured quantity must be sent to other electronic systems in a standard signal.

Local instrument – an element serving only for local monitoring of measured parameter. For instance of filled-in or bimetallic temperature gauges or pressure gauges. These instruments operate without additional external power supply.

DCS – Distributed Control System.

ESD – Emergency Shut Down System

SIS – Safety Instrumented System

MOV – motorised valve i.e. the valve with electric actuator

Unit – the term „unit" means the part formed by factory area and sub-area according to procedure N° 90-10-00001 „Documentation Numbering". It is designated with digits, for example 110.

Locally – means location within immediate proximity of measuring and executing elements, as opposed to location, for example, in Central Control Room.

Transmitter – electric or/and electronic or/and programmable element of automatics system, converting signal from electric sensor to defined output signal, for example 4 – 20 mA. It may contain local indicator of measured value.

Transducer – general term for instrument that receives one or several signals, modifies them and generates single output signal. Depending on application, the term "transducer" can designate transmitter, converter or other device.

Converter – a device that receives signal in some form of electric signal and converts it to other form.

Plant – this term means complex of some/dozen sub-units, which are, or are not functionally combined. It is designated by letters, for example PZH.

SAFETY LOOP – the label used for designation of circuit which constitutes part of safety function (at adequate SIL level), in order to clearly highlight its key importance for safety.

SIL - Safety Integrity Level

SIF - Safety Instrumented Function

Isolating barriers – electronic systems for separation – isolation of two different zones, for example intrinsically safe loops from non-intrinsically safe loops. Isolating barriers can protect against electromagnetic interferences, separate potentials of voltages, and can also constitute overvoltage protection.

5 Description

Below given paragraphs show designations and numbering scheme of control system elements:

5.1 Meaning of designation prefix

A prefix can indicate:

- Plant, for example **PZH**
- Control Room, for example **CR1**
- Unit, for example **110**

All instrumentation components have a prefix that is adequate for their function and location. Following procedure shows how to proceed:

If prefix of the Unit cannot be assigned to any component, then Central Control Room code shall be used. If function of given element is connected with several control rooms, then plant code shall be used.

Example:

110MA_001- failure of MOV valve

CR1_XA_001- failure of cabinet power supply, for example CD_001 in CR_1 central control room

PZH_XA_001- failure of fire safety system of PZH plant.

5.2 Length and meaning of designation suffix

Length of suffix depends on associated subject.

In designation of central control room, length of suffix equals to one, for example CR_**1,** ER_**1,** TIR_**1**...

In designation of terminal strips and cables, length of suffix equals two, for example X**01**, 110PT001K**01**.

For measuring and executing elements of boxes, panels, cabinets and other elements, which can be assigned to various subcontractors, suffix length is equal to three (see paragraph below). In exceptional cases, and for very large numbers of control elements, Lotos Group can introduce four digit suffix.

Example:

110PT_001- pressure transmitter

110PY_002 valve positioner

110JIA_002 junction box

OS_001 operator station

CD_001 DCS system cabinet

CR_1- premise of central control room

5.3 Usage of underline (_) character

„Underline (_)" sign, separating designation of functional group, and serial number, is used in designations of all control elements and associated elements, such as junction boxes, panels, cabinets, system cabinets, premises, buildings, with exception to designations of cables and terminal strips (because of notation length limitation on tags).

In case of tagging loop that is not associated with one specific Unit, e.g. designation of central control room air-condition alarm loop, instead of area / sub-area, designation of control room associated with this loop shall be used, as well as underline character for separating of parts designating the control room and functional group.

Designation example:

CR1_XA_001 failure of CR_1 control room air-condition system

In case of signal, that is not associated with specific control room, but with the plant, thus the plant designation with underline character shall be used instead of area/sub-area code.

Designation example:

PZH_XA_001 fire has been detected in PZH plant

It shall be noticed, that because of notation legibility, underline sign is absent in prefix that designates central control room – there is CR1 and not CR_1.

Underline character shall be used after suffixes that specify central control room and a plant.

Example:

110PT_001

CR1_XA_001

PZH_XA_001

5.4 Split of numbers intervals for subcontractors

In places, where suffix length is equal to three, that is for cabinets, panels, boxes, measuring and executing elements, the interval of 001 – 999 shall be divided into sub-ranges for individual subcontractors, package units vendors, etc., so as to one can freely use numbers of own sub-range with no fear of duplicating designations of various subcontractors, for example:

Main contractor - 001-500 interval

Subcontractor 1 - 501-600 interval

Subcontractor 2 - 601-700 interval

Subcontractor 3 - 701-750 interval

Subcontractor 4 - 751-900 interval

Subcontractor 5 - 901-999 interval

Example 1 of designation:

An element within in scope of Main contractor:

- 110PT_**0**01 – pressure transducer
- 110JIA_**0**01- junction box
- 110LCP_**0**01- local panel
- CD_001- DCS control cabinet located in central control room building

Example 2 of designation:

Elements within in scope of subcontractor 1:

- 110PT_**5**01- pressure transducer
- 110JIA_**5**01- junction box
- 110LCP_**5**01- local panel
- CP_**5**01- control cabinet located in central control room building

5.5 Junction boxes

This applies to junction boxes to which cables from measuring or executing instruments, or from other junction box come in, and from which one or several multi-pair cables come out to control room or to next junction box. As to terminal strips, refer to point „Terminal strips".

Example of designation: **110JIA_001**: junction box located on 110 unit, analogue intrinsically safe loops, number of the box on unit is 001.

Unit Number	First letter of designation	Second letter of designation	Third letter of designation	Box N° on the unit	Description of designation
110				**001**	
	J				Junction box
		I			Intrinsically safe design
		D			Flame-proof design
		N			Design other than intrinsically safe one, for use in explosion hazardous areas
		E			Design for areas that are not located in explosion hazardous area
		S			Special design not listed above, e.g. the box contains loops for both explosion hazardous area and safe area
			A		Analogue loops
			B		Binary loops
			D		Digital communication link loops
			G		Gas detectors loops or loops associated with explosive atmosphere detecting
			M		Machine monitoring
			P		Power supply circuits
			R		Signals running directly from resistance sensors (not converted by transmitter to analogue signal)
			T		Signals running directly from thermocouple sensors (not converted by transmitter to analogue signal)
			X		Other loops

5.6 Tagging of local control panels

Local panels are meant as elements that are placed „locally", which, as opposed to junction boxes, allow for execution of control actions. This can be, for example, compressor panel containing pushbuttons for the machine operation, lamps indicating condition of sub-assemblies, as well as terminal strips. A panel can contain loops of various types (taking into considerations signal type: analogue, binary; as well as explosion protection type) located in separate segments. From this reason, distinguishing of these types is not entered in tagging of panels.

Example of designation:: **110LCP_001;** where LCP stands for local panel (while PNL means panel located in building).

As to terminal strips refer to point „Terminal strips"

Refer also to Specification No. 3630, Local panels.

5.7 Multiplexers

These are devices for switching over signals coming from sensors, for example temperature ones, for purposes of process parameters visualisation.

Example of designation: **110MUX_001** where MUX comes from English wording MUltipleXer.

5.8 Cabinets of samplers

Cabinet of sampler is meant as conditioning set for sample to be taken for physical and chemical parameters measurements, which is connected to measurement nozzles located on unit.

For fluid composition analysers **AP** designation is used (the designation suggested by ISA-S5.1)

Example of designation: **110AP_001:** cabinet of sampler on 110 unit of 001 number, for fluid composition analysing.

For points of corrosion testing, **CP** designation is used.

Example of designation: **110CP_001:** cabinet of sampler on 110 unit of 001 number, for testing of corrosion degree.

See also Specifications Nos. 3530 and 3510.

5.9 Analyser shelter

These are buildings of shelter type, containing instruments for sample taking and analysing, along with equipment necessary to connect to control and interlocking monitoring systems.

Example of designation: **110AH_001:** that comes from English „**A**nalyser **H**ouse".

Refer also to Specifications Nos. 3530 and 3510.

5.10 Air distributors

Elements of air distribution for instrumentation purposes. There are mainly created for valves.

Example of designation: **110IAD_001**, that comes from English: **I**nstrument **A**ir **D**istributor

See also Specification No. 3140.

5.11 Stanchions for junction boxes, protection boxes and air distributors

Support in a form of stanchion for fixing of junction boxes and/or transmitters and/or air distributors.

Example of designation: **110SC_001,** that comes from English: **S**tanchion **C**onstruction

Refer also to Specification No. 3020.

5.12 Protection boxes of transmitters

Box for transmitter winterising, mainly with heating in order to maintain the transmitter in adequate temperature. It is assumed, that one transmitter only may be housed in a one box, however other solution is acceptable if approved by GLSA

Example of designation: **110PT_001** – designation identical as for element mounted in the box.

Refer also to Specification No. 3020.

5.13 Local premises of control and monitoring systems

Shelter, or other type building, located on the Unit and containing system cabinets. They have „**TIR**" letters in their designation. Attention shall be paid that the premise located next to central control room – where system cabinets are located – also has designation containing „TIR" part (see paragraph „Premises of Central Control Room").

Example of designation: **110TIR_001,** that comes from English: **T**echnical **I**nstrumentation **R**oom

If assigning of TIR premise to given unit or to central control room cannot be accomplished, then a prefix informing about plant shall be used.

Example:

PZH_TIR_001

5.14 Premises of Central Control Room

Central control room can be composed of several premises that are functionally separated. The premise where operator stations are located is called Central Control Room.

Example of designation: **CR_1**

CR- comes from English: **C**ontrol **R**oom

1- serial (consecutive) number of central control room in given plant, for example PZH

The premise, where engineering stations are located, bears name of – engineering stations room, with „ER" part in designation, that comes from English term: **E**ngineering **R**oom.

Example of designation: **ER_1**

Premises, where system cabinets are located, bear name of technical instrumentation room, with „TIR" part in designation, that comes from English term: **T**echnical **I**nstrumentation **R**oom.

Example of designation: **TIR_1**

TIR- comes from English term: **T**echnical **I**nstrumentation **R**oom

1- serial number of technical instrumentation room in given control room.

Attention shall be paid, that premises of „TIR" type are locally assigned to single unit, for example 110TIR_001, or single plant PZH_TIR_001, while technical instrumentation rooms at central control room are assigned to central control room.

Example:

CR1_TIR_1 – technical instrumentation room in CR_1 control room.

5.15 Cabinets and associated equipment in central control room

The following designations of elements are possible:

PNL control panel (from Eng.: **P**a**N**e**L**)

OS operator station (from Eng. **O**perator **S**tation)

ES engineering station (from Eng. **E**ngineering **S**tation)

VD video display (from Eng. **V**ideo **D**isplay)

KB keyboard (from Eng. **K**ey**B**oard)

PR printer (from Eng. **P**rinte**R**)

CD DCS system cabinet (from Eng. **C**abinet and **D**CS)

CE ESD system cabinet (from Eng. **C**abinet and **E**SD)

CP PLC system cabinet (from Eng. **C**abinet and **P**LC)

CG cabinet of chemical alarm and dangerous gases detection system (from Eng. **C**abinet and **G**as)

CF cabinet of fire detection system (from Eng. **C**abinet and **F**ire)

CM marshalling cabinet of system connections (from Eng. **C**abinet and **M**arshalling)

CO cabinet of overvoltage protectors (from Eng. **C**abinet and **O**vervoltage)

CB cabinet of spark-proof isolating barriers (from Eng. **C**abinet and **B**arriers)

CA auxiliary cabinet – additional (from Eng. **C**abinet and **A**uxiliary)

CS power supply cabinet (from Eng. **C**abinet and **S**upply)

CI cabinet of signal interface to other systems, for example connections to electric installation systems (drivers' handling), alarm gas detection and other (from Eng. **C**abinet and **I**nterface)

Example:

PNL_001 : control panel N° 001, located in central control room.

If a need exists in documentation to distinguish cabinets on various control rooms levels, then designation containing part that informs about the control room in which given cabinet is located shall be used.

Example:

CR1_CD_001

Refer also to Technical Specification No 3610.

5.16 Cabinets and associated equipment in local premises of system (TIR)

Designations are created according to principles given in paragraph „Cabinets and associated equipment in Central Control Room".

If a need exists in documentation to distinguish cabinets on various TIRs' levels, then designation containing part informing about the premise in which given cabinet is located shall be used.

Example:

TIR1_CD_001

5.17 Cables

Designation of a cable is composed of two parts: first of them contains designation of element from which a signal comes out (if such direction is possible to determine), while the second part contains „K" component, depicting a cable. For circuits constituting portion of safety functions (defined SIL level), additional designation of cable shall be introduced, containing description „SAFETY LOOP".

In designations of cables „underline " character is not used, because of cable tag length limitation.

All cables must have designators on both ends of the cable. Individual cables shall be marked according to the end device however multicore cables shall be marked with junction box symbol (JB).

Refer also to Specification No. 3120.

5.17.1 Cable from local element with single output cable.

Designation example 1:

110PT001K : the cable from 110PT_001 transmitter

Designation example 2:

110JIA001K : the cable from 110JIA001 junction box

5.17.2 Cable from local element, which has more than one output cable

Designation example 1:

110PT001K01 : the cable from 110PT_001 transmitter, number 01 (for example, signal)

110PT001K02 : the cable from 110PT_001 transmitter, number 02 (for example, supply)

Designation example 2:

110JIA001K01 : first cable from 110JIA001 box

110JIA001K02 : second cable from 110JIA001 box.

5.17.3 Cable from element located in building

Designation of cable is formed from the following components:

- a plant or unit code, for example PZH or 110
- a building code, for example CR1 or TIR1(present for cables going out the buildings)
- code of cabinet, panel, box, for example: CE001 or PNL001
- terminal strip code, for example X01 (absent for boxes and small panels)
- cable code, for example K01

Example of designation:

PZHCR1CE001X01K01

This is full and the longest possible designation of cable. Full cable designation shall be used in list of cables and other documents, where designations of cables from various units are compiled. On cable tag the shortest possible designation of cable shall be put, which enables however proper cable

identification. So, for example, the cable between cabinets located in the same technical instrumentation room, between CP001 and CD002 cabinets, shall have the following tag designation:

CP001X01K01 the cable from CP001 supply cabinet, X01 terminal strip, serial number of cable 01.

In this case, module that informs about control room and plant is not necessary on cable tag.

In case when given cable connects various buildings of control room, a portion informing about control room number shall be added to cable designation.

Example of designation:

CR1CP001X01K02 : the cable outgoing from CR1 control room, CP001 supply cabinet, X01 terminal strip, serial number of cable 02.

In case of cable that connects different plants, its designation will be as follows:

Example of designation:

PZHCR1CP001X01K01 : the cable from PZH plant, outgoing from CR1 control room, CP001 supply cabinet, X01 terminal strip, serial number of cable 01.

For cable from control panel located in TIR technical instrumentation building, its designation will be as follows:

110TIR001PNL001K01 : the cable outgoing from TIR001 technical instrumentation building on 110 unit, PNL001 panel, serial number of cable 01

In case of panels that contain many terminal strips, the principles given for system cabinets shall be used (additional identification of terminal strip in designation).

5.18 Terminal strips

Terminal strips for cables outgoing from junction boxes and local panels to system cabinets, are semantically assigned to cables, i.e. a terminal strip in marshalling cabinet for 110JIA001K cable receives **110JIA001X** designation. Thus, such designation is formed by replacing „**K**" letter indicating cable for „**X**" letter indicating terminal strip.

Similarly as in case of cables, for the tags length limitation, underline character is not used in terminal strips designations.

Designation example 1:

110JNA001X01 : terminal strip in cabinet for 110JNA001K01 cable

110JNA001X02 : terminal strip in cabinet for 110JNA001K02 cable

Designation example 2:

110LCP001X01 : terminal strip in cabinet for 110LCP001K01 cable

110LCP001X02 : terminal strip in cabinet for 110LCP001K02 cable.

For instruments, which are not connected through junction boxes nor panels, that is, for example, cables connecting directly a transmitter with cabinet, or cables between cabinets, terminal strips shall be prepared for individual signal types marked with **X** letter and serial number, that is, for example, **X01**.

Example of designation:

X01 : terminal strip for intrinsically safe analogue loops (refer to table given below).

Within a cabinet, in order to provide adequate separation of voltages and to prevent electromagnetic interferences, terminal strips shall be separated in the manner given below. In the course of terminal

strips separation, not only distinction between intrinsically safe and non intrinsically safe loops is taken into consideration, but also separation in respect of signal type in each of these groups. Therefore intrinsically safe terminal strip with analogue signals shall be separated from non-intrinsically safe terminal strip with analogue signals. Ranges of terminal strips numbers for individual signal types are given in the following table.

Division of terminal strips	Range of number within single cabinet for specified terminal strip type
Intrinsically safe analogue loops	01÷10
Intrinsically safe binary loops	11÷20
Remaining intrinsically safe loops	21÷30
Non intrinsically safe analogue loops	31÷40
Non intrinsically safe binary loops	41÷50
Remaining non intrinsically safe loops	51÷60
Direct signals (that are not converted by transmitter to analogue signal) from resistance sensors	61÷70
Direct signals (that are not converted by transmitter to analogue signal) from thermocouple sensors	71÷80
Digital communication link loops	81÷90
Power supply circuits	91÷99

Each cable core shall have separate terminal.

Colours of terminals:

Intrinsically safe loops : blue

Non intrinsically safe loops : grey

Supply circuits – direct current : „+" grey „–" grey

Supply circuits – alternate current : „L" grey or black, „N" grey or black, „PE" yellow-green

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 conform to latest editions of following standards and regulations:

- ISA-S5.1-2009 Instrumentation Symbols and Identification.
- ISA-S5.2-1976 Binary Logic Diagrams for Process Operations.
- ISA-S5.3-1983 Graphic Symbols for Distributed Control/Shared Display Instrumentation, Logic and Computer Systems.
- ISA-S5.4-1991 Instrument Loop Diagrams.
- ISA-S5.5-1985 Graphic Symbols for Process Displays.

8 Record of changes

No.	Date	Description of change	Introduced by
1	4.05.2011	1. Correction of item 2.1. 2.”SAFETY LOOP” loops colours of terminals are deleted - item 4.18.	M. Baryła
2	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