Contents

1 Subject of specification 2
2 Scope of validity 2
2.1 Deviations 2
2.2 Order of Precedence 2
3 Definitions and designations 2
4 Description 3
4.1 Documentation 3
4.1.1 List of documents 3
4.2 Manufacture and acceptance test 5
4.2.1 Manufacture 5
4.2.2 Testing and acceptance 5
5 Relevant documents 6
6 Codes and standards 6
7 Record of changes 8

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1 Subject of specification

This specification and other documents referenced herein establish the minimum requirements for the design, fabrication, inspection, testing and accaptance for control and protection systems for burners of furnaces and boilers subject to UDT/ZDT.

2 Scope of validity

This specification applies to the preparation of tender documents, inquires and contracts for newly planned investment or modernization projects of Grupa LOTOS S.A.

It shall also be a basis for preparing both detailed specifications and inquires for individual or package 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 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 S.A. or non-compliance with the referred documents / standards and obtain a written explanation from Grupa LOTOS S.A.

2.2 Order of Precedence

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 Grupa LOTOS S.A.
- Data Sheets approved by Grupa LOTOS S.A.
- This specification
- Other Specifications
- Drawings and other documents
- Standards

3 Definitions and designations

GLSA – Grupa LOTOS S.A.

DCS – Distributed Control System

SIS-PLC – Programmable Logic Controller for implementation of SIF function

SIS – Safety Instrumented System

SIL – Safety Integrity Level – reliability level of safety

SIF – Safety Instrument Function – safety functions with defined SIL level

BMS – Burners' Management System

4 Description

Construction of burners, control and protection system, accessories, as well as production and testing, should fulfil requirements of standards and regulations, as well as specifications Grupa LOTOS SA listed in paragraph 5 and 6 of this specification. Scope of documentation that shall be elaborated and submitted for Notified Body approval, is specified below. Particularly important part of the documentation constitutes specification of safety requirements for Safety Instrumented System (SIS) by package supplier (or supplier of licence/process).

Essential requirement for safety of burner system operation is completion of hazards and risk analysis, which in turn through determination of so-called safety requirements, their addressing, implementation and verification, leads to required/necessary risk reduction, and this in turn corresponds to tolerable risk level for burner system. Schemes of proceeding are specified by standards PN–EN 61508, PN-EN 61511, PN–EN50156. For details refer to specification Grupa LOTOS S.A. no. 3650.

Results of individual stages must be documented.

The supplier is obliged to deliver documentation, resulting from a study determining safety requirements specification in relation to SIS. Furthermore, important element of this part of documentation required from package supplier, is reasonable and adequate for safety requirements service and testing program of SIS system during operating period.

Detailed results of analysis, being the base for safety requirements specification, should be available and supplied to Grupa LOTOS S.A. on request.

Pressure equipment, burners, as well as protecting equipment shall fulfil requirements of the following directives: Appliances burning gaseous fuels 90/396/EEC, Machines 2006/42/EC, Pressure Equipment 97/23/EC, Measuring instruments 2004/22/EC, and shall be marked according to them and to requirements included in Grupa LOTOS S.A. specifications no. 2110 and 3030. The supplier shall deliver documents necessary for operation, resulting from directive 2009/104/EC– Minimum safety and health requirements for the use of work equipment by workers.

4.1 Documentation

The documentation should be delivered to Notified Body in two copies, in Polish or English language. Procedure of approval lasts 1 to 3 months, and its result is approved (stamped) documentation and Design Approval Report. Any changes introduced after approval require approving once again.

4.1.1 List of documents

1. General documents

1.1 P&I diagrams

1.2 General drawing of furnace (boiler) elevation

1.3 Section of furnace (boiler) elevation

1.4 Location of control valves and instruments

2. Documentation of burners

2.1 Assembly drawing of burner

2.2 Specification of burner and calorific effect curves

2.3 Burner start-up and operating instruction (in Polish language)

2.4 Certificates and declaration of manufacturer

3. Burners' Management System

3.1 Detailed description of furnace control and protections

3.2 Cause and effect diagram

3.3 List of alarms and interlocks

3.4 BMS block and electrical diagram

3.5 BMS – input/output list

3.6 BMS – logic diagrams

3.7 PLC configuration diagram

3.8 Wiring diagrams

3.9 Risk analysis and determination of protection instruments' class

3.10 Technical specifications and certificates:

- PLC
- Safety barriers, separators
- AC – DC converter

4. Local control panel

4.1 Drawing of local control panel and its equipment

4.2 Certificates

5. Instruments and equipment

5.1 List of instruments and equipment with range values, threshold set values for interlocks and alarms, with Ex certificates relevant to them

5.2 Pressure and flow transmitters

- Specifications, catalogue sheets, certificates

5.3 Temperature sensors and thermwells

- Specifications, catalogue sheets, certificates

5.4 ON/OFF shut-off valves and solenoid valves

- Specifications, catalogue sheets, certificates

5.5 Flame detection system

- Specifications, catalogue sheets, certificates

5.6 Igniter

- Specification, catalogue sheets, certificates

4.2 Manufacture and acceptance test

4.2.1 Manufacture

Materials used for production of burners should correspond to requirements of standards and regulations listed in paragraphs 5 and 6.

Materials, elements and sub-assemblies subject to inspection prior to being passed for production.

Burners' manufacturing technology shall conform to technological documentation of burner manufacturer.

For unitary manufactured burners, their producer should have results of prototype tests, confirming achieving of declared parameters.

A Party that installes and start-up shall issue an attest confirming completion of burner installation and its adjustment on boiler, furnace or process pressure equipment according to technical and operating documentation of boiler, furnace or process pressure equipment, as well as enclose results of measurements of harmful substances concentrations in flue gases, and for oil and gas-oil fired burners additionally results of carbon black concentration in flue gases measurements.

4.2.2 Testing and acceptance

The burners manufactured unitary for specific boiler, furnace or process pressure equipment shall subject to acceptance tests on individual basis in place of operating site; the tests should be performed within a framework of external on-duty revision by Notified Body.

The tests shall be performed on burners in place of operating site on order and cost of burners' manufacturer, or furnace/boiler vendor in agreement with burners' manufacturer. Preparation of burners for testing, as well as furnishing boilers, furnaces or process pressure equipment with measuring and monitoring instruments necessary for completion of tests by Notified Body, falls within scope of responsibility of furnace/boiler vendor or manufacturer of burners.

Scope of burners' tests shall include:

- testing of burner construction and its equipment for conformity to technical and design documentation
- verification of certificates and attests presented by manufacturer for safety equipment constituting equipment of the burner (burner system)
- verification of electrical safety requirements fulfilment on burner
- operational testing of burners, consisting in verification of:
    1. minimum and maximum burner output with simultaneous analysis of harmful substances emission in flue gases

2. effectiveness of burners' safety instruments operation in normal operating mode and during simulated interferences, which can occur during burners' operation on boiler, furnace or process equipment
3. co-operation of burner control system with boiler, furnace or process equipment protection system

- additional testing and proofing tests recognized necessary during acceptance tests.

Detailed programs of tests shall be each time individually established by Notified Body, with consideration given to design solutions of burners and their operating conditions.

5 Relevant documents

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

6 Codes and standards

Codes and standards listed below form part of this specification. Each publication shall be the latest revision and addendum in effect at the Contract award, unless otherwise specified:

PN (Polish Standard)

- PN-EN 746 Industrial thermoprocessing equipment (all parts).
- PN-EN 125 Flame supervision devices for gas burning appliances. Thermoelectric flame supervision devices
- PN-EN 61508 Functional safety of electrical/electronic/ programmable electronic safety related system (all parts)
- PN-EN 61511 Safety instrumented systems for the process industry sector (all parts)
- PN-EN 50156 Electrical equipment for furnaces and ancillary equipment. Requirements for application design and installation
- PN-EN 12952 Water tube boilers
- PN-EN 12953 Shell boilers

Dz. U. (Journal of Laws)

- Rozporządzenie Ministra Środowiska z dnia 22 kwietnia 2011 r. w sprawie standardów emisyjnych z instalacji Dz.U 2011 nr 98 poz. 558 (Journal of Laws 2011 no. 98, item 558).
- Rozporządzenie Ministra Środowiska z dnia 4 listopada 2008 r. w sprawie wymagań w zakresie prowadzenia pomiarów wielkości emisji oraz pomiarów ilości pobieranej wody Dz.U. 2008 nr 206, poz. 1291 (Journal of Laws 2008 no. 206, item 1291).

Directives of European Community

- 2009/142/EC Directive of the European Parliament and of the Council of 30 November 2009 relating apliances burning gaseuous fuels

- 2006/42/EC — Directive of the European Parliament and of the Council of 17 May 2006 on machinery and amending Directive 95/16/EC
- 97/23/EC — Directive of the European Parliament and of the Council of 2 June 1997on the approximation of the law of the Member States concerning pressure equipment
- 2006/95/EC — Directive of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits
- 2004/108/EC — Directive of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC
- 2004/22/EC — Directive of the European Parliament and of the Council of 30 May 2004 on measuring instruments
- 2009/104/EC — Directive of the European Parliament and of the Council of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at works

7 Record of changes

No.	Date	Description	Introduced by
0	27-03-2006	This specification entirely replaces the former LOTOS Group S.A. standard No. PR 07 850 with the same title.	W. Zaborowski
1	28-04-2011	Changed UDT-Cert to the Notified Body	A. Jarosz J. Dampc
2	30-11-2013	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