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1 Subject of specification

This specification and other documents referenced herein establish the minimum requirements for the design, fabrication, installation, testing and inspection for loading arms being operated on LOTOS Group S.A. plants.

2 Scope of validity

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

It shall also be a basis for preparing both detailed specifications and inquiries 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.

3 General

3.1 Purpose and scope

The purpose of this specification is to establish additional requirements for the loading arms to those that are included in TDT regulation.

The applied regulations, standards and specifications shall be specified in the loading arm data sheet.

The fabrication of equipment for filling and unloading of mobile vessels as recommended by the supplier shall be agreed with LOTOS Group S.A. and it must comply with the applicable regulations. The Supplier shall inform LOTOS Group S.A. about any non-standard technical solutions.

This specification shall be used in conjunction with Specification 2400 – "Machines and drives".

3.2 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

4 Definitions and designations

4.1 Definitions and designations of loading arms components

The components of loading arms systems are:

- a loading arm – a device for filling road tankers and rail tank cars, comprised of pipe members (rigid, flexible or rigid-flexible) connected by tight rotating joints, on the one side limited by a cut-off valve isolating it from the transmission installation, and on the other by an element connecting it to the vessel that is being filled or unloaded;
- an emptying installation (residue removal) – a system of small-diameter pipes and valves that makes it possible to empty the loading arm gravitationally or by means of a pump, when reloading has been completed;
- a vapour installation – a system of pipes and valves, whose purpose is to remove vapours or the gaseous phase to a recovery system or a storage tank;
- an emergency-release joint – a remotely or automatically activated device, permitting a quick and spill-safe disconnection of the loading arms in case of unexpected movement of the vessel;
- a quick-release joint – a joint used to connect the loading arms, without bolts or threaded connections;
- aerating valve – two-position, non-return valve, to be opened in order to gravitationally empty the loading arm by aerating the pipe installation.

5 Design and constructional requirements

5.1 Safety requirements

Units, subassemblies and elements of loading arms shall meet the requirements of separate Polish and foreign safety regulations as well as the requirements defined in the regulations concerning CE marking.

Equipment manufacturer shall carry out hazards analysis in order to determine hazards that may occur during equipment operation, due to the pressure, temperature and type of the medium inside the equipment.

Equipment shall be designed and manufactured in accordance with the results of the above mentioned analysis and it shall be furnished and installed to ensure user-safe operation throughout its whole life.

5.2 Design requirements

5.2.1 General.

Loading arms for bottom-up loading of road tankers shall be furnished with standard couplings fitting the connections on the tankers.

Loading arms for bottom-up loading of road tankers shall be furnished with special control devices protecting against overfilling of the tankers and stopping the operation of the loading arms in emergency conditions.

When designing loading arms, process parameters and loads that may occur during their operation shall be taken into account. In particular, the designer shall foresee and take into account such factors as the following:

- internal and external pressure;
- ambient temperatures and operating temperatures;
- the mass of the substance in working and testing conditions;
- loads from wind, snow or ice;
- dynamic loads;
- reaction forces and moments from such structures as e.g.: supports, attachments;
- corrosion, erosion, material fatigue and other;
- decomposition of unstable fluids.

5.2.2 Materials.

Materials used for pressure elements of loading arms shall have properties suitable for the operating conditions and shall be sufficiently resistant to the physical and chemical action of reloaded goods to maintain operation safety throughout the whole duration of the equipment operation.

In cases where adverse conditions causing corrosion, erosion or abrasion of material may occur, measures to restrict or eliminate those phenomena by e.g. adopting suitable material allowances, use of protective lining or solutions facilitating easy replacement of the most exposed elements shall be implemented.

Loading arms shall be designed so that its components serve their purposes and are reliable in performing functions intended for them.

5.3 Constructional requirements

5.3.1 General

Loading arms shall be constructionally selected for the properties of the reloaded medium so that the required capacity and reloading speed are ensured regardless of external conditions in the place of operation.

The equipment shall be fitted with a seal preventing the start of filling without the user being able to make sure that the filling operation is safe at the given moment and that the parameters of the reloaded medium such as pressure and temperature are within the limits specified for the given medium.

5.3.2 Monitoring equipment

It shall be possible to install equipment for monitoring the occurrence of hazards such as these mentioned below, on the loading arms:

- during filling – monitoring for overfilling or excessive pressure
- during emptying – monitoring for uncontrolled release of pressurised liquid

- during filling and emptying – monitoring of hazardous connecting and disconnecting.

Monitoring equipment shall also meet the requirements of separate safety regulations and CE marking requirements.

5.3.3 Safety devices

If there is a possibility of occurrence of conditions where permissible parameters can be exceeded, loading arms shall be fitted with suitable safety devices selected on the basis of the performance of the loading arms and the installation on which they are to be installed.

Safety devices include safety equipment and monitoring systems, such as indicators or alarm systems, enabling the implementation of adequate actions to maintain the parameters of the loading arms as specified in the design requirements.

Safety devices shall also meet the requirements of separate safety regulations and CE marking requirements.

5.3.4 General requirements for safety and accessories

Loading arms intended for reloading of hazardous media of toxic, caustic, infectious, flammable or self-igniting properties shall be fitted with an installation ensuring airtight sealing during filling or unloading of tankers or other storage tanks.

Vapours recovered in the airtight sealing system during hazardous media reloading shall be disposed to a vapour recovery installation or to a storage tank.

During the top-down filling of road tankers and rail tank cars, the tip of the arm outlet should be as close to the tank bottom as possible.

Loading arms shall be fitted with installations functioning together with the corresponding installations of mobile vessels, to protect against overfilling and stop the arm operation in emergency situations or in case of interruption of earth conductor continuity.

Loading arms for reloading of hazardous media shall be fitted with an emergency-release joint or another device of a similar function. The emergency-release joint must be protected against inadvertent activation.

It is recommended that loading arms be fitted with quick-release joints, controlled manually, hydraulically or pneumatically.

Quick-release joints should:

- be fitted with an interlock system excluding a possibility of spontaneous opening
- ensure tightness of the opening after disconnection
- be fitted with a manual release making manual disconnection possible, without the need for using a drive.

Manually operated loading arms shall be fitted with balancing systems.

Flexible reloading conduits used for reloading of hazardous media shall be permanently marked to enable their identification.

5.3.5 Location requirements

The following rules shall be followed when defining the location and length of the loading arm:

- when in off-position, no part of the arm shall protrude outside the outline of the reloading platform;

- the range of the arm movement and the point of its attachment shall enable its maintenance or dismantling from the reloading platform;
- the minimum distances from any element of the arm in its operating or manoeuvring position shall be:
  - 0.15 m to any part of the neighbouring arm being in off-position or under maintenance,
  - 0.30 m to any part of an arm being in operating position (except for counterweights),
  - 0.30 m to any part of the reloading platform structure or equipment,
  - 0.15 m between the counterweights of the neighbouring, simultaneously operating arms.

Loading arms located on a siding shall not encroach on the clearance gauge in off-position.

The operating zone and the alarm zone of loading arms made from rigid elements shall be precisely defined in the technical documentation, and travel beyond these zones by the arm elements shall automatically activate the alarm system, if such system has been provided for operating safety reasons.

5.3.6 Requirements for hydraulic, pneumatic and electric components

All hydraulic, pneumatic or electric components shall meet the requirements of specific regulations and standards for a given piece of equipment.

Hydraulic drives shall be protected against the effects of hydraulic conduit bursts or breakage of other components. In case of a burst of a conduit or other element the given actuator shall be completely immobilised or the drop speed of the arm element shall be reduced to a vertical component velocity of not more than 0.01 m/s with maximum load.

Internal leaks in hydraulic drive systems shall not lead to uncontrolled movements of the arms. The vertical component velocity of the drop of the outlet flange shall not exceed 0.1 m/h.

Use of a pneumatic system for driving the emergency-release joint and the quick-release joint is permissible.

Pneumatic systems shall be fitted with devices for cleaning of compressed air and for preventing its freezing.

Pneumatic conduits shall be protected against mechanical damage.

Loading arms intended for media whose reloading must take place at elevated temperature shall be fitted with a tracing installation.

The tracing system shall not restrict the operating movements of the arm.

Loading arms fitted with electric tracing shall have electric shock protection.

Electric tracing installations shall be provided with systems for the control and regulation of the heating power depending on ambient temperature, to ensure that the temperature of the reloaded medium is maintained within the required limits.

Tracing systems shall shut down automatically after the completion of reloading or there shall be a safety device preventing the tracing installation from being left switched on after reloading has been completed.

All elements and casings of loading arms whose surface temperature can exceed 70 ^{o}C shall be provided with thermal insulation or suitable covers to protect personnel working in the equipment area from burns.

Thermal insulation shall be made of materials characterised by:

- resistance to the action of the reloaded medium
- adequate heat conductivity and mechanical properties
- fire resistance.

5.3.7 Requirements for arms operating in hazardous areas:

Loading arms planned for installation in hazardous area shall be fitted with electric installation and equipment adapted for the parameters of the hazardous area.

Protection against static electricity and shock protection of the loading arms fitted with an electric installation shall comply with separate regulations and standards specific for the given type of equipment.

Loading arms intended for reloading of flammable liquid media of ignition temperature not exceeding 61 ^{o}C and flammable gases shall be fitted with systems preventing activation of the arm in case of ineffective earthing.

5.3.8 Control of loading arms

The arrangements of the control elements, control levers and pushbuttons, shall be made in such way that simultaneous activation of opposite movements of the same mechanism is not possible.

Control pushbuttons and levers shall return to the neutral (zero) position after the disappearance of the force acting on these elements.

Marking, inscriptions and symbols describing the functions of pushbuttons and control levers should unmistakably and clearly permit their reading in any conditions of loading arms operation.

5.3.9 Marking of loading arms and flexible reloading conduits

Every piece of loading arms shall be provided with a nameplate made of permanent material resistant to corrosion and the action of the reloaded medium, permanently attached in a place accessible for inspection, containing at least the following data:

- the manufacturer's name;
- serial number;
- year of manufacture;
- type designation , if any;
- equipment parameters (nominal diameter, flow rate, working pressure and the range of allowable temperatures of reloaded medium);
- intended use of equipment (type of reloaded medium);
- the manufacturer's quality inspection mark;
- date of the latest examination and TDT inspector's stamp.

Every flexible reloading conduit shall be fitted with a permanently attached plate made of a corrosion-resistant material, containing at least the following data:

- the manufacturer's name or trademark;
- standard name or definition of the intended use (allowed types of reloaded media);
- serial number and date of manufacture;

- date of the latest examination;
- test pressure.

The above mentioned data may be marked on the conduit tip bodies.

Every piece of loading arms shall be marked with a record number assigned by TDT.

At the approach path (road) to the operating area of loading arms there shall be placed warning signs – appropriate for the fire-protection requirements and the hazardous area, as well as inscriptions (boards) required by specific regulations and industrial safety instructions.

Movable structural elements of loading arms that may be a danger to surrounding people and machinery shall be marked with warning stripes in accordance with respective standards.

5.4 Technical documentation

At the stage of designing loading arms technical documentation shall be prepared, and shall be agreed with TDT by manufacturer.

Technical documentation should contain:

- a list of regulations and standards applied;
- assembly drawings of units and subassemblies and workshop drawings of elements, which will make it possible to verify the compliance of the design solutions with the requirements of applicable codes and standards;
- a part list of materials planned to be used for the construction of equipment;
- technical data of thermal insulation, if applicable;
- hydraulic and pneumatic installation diagram, if applicable;
- tracing installation diagram, if applicable;
- schematic and assembly electrical diagrams of the drive and the control system, if applicable;
- electrical supply diagram, if applicable,
- operating manual;
- strength analysis of loading arms within the scope resulting from the analysis of the hazards;
- hazards analysis;
- test and examination program for the whole equipment and its subassemblies;
- nameplate's photocopy;
- design of the foundation, if applicable, for information.

The operating manual shall contain at least the following:

- a general description of equipment, its intended use and technical characteristics;
- a description of the construction, functioning and regulation of the drive mechanisms and their subassemblies and accessories (mechanical, electric, hydraulic or pneumatic);
- a description of the construction, functioning and regulation of safety devices used in the construction;

- a description of actions performed when operating the piece of equipment (functional description of controls and signalling devices, instrument indications) together with layout drawings for these devices and instruments, the way and principles of control, as well as the operator's responsibilities and his actions before, during and after the end of work);
- requirements relative to safe operation of loading arms depending on its intended use and operating conditions;
- information about the required qualifications and eligibility of the loading arms operating and maintenance personnel;
- the rules of performing maintenance actions, stating the types and times of inspections, and the actions to be performed by the maintenance technician, belonging to his scope of responsibility;
- greasing instructions, including the specification of places – greasing points; types of lubricants used, in particular oils and greases, and greasing intervals;
- a specification of defects or irregularities that may occur during the operation of loading arms, stating the causes and ways of rectification;
- dates of planned preventive service (inspections), defined on the basis of the duration of effective work, stating the scope of service actions and a list of elements subject to replacement after a given time of equipment work;
- the properties of the reloaded medium.

The necessary scope of the loading arms operating manual shall be defined by the designer.

Loading arms must undergo technical examinations such as type examination, acceptance tests, immediate inspections and periodic inspections according to TDT's guidelines.

Loading arms shall be operated in compliance with its intended use and technical documentation.

5.5 Registration documents

According to the Regulation of Law on technical inspection of 21 December 2000 (Journal of Law. 122, item 1321) paragraph 14 loading arms may be operated only on the basis of a decision permitting its operation, issued by an organ of the competent unit of technical supervision and inspection.

The loading arms Manufacturer /designer shall prepare equipment registration form (if required) and make any necessary agreements with TDT.

The scope of documentation required for registration is specified in Grupa LOTOS S.A specification no. 8700

6 Relevant documents

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

7 Regulations

Loading arms shall be designed, manufactured and installed in compliance with the respective national and local regulations.

- Regulation of Ministry of Transport of 20 September 2006 „w sprawie warunków technicznych dozoru technicznego jakim powinny odpowiadać urządzenia do napełniania i opróżniania zbiorników transportowych – Journal of Law 2006 no 181 item 1335.
- Regulation of Ministry of Transport of 23 September 2011 zmieniajace rozporzadzenie „w sprawie warunków technicznych dozoru technicznego jakim powinny odpowiadać urządzenia do napełniania i opróżniania zbiorników transportowych" – Journal of Law 2005 no 208 item 1242.
- Regulation of Minister of Economy of 21 November 2005 „w sprawie warunków technicznych, jakim powinny odpowiadać bazy i stacje paliw płynnych, rurociągi przesyłowe dalekosiężne służące do transportu ropy naftowej i produktów naftowych i ich usytuowanie" – Journal of Law 2005 no 243 item 2063, as amended.
- Regulation of the Council of Ministers of 7 December 2012 „w sprawie rodzajów urządzeń technicznych podlegających dozorowi technicznemu". Journal of Law 2012, item 1468.

8 Record of changes

No.	Date	Description	Introduced by
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
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