



Exploration & Production

GENERAL SPECIFICATION

PIPELINES - RISERS

GS EP PLR 403

Installation of onshore pipelines

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1. Scope

The present standard specification for installation defines the general conditions for laying onshore steel pipelines for transporting fluids such as liquid or pressure liquefied hydrocarbons, gases, chemical products, water and solids in suspension.

Standard drawings from SD EP PLR 401 to SD EP PLR 424 are presented in section 19 of the present General Specification.

In the present General Specification, the following definitions shall apply:

Project Requirements	Means the requirements set for a specific project, such as detailed throughout the job specifications, the scope of works and in the general, the associated contractual documents.
WORKS	Means the whole of the site surveys, the site preparation, the assembly and installation of the pipeline and of its ancillary equipment, and the site restoration works.
Local Authority	Means any Local Authorities, which are involved in the design and installation processes.
COMPANY	Means the COMPANY on behalf of which the pipeline system is to be installed in the frame of the Project.
COMPANY's Representative	Means the representative of the COMPANY on the work sites, as stipulated in the Project Requirements.
CONTRACTOR	Means the main CONTRACTOR and its SUBCONTRACTORS in charge of the WORKS covered by the Project Requirements and the present General Specification.
SUPPLIER	Means the supplier of the line pipes, ready made for the WORKS.
OWNER	Means the owner of a land through which the Right of Way of the pipeline shall have pass, or the owner of land that shall be occupied for the works, on a temporary basis.

It is outlined that:

- For hilly areas, this General Specification shall be used with care when addressing points such as testing and precommissioning activities and CONTRACTOR'S experience in these domains can be used wherever this General Specification is silent
- This General Specification does not cover temporary swamp areas of known or expected significant water depths, permanent swamp areas, and permafrost areas.

The stipulations of the present specification are applicable, unless otherwise amended by Project Requirements.

The scope and methods of the detailed engineering works are covered by the **GS EP PLR 104**.

Alternate methods may be proposed in the frame of the WORKS; meanwhile, in such cases these alternates shall reflect as a minimum the requirements set out in the present General Specification.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
Not applicable	

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
API RP 1102	Steel Pipelines Crossing Railroads and Highways

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP COR 102	Design of cathodic protection of sealine by sacrificial anodes
GS EP COR 110	External cathodic protection of buried pipelines
GS EP COR 111	External cathodic protection of onshore facilities
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 354	External protection of onshore structures and equipment by painting
GS EP EXP 101	Precommissioning & Commissioning specification

Reference	Title
GS EP EXP 103	Precommissioning & commissioning technical preparation
GS EP EXP 105	Precommissioning execution
GS EP PLR 104	Onshore pipeline systems
GS EP PLR 221	Fabrication of hot bends for pipelines (sweet service)
GS EP PLR 223	Carbon steel tees for pipelines (sweet service)
GS EP PLR 404	Installation of steel pipeline by horizontal directional drilling
GS EP PLR 501	Hydrostatic testing of pipelines

3. Safety, health and environmental requirements

3.1 General

During the preparation and the execution of the WORKS, due consideration shall be permanently brought on the Health, Safety and Environmental Project Requirements.

3.2 Ground occupation

The permanently and temporarily occupied sites shall be prepared and maintained in the strict observance of the requirements set out in this section.

Risks on the existing facilities, plants, properties, public and private roads and paths, railways, rivers and secondary courses shall be duly avoided or mitigated.

Permanent and temporary markings shall be erected so as to keep inhabitants, drivers, pedestrians, etc. fully aware of the risks and damageable consequences during the WORKS and on the permanent sites dedicated to the pipeline system.

3.3 Personnel and means

The personnel intended for the execution of the WORKS shall be permanently kept informed of the inherent risks of the activities herein represented and of the environmental prescriptions in general, and trained accordingly.

The means intended for the execution of the WORKS shall be permanently kept and used in such a condition that they fit for safety and environmental purposes.

3.4 Environment

Over the entire duration of the WORKS, special care shall be brought to environmental conditions bearing on:

- The temporary occupation of the public and private areas
- The induced disturbance to the human activities
- The cut vegetation and plantations
- The re-usable excavated top soils and other non re-usable soils

- The temporary and permanent disposal zones for the soils, debris, unused construction materials, consumables, scraps, chemical agents and waters containing chemical agents
- The disturbed secondary courses and the drained waters.

The permanently and temporarily occupied grounds shall be restored in such a way that the environmental disturbances and risks are permanently suppressed or at least mitigated and only fully approved measures and procedures shall be used (see section 4).

3.5 Use of explosives

For the preparation of these works and during their execution, the HS&E requirements set in section 3 shall be strictly fulfilled.

A detailed work permit procedure shall be elaborated in the course of the construction engineering phase and the works involving the use of explosives shall be fully documented in this view.

Work permit for use of explosives shall address **each and every work** with explosives, and shall therefore correspond to a **unique location and a unique period of time**.

4. Organisation of the WORKS

4.1 General

The WORKS comprise:

- Any Construction Engineering details, as needed to supplement the detailed engineering studies, for the completeness of the WORKS
- The route detail surveys
- The site preparation works
- The care of and the site delivery of the line pipes, fittings, ancillary equipment and consumables
- The laying works on the standard route sections
- The execution of the singular and special points
- The precommissioning works
- The site restoration works and finally
- The exhibition of the completion file for the above said works.

4.2 Surveys

At the beginning of the basic engineering, a particular project specification (PPS) is to be issued giving the sites data, references of charts, reference geoid, datum points, geodetic network (etc.) and the technical requirements for the future route surveys. Attention shall be paid to the interfacing of survey references for the pipeline and those used for any upstream and downstream facilities.

4.3 Knowledge of the worksite conditions

The detail studies and installation procedures, and the selection of the installation means, machinery and ancillary equipment shall take into account the specific environmental conditions which are prevailing in the temporary and permanent areas intended for the WORKS; as such but not limited to:

- Health, safety and environmental requirements
- Meteorological conditions during the works and during the service life of the pipeline system
- Water tables during the works and during the service life of the pipeline system
- Seismic condition
- Existing private and public properties and facilities
- Other local regulations.

4.4 Management activities

Management activities of the WORKS shall conform to the Project Requirements. As a minimum they shall cover:

- Progress scheduling and reporting procedures
- Health, safety and environmental management and track records
- Logistic support for the work-sites, and shows the functional and links between the work-sites and the centralising office
- Work permit applications, especially for hot works, works on or nearby existing facilities, works with explosives, works on communication ways, private and public zones, etc.; it is outlined here that these applications involve COMPANY's representative authorisations and may involve such from the Local Authorities
- Advising the Local Authorities and obtaining the authorisations necessary for temporarily diverting or interrupting the traffic on the public roads
- Advising the landowners of the lands to be temporarily occupied during the WORKS
- Providing means and resources to the COMPANY such as offices, local and international communications, computer with network means, sanitary facilities, individual transportation means
- Etc.

4.5 Construction Engineering details

The Construction Engineering details shall provide all the necessary detailed instructions, procedures and drawings at an "Approved for Construction" level.

In addition, the Construction Engineering details shall also aim at resolving issues and/or developing alternatives as soon as contingency conditions are locally met in the course of the WORKS.

They may involve as a minimum:

- Stability of trenches
- Over stabilisation of pipeline section by means of concrete weighting
- Contingency repair works, following major soil disturbances
- Contingency works as a consequence of unexpected underground live or abandoned lines, cables, wrecks, etc.
- Use of elastic curvatures at very large bending radius.

4.6 Connection to an existing installation

Connection to an existing installation requires a precise programme and timetable for the connecting works shall be prepared, with due consideration on the necessary permits for the admission of staff, machinery and vehicles to the installation.

If the connection operations involve any works that are deemed to constitute a fire hazard, such as welding, gas cut, grinding, heating of materials, etc., a hot work permit is required and the works shall only be initiated in the presence of the COMPANY Representative.

The COMPANY Representative has the right to order the immediate interruption of work if he is of the opinion that there exists a danger or if the prescriptions set out above are not followed to the letter.

4.7 Links with local authorities and OWNERS

Mandatory applications shall be requested in due time, then made accessible during the WORKS and finally incorporated in the Completion File.

They bear on the authorisation to be obtained from the concerned parties and in general, they shall be required for:

- The pre-works statement of condition
- The occupation of the temporary and permanent areas for the WORKS
- The excavation, reinforcement, restoration works to be executed in these areas
- The special applications for works of high risk, such as hot works, works in the vicinity of existing facilities, etc.
- The crossings of the existing underground facilities and ways and the involved temporarily interrupted or diverted traffic
- The transportation of special equipment on roads and waterways
- The full discharge of the CONTRACTOR from the Local Authorities, in the case of damages caused in the public domain under the normal condition of the WORKS
- The post-works statement of condition.

4.8 Pre-works statement of condition

The reports and official notes specified in this paragraph are subject to section 4.6 requirements.

Before any work is undertaken, the parties shall carry out a thorough inventory of the site within the strip of land delimited by marker posts, which also forms the boundary of the zone put at the disposal of the WORKS. The inventory shall also include consideration of the access routes to the ROW.

This shall take the form of a set of reports and an official inventory which shall be submitted to for the full extent of the zone put at the disposal of the WORKS and for all additional rights of way deemed necessary, notably for particular points and access routes.

The official inventory of the site shall reflect the observations made by the public and private OWNERS and the planned date for the occupation or utilisation of the land.

All the surfaces of access roads, including all public or private roads or communication lines used for the movements and transportation intended for the WORKS shall be documented through reports stating the condition of these roadways.

Buried structures (tables, pipes, drains, aqueducts, etc.) pointed out by the public and private parties should form the observations on the statements of condition.

Underground work reports shall be also drawn as necessary as and when observations become possible.

4.9 Post-works statement of condition

The reports and official notes specified in this paragraph are subject to section 4.6 requirements.

Upon completion of the site restoration works, post-work statement of condition certificates shall be drawn up.

The latter shall be jointly signed after due hearing of the parties by the COMPANY Representative, the Landowners and/or farmers, and the CONTRACTOR Representative.

4.10 Completion file

The following information shall be supplied in the conditions set out in the Project Requirements:

- The detail engineering dossier with the whole sets of documents at the "Approved for Construction" level which shall be at scale and accuracy level identical to that of the "Approved for Construction" dossier, as a minimum
- The as built dossier with whole sets of documents at the "Approved" level
- The inventories, the application dossier, the reports on damages and repairs made, etc.

The maps shall indicate the location of the principal installations and the line equipment with positions marked in kilometres.

For the strip of land, which figures on the laying drawing and will extend beyond the ROW limits, each map shall show:

- The plane geometry elements - i.e. a survey grid
- The topographic contours

- The geographical elements, such as land use, housing, roads etc
- The exact route of the piping axis after laying
- Indicators of the position of line equipment and structures, singular or special points, pipe and weighting characteristics
- The lengths which are the result of horizontal chaining following the pipe axis
- The angles
- The bending radii
- The limit of permanent easements (reduced strip zone)
- And the references to particular drawings in relation to certain parts of the structure.

The planar view strip map shall be centralised along the axis of the pipeline and split as necessary to ensure the pipeline remains central within this view. The strip map shall extend beyond the ROW to the extent that it adequately shows the pipeline within its geographical context.

The cross-sections shall provide in particular:

- The reference drawing level
- The horizontal lengths and lengths measured by chaining according to the upper generating line of the pipe
- The height of the earth and the upper generating line of the pipe
- The position of buried obstacles
- And the pipe protection devices.

For the special points and singular points, a plan drawing and a cross-section shall be drawn up at a suitable scale, especially indicating the particular measures taken for:

- The crossing of the point in question
- The depth of the pipe
- The dimensions, nature, and location of the protection devices, casings, etc.
- The location and the nature of the weighting blocks and anchors
- And the nature of the backfill.

For miscellaneous structures and equipment, the as built files shall include a plan drawing, a cross-section and all the sectional drawings necessary for the full descriptions of the structures.

The pipe book shall be drawn up onto a computer-readable format as per the Project Requirements and shall reflect:

- The characteristics of the pipe: thickness, grade, SUPPLIER, number, length, casting number
- The cumulative length
- The welding number
- The bent pipes
- The plan drawing and cross-section

- The date the welding was executed
- The identification locators for the welds
- The x-rayed welds
- The X,Y,Z position and geographical coordinates for each and every girth weld, hot bend, inlet/outlet, flange, isolation joint, tee, mainline valve etc.
- The electronic pipe book shall enable relations to be made between items such as provided by a spreadsheet or database format.

5. Pipeline route detailed assessment

5.1 General requirements

The standard width of the right-of-way for construction is of 30 m, unless otherwise stipulated in the Project Requirements. The right-of way to be purchased or leased may vary depending on local regulation, the future inspection methodology and future plans for any additional pipelines within the same ROW and may be different for construction and operational phases.

The various types of Right of Ways as per COMPANY requirements shall conform to SD EP PLR 401, SD EP PLR 402, SD EP PLR 403 and SD EP PLR 404 in section 19, as applicable.

As a consequence of any future pipelines to be installed in this right-of-way, the offset between the pipeline and R.O.W. centre lines shall be as large as feasible, and shall remain at constant offset along the ROW. The position of the pipeline within the ROW shall be agreed between the Project and COMPANY's local Operations department.

Several areas for future in-service purposes (i.e. temporary storage of contingency repair means and materials) shall be prepared and worked out in such a way that they will remain accessible during the intended service life of the pipeline.

In specific cases, and as instructed by the Project, certain sections of the pipeline shall be as horizontal as feasible and the number of cold bends reduced to a minimum. This shall require additional detail studies.

Sections of the pipeline route showing important variations of elevation profile shall be treated as special points, thus requiring special constructional dispositions and means.

No connection shall take place after backfilling in the vicinity of a curvature made of potentially forced elastically bent elements.

5.2 Singular and special points

They consist of the points on the route that require very specific laying methods. Those points shall have been clearly reported as such in the detailed route maps.

This is the case notably for the crossing of natural or artificial obstacles such as the water table or below ground piping crossings, the crossing of communication lines and minor water courses.

5.3 Crossing of a major railway

The execution project shall comprise:

- A drawing giving the location of the structure as a whole and indicating the kilometre marker of the lines crossed

- A longitudinal cross-section of the piping giving:
 - The right of way of the railway
 - The depth of covering of the upper generating line of the pipe or its casing in relation to the lowest point of the railway sleepers and any other points of the crossing
 - The slope of the casing
 - The location of the connection sleeves, if applicable
 - The length and the nature of the pipes in place
 - The bending radii of the pipes
 - The location of the breathers and cap access ports, if applicable.

5.4 Crossing of a major water course

A drawing shall be prepared giving in addition to the location of the pipe and its possible annexes (valve chambers):

- The extent of the surfaces necessary for setting up the site on each bank
- The probable limits of the earth works, according to the method used
- The locations of the profile sections, with, in certain cases, a diagram of the access routes to valve chambers.

A longitudinal section of the pipe shall be prepared giving, with reference to a clearly defined reference level (general level of the country):

- The level of the natural bed, of the current or planned theoretical navigation channel, of the location of the stabilised bed (particularly for water courses in mountain regions and intermittent water courses), of the location of the high-water bed, of the low-water bed and of the distance which the latter moves
- The level of the bottom of the trench
- The levels of the position of the pipe with respect to the real bed, theoretical channel, to the stabilised bed
- The low-water mark and the level of the highest water known, also indicating:
 - The location of the connection sleeves, where they exist
 - The length and nature of the pipes in place
 - The bending radii of the pipes
 - The location of the weightings necessary
 - The attachment and suspension devices
 - The reconstitution, attachment, safety and tightness procedures for the bed, the embankments and the dikes.

6. Materials and equipment

6.1 General

Care and custody of any of the materials to be permanently or temporary incorporated in the pipeline system is comprised in the frame of the WORKS covered by the present General Specification and as supplemented by the Project Requirements.

Any appraisal of materials found in unacceptable condition shall be subject to Project's expertise and approval before application.

In the case of bare pipes being supplied, where the coating is to be carried out by a third party on a special site, the management and quality control of the coating works shall remain on the side of the main CONTRACTOR of the WORKS.

In addition to the minimum requirements set in the next paragraph 6.6 to 6.8, any ancillary materials to be provided in the frame of the WORKS shall to the Project Requirements.

The Project Requirements set out the list of accessories to be installed in the frame of the WORKS.

Layout, locations, levelling and assembly operations shall be performed in compliance with the Project Requirements, then in compliance with the instructions of the supplier of the ancillary equipment.

6.2 Supplies of materials

In general, purchase of coated or non coated line pipes is under Project's responsibility, unless otherwise stipulated in the Project Requirements.

Other materials such as -but not limited to- casings, with their tight end closure fittings, breathers and breather cap access ports, connecting sleeves for pipes of different thickness, any accessories and special parts, shall be provided in the frame of the WORKS.

6.3 Handling

The WORKS shall include:

- The supplies of machinery and personnel needed for unloading equipment at the point of delivery and on-site handling
- The load handling to be carried out by qualified personnel, using suitable machinery, with the required flexibility, power and range for the job in hand, in order above all to avoid the deterioration of weld bevels, the permanent deformation of pipes, the deterioration of the coating of pipes that are delivered pre-coated
- All necessary precautions to be taken during handling of the coated pipe to avoid deterioration. In particular, supports are to be padded and the width of hoisting straps shall be suited to the diameter and weight of the equipment handled
- The supplies of the straps, which shall be designed to be detached without the risk of tearing the coating, and without impact damage to the pipe. The use of chains or tables is strictly forbidden.

6.4 Transportation and storage

The WORKS shall include the transportation of the material between the place of taking possession of the goods and materials and the storage areas. The latter must have a perfectly flat surface.

Transportation equipment shall be fitted out so as to prevent all risk of damage.

Manoeuvres liable to damage material are forbidden.

Vehicles used for transporting coated pipes shall be equipped with devices to prevent coatings being exposed to shocks or friction. Padding shall be provided on the supports, side panels and stowage slings.

The pipes are stored by SUPPLIER and according to their characteristics (diameter, grade, thickness) and, where applicable, by the nature of the coating.

The maximum height of the stockpiles is normally stated in the Project Requirements, depending in particular on the climatic conditions and taking into account safety considerations. Bevels must continue to be protected.

The storage of material other than pipes shall conform to the SUPPLIERS' instructions; the pipe storage area is to be equipped to ensure that the pipes are protected from the sun.

6.5 Inventories

The WORKS includes monthly and final cumulative inventory reports of material taken into possession by the CONTRACTOR with and without reservations.

These reports shall show the quantities taken into possession for bare and coated pipes according to SUPPLIER, diameter, grade and thickness.

At the end of the works, and before the provisional reception notice is drawn up, a definitive inventory of the material taken into possession by the CONTRACTOR shall be implemented.

The pipe balance shall be used by the CONTRACTOR for allocating the costs of the laid and unused pipes, according to the Project Requirements.

Unused materials and pipes, which have not been provided by the CONTRACTOR, shall be returned to the COMPANY as per the Project Requirements.

The line pipe inventories shall reflect:

- The quantities used according to the weld book, after deductions have been made for lengths corresponding to equipment laid in line
- The quantity used for the qualification of welds and the approval of the welding procedure
- The weld samples
- The whole pipes remaining available and their place of storage
- The reusable off cuts (at least 5.00 m in length) and their place of storage.

CONTRACTOR shall at the end of the works, and before drawing up the provisional notice of reception, provide a pipe balance that shall show per diameter, grade and thickness:

- a. The lengths taken into possession without reservation
- b. The lengths that can be justified according to the inventory

- c. The difference between the lengths taken into possession and the lengths that can be justified
- d. The permissible tolerances (in length) for non-reusable off cuts (0.20% of the length laid)
- e. The balance, that is difference between c and d.

The inventories of materials other than pipes shall reflect the quantity and nature of the materials, their SUPPLIER names, their as-built identification and geographical location, and for surplus material, the storage location(s).

6.6 Flanges, valves and fittings

Scrupulous attention shall be paid to the direction in which equipment is installed (valves, check valves, etc.); all equipment and accessories shall be vertically and horizontally aligned; the greatest care shall be taken to avoid any strain or misalignment.

For flange joints, bolts shall be tightened using a torque wrench to ensure that the torque does not cause, whether in the metal of the joint components, or in that of the assembled parts (flanges notably), a stress greater than the permissible limit; the forces to be applied for the tightening of the parts to be assembled shall be fully assessed in the frame of the WORKS.

6.7 Casings

Casings shall be designed and as installed as per [API RP 1102](#), unless more stringent requirements apply. See also section 11.4.

6.8 Connecting sleeves for pipes of different thickness

Some connecting sleeves for pipes of different thickness and different grades and qualities of steel may be necessary.

If they have to be manufactured, they shall meet the Project Requirements.

If they have to be machined, a section of the pipe with the best mechanical characteristics shall be used.

6.9 Accessories and special parts

COMPANY shall approve the dimensions and conditions for the manufacture of accessories and special parts not provided by the COMPANY.

7. Ground occupation and site preparation works

7.1 Staking out

The staking out procedure of the pipeline route shall be established or refined in conformity with the Project Requirements and during this, the Project shall be kept informed of any anomaly or drawing error that he notices, any unforeseen difficulty encountered.

7.2 Construction marker posts

See section 19 - SD EP PLR 418 to SD EP PLR 420

Temporary mark out on the ground works occupation zones for the WORKS shall be performed on the basis of the staking out procedure.