

## GENERAL SPECIFICATION

### STRUCTURAL

#### GS EP STR 204

|                                                                 |
|-----------------------------------------------------------------|
| <b>Subsea structures: Carbon Steel Material and Fabrication</b> |
|-----------------------------------------------------------------|

| Rev. | Date    | Purpose of the revision                                                         |
|------|---------|---------------------------------------------------------------------------------|
| 05   | 11/2016 | Table 5, Table 8, Table 10, § 11.14.1, Bibliography added, Appendix 1 & 2,      |
| 04   | 05/2015 | Organisation change - January 2015                                              |
| 03   | 12/2014 | § 1, 4.2.b, 5.3, 11.13, 11.14.1, 11.14.9.1, Table 10                            |
| 02   | 10/2013 | § 11.1, §11.14.1, §11.14.5.b, § 11.14.6.a, §11.14.7.1.a, §11.15.2.1, Appendix 4 |
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## 1. Scope

### 1.1 General

This specification defines the Company's general requirements for fabrication, supply of structural materials to be used, welding assemblies, heat treatment and inspection to apply in the fabrication of subsea steel structures without fatigue sensitivity and their particular lifting appurtenances (spreader bars, ...).

Subsea structural components are those designated as non-pressure containing and shall include, but shall not be limited to the following:

- Structural steelwork of ILT, ITA, FLET/PLET, FTA...
- Manifold, Subsea Distribution Unit
- Pipeline Termination Structure (subject to a particular acceptance from Company on a case by case basis)
- Flexible pipe ancillary equipment
- Hang off collar
- Mid water arches structure
- Anchor bases
- Suction piles excepting those for permanent mooring of FPSO and offloading buoys or equivalent
- Installation aids for the above items, spreader bars, spiders, and associated sea fastenings.

The present specification shall not be applied for critical structures (single hybrid risers, buoyancy tankers, riser towers...) for which **GS EP STR 201** and **GS EP STR 301** shall apply.

This specification discriminates "structural materials" from "non-structural materials" as per whether or not they are included into the composition of resisting members of the structure (refer to paragraphs 1.2, 1.3 and 5).

Icing of water is not considered in the present specification, if icing is considered as a design case, a PPS (Project Particular Specification) shall be issued.

For lifting, temperature is assumed  $\geq -5^{\circ}\text{C}$ . If lifting performed at a lower temperature, then **GS EP STR 201** shall apply for components submitted to lifting loads.

This Specification shall be used in conjunction with a Project Particular Specification (PPS), if any, detailing the additional tests and requirements or the possible modifications to the present specification, based on the particular design conditions of the steel structures.

No deviation from the requirements stated in the present specification shall be permitted unless prior written approval has been obtained from the Company using contractual forms as defined for the project.

Attention is drawn on certain materials that shall be subject to inspection and approval by a Third Party Inspection (TPI), as specified below.

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Attention is drawn too on certain structures that shall be subject to comply with requirements of classification society or any particular state regulation. In that case, fabrication of these structures shall comply with the most severe requirement. In the event of conflict between this specification and any other contractual document, the Contractor shall inform the Company in writing and receive written clarification or approval from the Company.

At the bid stage, the Contractor/sub-contractor shall declare which appendix (EN or AWS) will be used for fabrication.

This specification doesn't apply for fabrication of stainless steel structure, for which [AWS D 1.6/D 1.6M](#) or equivalent construction code approved by Company shall apply.

## 1.2 Structural materials

This specification covers exclusively carbon steel materials with Category S, First and Second, as defined in paragraph 5.

Cast and forged material (including their welding) are excluded from this specification. If cast or forged products are intended to be used, [GS EP STR 202](#), [GS EP STR 203](#), [GS EP STR 301](#) shall apply.

It applies to plates, rolled sections, hollow sections, welded tubulars (including welded reducers) and seamless tubulars, having a max. Specified Minimum Yield Strength (SMYS) of 355 MPa. For higher grade [GS EP STR 201](#) and [GS EP STR 301](#) shall apply.

## 1.3 Non-structural materials

Non structural members materials and fabrication (refer paragraph 5 for definition) are not covered by the present specification.

Those materials shall be Low Strength steels (as defined in Table 2) unless otherwise noted.

## 2. Reference documents

The reference documents listed below form an integral part of this General Specification.

Applicable specifications and documents are listed hereafter in the present section.

The order of precedence of the applicable documents shall be:

- The Purchase Order (PO) or Contract
- The Project Particular Specification (PPS)
- The Present General Specification and associated general specifications
- The Codes and Standards in reference.

Unless otherwise specifically indicated in writing, the Contractor shall work in accordance with the requirements specified herein and the applicable requirements of the latest editions at date of Contract award of the referenced codes and standards, whenever requested in the present specification.

The requirements of this specification shall take precedence over the referenced codes and standards. Where this specification states no overriding requirements the referenced codes and standards shall apply in full.

The Contractor shall equip himself with copies of all the reference specifications referred to in this specification and shall make them readily available to all his personnel involved on the work.

### External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

| Reference           | Title                                                                                                                                      |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| AISC 325            | Steel Construction Manual                                                                                                                  |
| API RP 2A-WSD       | Planning, Designing, and Constructing Fixed Offshore Platforms-Working Stress Design                                                       |
| API SPEC 2B         | Specification for the Fabrication of Structural Steel Pipe                                                                                 |
| API SPEC 2H         | Specification for Carbon Manganese Steel Plate for Offshore Structures                                                                     |
| API SPEC 2W         | Specification for Steel Plates for Offshore Structures, Produced by Thermo-Mechanical Control Processing (TMCP)                            |
| API SPEC 5L         | Specification for Line Pipe                                                                                                                |
| API SPEC Q1         | Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry        |
| ASME BPVC Section V | Non-destructive Examination                                                                                                                |
| ASTM A106/A106M     | Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service                                                         |
| ASTM A131/A131M     | Standard Specification for Structural Steel for Ships                                                                                      |
| ASTM A139/A139M     | Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)                                                        |
| ASTM A333/A333M     | Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service and Other Applications with Required Notch Toughness |
| ASTM A334/A334M     | Standard Specification for Seamless and Welded Carbon and Alloy-Steel Tubes for Low-Temperature Service                                    |
| ASTM A36/A36M       | Standard Specification for Carbon Structural Steel                                                                                         |
| ASTM A381           | Standard Specification for Metal-Arc-Welded Steel Pipe for Use With High-Pressure Transmission Systems                                     |
| ASTM A501/A501M     | Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing                                                   |
| ASTM A516/A516M     | Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service                               |

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|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| ASTM A524                | Standard Specification for Seamless Carbon Steel Pipe for Atmospheric and Lower Temperatures                                    |
| ASTM A53/A53M            | Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless                                  |
| ASTM A537/A537M          | Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel                                 |
| ASTM A572/A572M          | Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel                                          |
| ASTM A573/A573M          | Standard Specification for Structural Carbon Steel Plates of Improved Toughness                                                 |
| ASTM A578/A578M          | Standard Specification for Straight-Beam Ultrasonic Examination of Rolled Steel Plates for Special Applications                 |
| ASTM A633/A633M          | Standard Specification for Normalized High-Strength Low-Alloy Structural Steel Plates                                           |
| ASTM A671/A671M          | Standard Specification for Electric-Fusion-Welded Steel Pipe for Atmospheric and Lower Temperatures                             |
| ASTM A672/A672M          | Standard Specification for Electric-Fusion-Welded Steel Pipe for High-Pressure Service at Moderate Temperatures                 |
| ASTM A709/A709M          | Standard Specification for Structural Steel for Bridges                                                                         |
| ASTM E165/E165M          | Standard Practice for Liquid Penetrant Examination for General Industry                                                         |
| ASTM E23                 | Standard Test Methods for Notched Bar Impact Testing of Metallic Materials                                                      |
| ASTM E709                | Standard Guide for Magnetic Particle Testing                                                                                    |
| AWS D 1.1/D 1.1M         | Structural Welding Code - Steel                                                                                                 |
| AWS D 1.6/D 1.6M         | Structural Welding Code - Stainless Steel                                                                                       |
| EN 10025 (Parts 2; 3; 4) | Hot rolled products of structural steels - Parts 2; 3; 4                                                                        |
| EN 10160                 | Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)                            |
| EN 10164                 | Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions |
| EN 10204                 | Metallic products - Type of inspection documents                                                                                |
| EN 10210 (All parts)     | Hot finished structural hollow sections of non-alloy and fine grain steels - All parts                                          |
| EN 10225 (All parts)     | Weldable structural steels for fixed offshore structures - Technical delivery conditions - All parts                            |

| Reference   | Title                                                                                                                                                                                     |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 1435     | Non-destructive examination of welds - Radiographic examination of welded joints                                                                                                          |
| EN 462-1    | Non-Destructive Testing-Image Quality Of Radiographs - Part 1: Image Quality Indicators (Wire Type) Determination Of Image Quality Value                                                  |
| ISO 11666   | Non-destructive testing of welds - Ultrasonic testing - Acceptance levels                                                                                                                 |
| ISO 11699-1 | Non destructive testing - Industrial radiographic film - Part 1: Classification of film for industrial radiography                                                                        |
| ISO 148-1   | Metallic materials - Charpy pendulum impact test - Part 1: Test method                                                                                                                    |
| ISO 15614-1 | Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys |
| ISO 17640   | Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels and assessment                                                                                         |
| ISO 3834-2  | Quality requirements for fusion welding of metallic materials - Part 2: Comprehensive quality requirements                                                                                |
| ISO 4063    | Welding and Allied Processes - Nomenclature of Processes and Reference Numbers                                                                                                            |
| ISO 5580    | Non-destructive testing - Industrial radiographic illuminators - Minimum requirements                                                                                                     |
| ISO 9001    | Quality management systems - Requirements                                                                                                                                                 |
| ISO 9606-1  | Qualification testing of welders - Fusion welding - Part 1: Steels                                                                                                                        |
| ISO 9712    | Non-destructive testing - Qualification and certification of NDT personnel                                                                                                                |

### Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

| Reference     | Title                                               |
|---------------|-----------------------------------------------------|
| GS EP SPS 029 | Metallic Materials for Subsea Production Facilities |
| GS EP STR 100 | Offshore steel structures - General                 |
| GS EP STR 201 | Materials for offshore steel structures             |
| GS EP STR 202 | Cast materials for steel structures                 |
| GS EP STR 203 | Forged materials for steel structures               |

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| Reference     | Title                                                               |
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| GS EP STR 301 | Fabrication of offshore steel structures                            |
| GS EP STR 304 | Fabrication of welded plate girders (W.P.G.) and Box Girders (B.G.) |

These listings may not be inclusive of all standards and codes that could be considered applicable to the work scope.

The Contractor is responsible for identifying any additional codes or standards that may apply and shall propose those standards for Company's approval with relevant justifications at the bid stage.

### 3. General

#### 3.1 Definitions

Throughout this specification, the following definitions shall apply:

- **Supplier:** Means the company designated on the Purchase Order form or Contract as being the selected supplier of the said materials.
- **Manufacturer:** Means the company or its sub-contractors selected by the Company or the Supplier (as applicable) as the Manufacturer of the said materials.
- **Vendor:** Means Manufacturer/Supplier, which is the party that manufactures or supplies equipment and services, to perform the duties specified by the Contractor.
- **Purchaser:** Means the Company or the Supplier (as applicable) which have placed the Purchase Order to the Manufacturer.
- **Inspector:** Means the Company's or Supplier's representative(s), (as applicable), or member(s) from an Inspection Agency duly appointed by the Company or the Supplier (as applicable) to act as its representative(s) for the purpose of the contract.
- **PPS:** Designates the Project Particular Specification.
- **Approval:** Means the authorisation in writing given by the Company to the Supplier/Contractor on a procedure or to proceed with the performance of a specific part of the work without releasing in any way the Supplier/Contractor from any of his obligations to conform with the technical specifications, requisitions, etc. The words "Approve", "Approved" and "Approval" shall be construed accordingly.
- **Site:** The yards, workshops, docks, laboratories or other locations where the fabrication inspection and testing are to be performed complete or in part, shall be referred to herein as the "Site".
- **Contract Documents:** The drawings, equipment lists, bills of material, material specifications, etc., latest editions, issued by the Company and attached to the Contract or the Purchase Order shall be referred to herein as the "Contract Documents".

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### 3.2 Abbreviations

|                |                                      |
|----------------|--------------------------------------|
| <b>C</b>       | Carbon Content                       |
| <b>CE</b>      | Carbon Equivalent                    |
| <b>CVN</b>     | Charpy V-notch                       |
| <b>DPI</b>     | Dye penetrant inspection             |
| <b>EN</b>      | European standard                    |
| <b>ERW</b>     | Electric resistance welding          |
| <b>FCAW</b>    | Flux Core Arc Welding                |
| <b>FCAW-GS</b> | Gas Shielded Flux Core Arc Welding   |
| <b>FCAW-SS</b> | Self Shielded Flux Core Arc welding  |
| <b>FTA</b>     | Flow Line Termination Assembly       |
| <b>GMAW</b>    | Gas Metal Arc Welding                |
| <b>GTAW</b>    | Gas Tungsten Arc Welding             |
| <b>HAZ</b>     | Heat Affected Zone                   |
| <b>HFIW</b>    | High-frequency induction welding     |
| <b>ILT/ITA</b> | In-Line Tee Assembly                 |
| <b>ITP</b>     | Inspection test Plan                 |
| <b>MPI</b>     | Magnetic Particle Inspection         |
| <b>NDE</b>     | Non-Destructive Examination          |
| <b>NDT</b>     | Non-Destructive Test                 |
| <b>PQR</b>     | Procedure Qualification Records      |
| <b>PWHT</b>    | Post-Weld Heat Treatment             |
| <b>QCP</b>     | Quality Control Plan                 |
| <b>QT</b>      | Quenched and Tempered                |
| <b>RT</b>      | Radiographic Testing                 |
| <b>SAW</b>     | Submerged Arc Welding                |
| <b>SMAW</b>    | Shielded Metal Arc Welding           |
| <b>TMCP</b>    | Thermo-Mechanical Controlled Process |
| <b>TPI</b>     | Third Party Inspection               |
| <b>TS</b>      | Tensile Strength                     |
| <b>UT</b>      | Ultrasonic Testing                   |
| <b>WPS</b>     | Welding Procedure Specification      |
| <b>YS</b>      | Yield Strength                       |

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### 3.3 Approval of documents/Documentation

The following documents shall require approval of the Company or its Inspector and of an Independent Third Party (if any) prior to allowing fabrication to proceed:

- Drawings and calculation notes for temporary works or handling operations (staking, roll-up, etc.), inclusive of foundations, support points, jacking points and sling points
- Handling and lifting equipment to be used including rigging equipment, cranes, winches, etc. with review of test certificates
- List of proposed welding consumables (brand and type) with their data sheets
- Consumables handling, drying, storing, flux recycling and traceability procedure
- Sequence of fabrication, assembly, welding and erection
- Inspection test Plan
- Weld Map and Register together with all Welding Procedure Specifications (WPS) and Welding Procedure Qualification Records (WPQR)
- Welding procedure qualification test plan (i.e. up-dated status of WPQ tests of procedures under qualification)
- The Welding Procedure Qualification Tests and welder qualification tests
- List of welders and welding operators, with certificates
- Forming procedures for tubulars
- Manufacturing Procedure Specification (MPS) and Mill certificates of Contractor's supplied materials
- Identification, control and traceability procedures for materials
- Key plans showing member identification and weld marking schemes
- Inspection, dimensional and Non-Destructive Testing procedures (including report models)
- Initial available list of Non-Destructive Testing operators, with certificates
- Post-Weld Heat Treatment procedures
- Lifting, load-out and installation procedures, including details and certification of equipment to be used
- NDT maps linked with weld maps
- All sub-contractors of Contractor
- The Quality Assurance Manual and Plan.

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The following documents shall be permanently updated and shall be at the Company disposal (or Company's Inspector and or Independent Third Party) for review when requested.

- Fabrication or shop drawings showing weld arrangement, location of welding at prefabrication, on yard, at erection stages and weld details
- Updated Weld history register (see example in Appendix 3)
- Updated list of welders and welding operators, with certificates
- Inspection, Dimensional and Non-Destructive reports and production tests results if any
- Updated List of Non-Destructive Testing operators with certificates
- Post-Weld Heat Treatment charts
- All the as-built documentation.

At final reception of structural components, the fabricator shall constitute the final dossier as follows:

- All documentation approved by Company and TPI (if any) as stated above
- Last revision of Weld history register
- Last revision of Inspection, Dimensional and Non-Destructive reports and production tests results if any
- Post-Weld Heat Treatment charts
- All the as-built documentation
- Compilation of concession/deviations, if any, granted by Company and TPI (if any) during material manufacture.

### 3.4 Quality Assurance/Quality Control

The Contractor shall operate a Quality Assurance system, approved by a recognized authority. The Quality Assurance Manual shall be submitted to Company and made available to the Inspector at all times.

Four weeks prior to commencement of any fabrication, the Contractor shall prepare and submit to Company a written Quality Control Plan (or Inspection and Test Plan) which describes the inspections to be performed during the said fabrication. The Quality Control Plan shall set forth "witness", "hold", "review" and "monitor" points.

### 3.5 Execution of the work

The Contractor shall furnish qualified personnel and all equipment, tools, instruments, etc. necessary to carry out qualification of welding procedures and welders, handling, fabrication, welding, inspection and cleaning of the structures according to this specification.

In particular, the Contractor shall have available on location suitable ovens for drying and conservation of low-hydrogen consumables and suitable equipment for preheating, post-heating and stress relieving, when needed, and to ensure a good cleaning and fit-up before welding. Such equipment shall be subject to approval by the Inspector.

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The Contractor, shall provide the necessary weather protection or sun protection to ensure that all work continues always as specified here above.

When conditions are (or may become) detrimental to fabrication or weld quality, the Contractor shall notify the Inspector immediately.

The Contractor shall designate a competent representative familiar with all phases of fabrication with whom the Inspector may communicate at all times.

Should the Contractor wish to employ a sub-contractor, he shall submit its proposals in due time in writing to the Company for prior approval. The Company reserves the right to refuse or restrict the use of a particular sub-contractor.

### 3.6 Inspection by the Company

All procedures shall have prior approval of the Company.

The Contractor shall notify the Inspector sufficiently in advance to enable him to be present at qualification tests and at all other tests or stages of fabrication subject to acceptance in accordance with this specification.

The Contractor shall ensure that the Inspector has full and free access to all parts of the Site during all fabrication stages.

The Company reserves the right to re-check tests or inspections carried out by the Contractor. For this purposes, the Company may request the delivery of samples or specimens for analysis in an independent laboratory chosen by the Company.

### 3.7 Technical Queries/Non-Conformance Reports

Any Contractor's requests for clarifications or deviations to Company specifications shall be submitted to Company only through Technical Queries (TQ), the format of which shall have prior approval of the Company.

A deviation to specifications shall not be considered as accepted if it has not been submitted to and accepted by Company through a Technical Query.

Approval given by the Company to any Contractor's work procedures, specifications, equipment, etc. shall not release in any way the Contractor from his obligation to meet the Company's specifications.

Any work performance or test result which is found, at a later date, not in conformance with Company specifications or agreed procedure shall be subject to a Non-Conformance Report (NCR) to be issued by the Contractor for submission to Company. NCR report shall indicate the corrective action intended by the Contractor.

If classification of the structure is required, any Contractor's request for clarification or deviation to Classification Society Rules shall be submitted to Classification Society through a form previously agreed. Company shall be in copy of any Technical Query and Classification Society answers.

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## 4. Drawings

### 4.1 General

- a) In this specification, the word “Drawings” designates those drawings to be used for the fabrication and which are carried out by the Contractor acting as the Fabricator.

According to situations, these drawings can be **Shop Drawings** and/or **Fabrication Drawings** and **As-built Drawings**. In the following, “Fabrications Drawings” shall be substituted to “Shop Drawings” when Fabrication Drawings are carried out by the Fabricator and that Shop Drawings do not exist.

- b) Fabrication Drawings, Shop Drawings and As-built Drawings shall be in accordance with provisions of [API RP 2A-WSD](#) and provisions of paragraph 4.2 and 4.3 of present specification.
- c) Designation of steels on drawings shall fully comply with paragraph 5.3 and 5.4 of [GS EP STR 201](#).

### 4.2 Shop Drawings

- a) The Contractor shall check the Contract Documents, including the drawings, immediately upon award of the contract, and shall promptly notify the Company of all errors and omissions.

These drawings are based on “Approved for Construction” design drawings. Any deviation shall be documented and approved by Company through Site Query system or equivalent.

- b) Where necessary the Contractor shall prepare Shop Drawings (to supplement the Fabrication Drawings of the designer). Particularly, shop drawings shall be made to detail the connection of equipment or skids to the structure. All shop drawings shall be issued to Company for information. Company may decide to review some of these drawings and Contractor shall then comply with Company's comments if any.

Prior to submittal to the Company, all Shop Drawings shall be checked and approved by a qualified engineer in the employ of the Contractor.

- c) A comprehensive numbering system shall be established by Contractor to identify structural members and shall be used on all Shop Drawings. This should relate to the member identification used for design purposes.
- d) The Contractor shall be solely responsible for correctness of Shop Drawings and shall make any required modifications to fabrication due to errors in Shop Drawings.
- e) Approval or review of Shop Drawings by the Company does not relieve the Contractor of his responsibility to complete the work in accordance with the Contract Documents, the Company approved Fabrication Drawings and specifications.

### 4.3 As-built drawings

The Contractor shall prepare as-built drawings and submit each drawing to the Company.

These drawings shall incorporate all pertinent information regarding actual material supply and fabrication, and shall be submitted to the Company within thirty (30) days after completion of the work.

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#### 4.4 Other Drawings and Data

The Contractor shall furnish any other drawings and sketches that may be requested by the Company for such purposes as indicating the construction sequences (prefabricating, assembling, lifting, load-out, etc.), the progress of the work, schedules for material delivery, weld history summary, etc.

#### 4.5 Bolted connections

Bolted connections for structural purpose are forbidden unless otherwise specified in written by Company. When accepted, all bolted connections shall be compliant with [GS EP SPS 029](#).

### 5. Member classification

The following is a reminder and precisions of the provisions contained in [GS EP STR 100](#) on that matter.

During design stage, Contractor shall define for each member its Structural Category. Structural Categories shall be noted on drawings and shall be submitted to Company for approval.

#### 5.1 Structural members

The structural members of the resisting structures are distributed into three categories of importance, mainly in regard of the consequences of their possible failure during Subsea System production or during installation of constituting parts of the Subsea System (lifting of packages, etc.).

##### (1) Special category members (S)

Failure of any of these members either would cause total or partial destruction of the Subsea System during its production or destruction of parts of the Subsea System during their installation, or they are members that cannot be repaired.

##### (2) First category members (1)

Failure of any of these members would cause total or partial Subsea System shutdown, but no total or partial destruction of the Subsea System.

##### (3) Second category members (2)

They are members other than those classified in Special Category or First Category.

This distribution of Structural Members into categories of importance shall be submitted to the Company for prior approval.

As referenced in other specifications, primary structure addresses Special and First category structures as defined above. Secondary structures addresses Second category structures Tertiary structures addresses non-structural items.

Table 1 provides the distribution of Structural Members into categories of importance.

#### 5.2 Non-Structural members (NS)

Accessory and finishing elements, i.e. not participating in the overall strength of the module structures.

### 5.3 Indication of member categories on documents

Materials shall be identified as "S", "1", "2" and "NS" (as shown in paragraph 5.1 above) on drawings and materials requisitions.

The following table is a classification of typical subsea members.

**Table 1 - Classification of structural members into categories of importance**

| Special category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | First category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Second category                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• All components subjected to concentrated stresses during lifting/lowering, such as pad eyes, yokes, etc.</li> <li>• Cheek plate</li> <li>• Structures submitted to high stress and/or fatigue</li> <li>• Spreader beams and/or frames</li> <li>• Lift point (Tube, plate, etc.)</li> <li>• Main longitudinal chord</li> <li>• Diagonal bracing highly loaded</li> <li>• Critical nodes (based on design)</li> <li>• Structural members that are critical during lifting</li> <li>• Main transverse member highly loaded</li> <li>• Driven piles</li> <li>• Suction piles, top plate and first shell</li> </ul> | <ul style="list-style-type: none"> <li>• Elements submitted to heavy stresses (dynamic loads among other stresses)</li> <li>• Skid beam support tubular</li> <li>• Short and/or cranked transverse members</li> <li>• Secondary longitudinal chord</li> <li>• Long stiffener (thk <math>\geq</math> 15 mm)</li> <li>• Transverse skirt</li> <li>• Diagonal bracing</li> <li>• Gussets (thk <math>\geq</math> 15 mm) welded on First Category members</li> <li>• Main components (bracings) of sea fastening</li> <li>• Main transverse member</li> <li>• Lift point stiffener</li> <li>• Centerline and/or secondary longitudinal chord</li> <li>• Secondary transverse member stiffener</li> <li>• Guide frame</li> <li>• Main valve protection (ex. A-frame, etc.)</li> <li>• Buoyancy yoke support</li> <li>• Valve and tubular support</li> <li>• Suction piles (non-S part of suction piles)</li> </ul> | <ul style="list-style-type: none"> <li>• Other structural members</li> <li>• Guides and bumpers of lifting aids</li> <li>• Valve protection and hydraulic clamp support</li> <li>• Stiffener, support and/or skids plate</li> <li>• Structures submitted to low stress and/or fatigue</li> <li>• Mudmat, including stiffeners and/or outriggers</li> <li>• Docking beam (support, receptacle, stiffener, etc.)</li> <li>• End cap</li> <li>• Yoke support</li> </ul> |

**Note:** For connection to structure, anodes Material Category shall be considered as NS and connected to structure with fillet welds, unless submitted to potential high fatigue (typically anodes connected to driven piles). In case of potential high fatigue, connection of anodes to structure shall be made with full penetration welds and welds inspected 100% MPI with First Category acceptance criteria.