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## TECHNICAL SPECIFICATION N°10925925-SPC

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## 1. SUBJECT

The purpose of this specification is to define the technical requirements on forged parts dedicated to a FCS type fairlead. These rough parts will welded with a TM steel S460G2+M EN10225.  
The fairlead is classified in "special" structural category with design temperature +15°C (warm seas).

## 2. APPLICABLE DOCUMENTS

- EN10225 July 2009: *Weldable structural steels for fixed offshore structure – Technical delivery conditions.*
- BV NR 216 January 2014
- This specification
- TOTAL GS EP STR 203 October 2013

## 3. DEFINITION

### Weldable steel type S460

#### Forging ratio shall be at least 5/1

Part can be heat treated delivered if necessary.

Conditions of suitable heat treatment are let to supplier's initiative.

Suitable heat treatment is the subject of a report specifying the holding temperatures, the rates of temperature rise and drop, the cooling mode and the quenching medium.

**(§7 of GS EP STR 203 is fully applicable).**

### 3.1 Chemical analysis

Chemical composition on heat is given by the following table:

Chemical composition on heat (%)														
C max	Si max	Mn	P max	S max	Al* max	Ti max	N max	Cr	Cu max	Mo	Nb	Ni	V	Nb+V
0,23	0,45	0,30 to 1,60	0,02	0,005	0,06	0,02	0,012	(1)	0,30	(1)	0,02 to 0,05	(1)	0,05 to 0,12	0,15

(1) Let at manufacturer initiative within the following limit on product :  $Cr + Mo + Ni + Cu + V \leq 0,75 \%$   
NOV BLM to be informed of heat analysis before to proceed

\* with soluble Al to N ratio shall be at least 2

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The carbon equivalent CE calculated according to the following formula from heat analysis :

**CEV= C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15 shall be 0,41 maximum.**

The supplier will supply the chemical analysis of the heat used for manufacturing of part (with measurement of all intentionally added elements, all elements necessary for CE calculation, residual elements such as Sn, Sb, As.).

**On product, the following will be checked:**

%C ≤0,25

CEV ≤ 0,43

Cr + Mo + Ni + Cu + V ≤ 0,75 %

### 3.2 Mechanical tests

Test blocks shall be defined acc to **§8 of GS EP STR 203**.

Additional test blocks will be supplied for use for the qualification of welding specification (WPQ).

#### 3.2.1 Simulated PWHT

Tests shall be done after a simulated PWHT (whatever the thickness of the material is).

At max temp of the scheduled PWHT i.e. 600°C holding time 2min per mm thickness.

#### 3.2.2 Values to be achieved

Mechanical characteristics to be obtained at half thickness and in transversal direction (longitudinal for KVL):

MYS (N/mm <sup>2</sup> )	TS (N/mm <sup>2</sup> )	A% (5d)	Charpy V-notch		
			KVT	KVL	Test temperature
Mini 450	650	≥22	≥80 J	≥100 J	-40 (°C)

\* average minimum value on 3 test-pieces

individual minimum value: 56J for KVT, 70J for KVL

### 4. NDT

This examination concerns 100% of the surface and volume of part. It is to be carried out after rough machining or at a stage as progressed as possible, but in all cases carried out after the heat treatment.

#### Visual examination and PT

This examination is performed after machining in accordance with drawing. It is to be carried out on 100% of area (internal and external) so as to check the absence of all defect such as flaw, crack, notch, or other defects prejudicial to the use of part. PT will be carried out acc. to EN 10228-2. No indication allowed.

#### Ultrasonic examination

Acc to EN 10228-3 class 3.

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#### 4. THIRD PARTY INSPECTION

3.2 EN10204 certificate shall be supplied.

BV shall sign and stamp all 3.2 certificates. The date of stamping and signature shall be mentioned on certificates.

The minimum scope of work of this third party shall be as follows :

(BV may have a more extensive scope of work to fulfill their own obligations of material acceptance)

- Witness sampling, review chemical analyses (cast and product)
- Review and sign heat treatment records/charts
- Witness and marking test samples and test specimens
- Witness mechanical tests
- Witness/monitoring visual examination and dimensional inspection
- Checking markings (stenciling, color coding, die stamping, shipping mark)
- Witness calibration of ultrasonic equipment
- Review, approval, sign and stamp of Mill certificates, laboratory tests and NDT records
- Witness of above weldability tests
- Hard stamping of third party inspection's mark.

The supplier will take in charge the a.m. third party inspections (placing of the orders, specifying and notifications for inspections,...).

BV shall check and inform NOV-BLM in case of discrepancy of the present specification with the NR216 rules (most stringent rules shall be applied).