DNV·GL

Certificate No:
TAD00000E9

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Hoisting, Rotation and Pipehandling Equipment

with type designation(s)
Wire sheaves

Issued to
GOSAN, S.A.
Ortuella VIZCAYA, Spain

is found to comply with
DNVGL-OS-E101 – Drilling plant, Edition July 2015
DNVGL-SI-0166 – Verification for compliance with Norwegian shelf regulations, Edition July 2015

Application :

See next page

This Certificate is valid until **2021-09-15**.

Issued at **Høvik** on **2016-09-16**

for **DNV GL**

DNV GL local station: **Bilbao**

Approval Engineer: **Hallvard Thune Uglane**

Per Esvall
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.
The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

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Reference standards

- API Spec. 8C/ISO 13535, Specification for Drilling and Production Hoisting Equipment (PSL 1 and PSL 2), 5th Edition, April 2012.
- API Spec 16F, Specification for Marine Drilling Riser Equipment, 1st Edition, August 2004 (for riser tensioner sheaves).
- FEM, Rules for the design of hoisting appliances, 3rd edition 1998.

Product description

This Type approval certificate includes 36 different wire sheave models.
Two (2) models of 30" wire sheaves
Twelve (12) models of 60" wire sheaves
Fourteen (14) models of 72" wire sheaves
Four (4) models of 78" wire sheaves
One (1) model of 82" wire sheave
One (1) model of 88" wire sheave
Two (2) models of 114" wire sheaves

Application/Limitation

Min. design temperature	-20 °C
PSL 1 / PSL 2 (order specific)	

30" sheaves

4-59403 Idler Sheave

Max. line pull, static	44,0 mT	
Max. line pull, dynamic	63,0 mT	
Max. wire inclination / fleet angle	2 deg	
Wire wrap angle	8 deg	
FEM classification of component	E6 (Static)	E4 (Dynamic)
Wire diameter	1 5/8"	

4-59858 Sheave

Max. line pull	30kN
Max. wire inclination / fleet angle	2 deg
Wire wrap angle	180 deg
FEM classification of component	E4
Wire diameter	1 5/8" / 42mm

60” sheaves

4-56672 Crown Block Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E5 (Static)	E4 (Dynamic)
Wire diameter	1 1/2”	

4-56799 Crown Block Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E5 (Static)	E4 (Dynamic)
Wire diameter	1 3/4”	

4-57245 Crown Block Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E5 (Static)	E4 (Dynamic)
Wire diameter	1 5/8”	

4-57894 Linkage Arm Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 5/8”	

4-57895 Light Weight Sheave	Load case 1		Load case 2
Max. line pull, static	49,13 mT		-
Max. line pull, dynamic	64,72 mT		46,07 mT
Max. wire inclination	2 deg		2 deg
Wire wrap angle	40 deg		143 deg
FEM classification of appliance	E6 (Static)	E4 (Dynamic)	E4
Wire diameter	1 5/8”		

4-57909 Linkage Arm Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 1/2”	

4-57910 Light Weight Sheave	Load case 1		Load case 2
Max. line pull, static	49,13 mT		-
Max. line pull, dynamic	64,72 mT		46,07 mT
Max. wire inclination	2 deg		2 deg
Wire wrap angle	40 deg		143 deg
FEM classification of appliance	E6 (Static)	E4 (Dynamic)	E4
Wire diameter	1 1/2”		

4-58031 Linkage Arm Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 3/4”	

4-58032 Light Weight Sheave	Load case 1		Load case 2
Max. line pull, static	49,13 mT		-
Max. line pull, dynamic	64,72 mT		46,07 mT
Max. wire inclination	2 deg		2 deg
Wire wrap angle	40 deg		143 deg
FEM classification of appliance	E6 (Static)	E4 (Dynamic)	E4
Wire diameter	1 3/4”		

4-58946 Crown Block Sheave		
Max. line pull, static	33 mT	
Max. line pull, dynamic	50 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 3/8”	

4-58947 Sheave for Cluster		
Max. line pull, static	33 mT	
Max. line pull, dynamic	50 mT	
Max. wire inclination	2 deg	
Wire wrap angle	90 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 3/8”	

4-59625 Crown Block Sheave		
Max. line pull, static	49,13 mT	
Max. line pull, dynamic	64,72 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 1/4”	

72” Sheaves

4-56385 Crown Block Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-57949 Sheave C

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 7/8”	

4-58108 Crown Block Sheave

Max. line pull, static	45 mT	
Max. line pull, dynamic	58 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 3/4”	

4-58325 Crown Block Sheave

Max. line pull, static	38 mT	
Max. line pull, dynamic	50 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	1 3/4”	

4-58397 Crown Block Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	90 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-58501 Full Load Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	90 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-58502 Light Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	90 mT	
Max. wire inclination	2 deg	
Wire wrap angle	90 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-58554 Crown Block Sheave

Max. line pull, static	125 mT	
Max. line pull, dynamic	167,4 mT	
Max. wire inclination	2 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E5 (Static)	E4 (Dynamic)
Wire diameter	2 7/8”	

4-59241 Crown Block Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2 1/8”	

4-59275 Crown Block Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-59276 Crown Block Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2 1/8”	

4-59348 Full Load Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-59349 Light Sheave

Max. line pull, static	55,78 mT	
Max. line pull, dynamic	85,83 mT	
Max. wire inclination	2,5 deg	
Wire wrap angle	110 deg	
FEM classification of appliance	E6 (Static)	E4 (Dynamic)
Wire diameter	2”	

4-59501 Crown Block Sheave

Max. line pull, dynamic	54 mT
Max. fleet angle	2 deg
Wire wrap angle	180 deg
FEM classification of appliance	E4 (Dynamic)
Wire diameter	1 3/4”

78" Sheave

4-59399 Crown Block Sheave

Max. line pull, static	59,29 mT	
Max. line pull, dynamic	91,20 mT	
Max. wire inclination / fleet angle	2,5 deg	
Wire wrap angle	180 deg	
FEM classification of component	E6 (Static)	E4 (Dynamic)
Wire diameter	2 1/8”	

4-59923 Sheave

Max. line pull, dynamic	90,7 mT
Max. fleet angle	2 deg
Wire wrap angle	180 deg
FEM classification of appliance	E4 (Dynamic)
Wire diameter	2”

4-59959 Crown Block Sheave

Max. line pull, static	59,3 mT
Max. line pull, dynamic	91,2 mT
Max. wire inclination / fleet angle	2,5 deg
Wire wrap angle	180 deg
FEM classification of component	E6
Wire diameter	2 1/8” / 54mm

4-70621 Sheave for Riser tensioner

Max. line pull, dynamic	74,4 mT
Max. wire inclination / fleet angle	2 deg
Wire wrap angle	180 deg
FEM classification of component	E5 (B6 + P2)
Wire diameter	2 1/4” / 58mm
Service classification acc. API RP 9B	B

82” Sheave

4-59240 Sheave

Max. line pull, static	80 mT
Max. line pull, dynamic	113,5 mT
Max. wire inclination / fleet angle	2 deg
Wire wrap angle	180 deg
FEM classification of component	E6
Wire diameter	2 3/4” / 71mm

88” Sheave

4-58272 Sheave

Max. line pull, static	52 mT	
Max. line pull, dynamic	75 mT	
Max. wire inclination / fleet angle	2 deg	
Wire wrap angle	180 deg	
FEM classification of component	E7 (Static)	E6 (Dynamic)
Wire diameter	2 1/4” / 58mm	

114” Sheave

4-59922 Sheave

Max. line pull, dynamic	90,7 mT
Max. fleet angle	2 deg
Wire wrap angle	180 deg
FEM classification of appliance	E4 (Dynamic)
Wire diameter	2”

4-59958 Crown Block Sheave

Max. line pull, static	59,3 mT
Max. line pull, dynamic	91,2 mT
Max. wire inclination / fleet angle	2,5 deg
Wire wrap angle	180 deg
FEM classification of component	E6
Wire diameter	2 1/8” / 54mm

Type Approval documentation

Testing

1. Charpy testing shall be performed in accordance with API Spec 8C, Ch.6.3.
2. Qualification of welding procedures and qualification of welders shall be in accordance with DNVGL-OS-E101 Ch.2 Sec.6, 2 or ASME IX.
3. Non-destructive examination (NDE) shall be carried out in accordance to with DNVGL-OS-E101 Ch.2 Sec.6, 3 and API 8C Ch.8.4.7 and Ch.8.4.9 (ref. DNVGL-OS-E101 Ch.2 Sec.6 3.1.1).
4. The following additional material requirements apply if the sheave is to be delivered with PSL2 notation:
   - Ductility of the materials shall be in accordance to API Spec.8C Ch.6.3.7.

Marking of product

For traceability the following marking is to be carried out on each product:

- Part No.
- Serial No.
- Manufacturers Name or Mark
- Rope diameter
- Sheave diameter
- PSL 1 or PSL 2 – depending on applicable notation

Other conditions and comments

- Each product is to be surveyed during fabrication in accordance with the requirements for equipment of Category I as defined in DNVGL's Offshore Standard DNVGL-OS-E101 Drilling Plant, followed by issuance of Product Certificate. If the intended installation is DNVGL classed, then this automatically means DNVGL Product Certificate. Fabrication records are to be maintained in accordance with DNVGL-OS-E101 Ch.3, Sec.3, 2.

Certificate Retention Survey

For retention of the Type Approval, DNV GL Surveyor shall perform a survey – every second year and before the expiry date of this certificate. This is in order to verify that the conditions for the type approval are complied with, ref DNVGL-CP-0338, DNV GL type approval scheme.

This certificate replaces the previously issued Type Approval Certificate Nos. D-4520, D-4969, D-5134, D-5271, D-5303, D-5376, D-5483, D-6105, D-6183, TAD000006T.

END OF CERTIFICATE