

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Mud and Cementing Equipment**

with type designation(s)

**Triplex Pumps Fluid Ends, Model Families TWS900, TWS1600LW, TWS2250, TWS2400,
Quintuplex Pumps Fluid Ends, Model Families QWS2500**

Issued to

**SPM Flow Control, Inc. dba Weir Oil and Gas - Pressure
Pumping
Fort Worth, TX, USA**

is found to comply with

DNVGL-OS-E101 – Drilling facilities, Edition January 2018**DNVGL-SI-0166 – Verification for compliance with Norwegian shelf regulations, Edition July
2018****Application :****See Page 2****Product(s) approved by this certificate is/are accepted for installation on all vessels classed
by DNV GL.****This Type Approval Certificate replaces D-5930, as issued 2015-01-20.**Issued at **Houston** on **2019-06-10**This Certificate is valid until **2024-06-09**.for **DNV GL**DNV GL local station: **Houston, Approval CMC**Approval Engineer: **M. Kevin Mandeville Jr.****Meindert van Mierlo
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.



The following standards were used as a reference:

API 6A, *Specification for Wellhead and Christmas Tree Equipment*, 20th Edition
API 7K, *Drilling and Well Servicing Equipment*, 5th Edition
ASME Boiler and Pressure Vessel Code, Section VIII, Div. 2, 2017 Ed.

Product description

Triplex Pump Fluid End TWS900, TWS1600LW, TWS2250, and TWS2400
Quintuplex Pump Fluid End QWS2500

Application/Limitation

- This certificate does not include the power end of the pump, its skid or frame, suction manifold, and any driving or power source components.
- The plunger weldment is considered as a non-critical component.
- Components listed below as acceptable for Low Temperature Use have a minimum design temperature of -30°C (-22°F). Remaining components have a minimum design temperature of 0°C (32°F). All components have a Maximum Surface Temperature of 100°C (212°F) with a Maximum Proppant Temperature of 80°C (176°F).
- See drawing 2A138943, Surveyor Guidance Drawing, Revision -, for a layout of the components of a fluid end assembly. This drawing includes a sample BOM.

Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
1P100140	1L18171	R15	10042	Y	5.5" Fluid Cylinder, TWS1300/1800
1P100234(AF)	1P100234(AF)	B	15000	Y	5" Fluid Cylinder, TWS2250, Grooved, Autofrettage
1P100335	1L18053	R14	18895	Y	4" Fluid Cylinder, TWS 1300/1800
1P100364	1L103375	R12	10186	Y	5" Fluid Cylinder, TWS1600LW
1P100646(AF)	1P100646(AF)	IR	15000	Y	4.5" Fluid Cylinder, TWS2250, Grooved, Autofrettage
1P100714	1L103375	R12	12575	Y	4.5" Fluid Cylinder, TWS1600LW
1P100775	1L103373	R12	15195	Y	4" Fluid Cylinder, TWS1150 & TWS1600LW
1P101403	1L18021	R9	7190	Y	6.5" Fluid Cylinder, Large Block, TWS1300/1800
1P101405	1L18021	R9	6667	N	6.75" Fluid Cylinder, Large Block, TWS1300/1800
1P101422	1L103260	R12	8418	Y	5.5" Fluid Cylinder, TWS1600LW
1P101430	1L103280	R12	5659	Y	6" Fluid Cylinder, TWS900
1P101436	1L18171	R15	9187	Y	5.75" Fluid Cylinder, TWS1300/1800
1P101506	1L18171	R15	8438	Y	6" Fluid Cylinder, TWS1300/1800
1P101611	1L103260	R12	7702	Y	5.75" Fluid Cylinder, TWS1600LW
1P102415	1L18053	R14	21600	Y	3.75" Fluid Cylinder, TWS 1300/1800
1P103268	1L103260	R12	7074	Y	6" Fluid Cylinder, TWS1600LW
1P103281	1L103280	R12	6162	Y	5.75" Fluid Cylinder, TWS900
1P103282	1L103280	R12	6734	Y	5.5" Fluid Cylinder, TWS900
1P103303	1L103302	R12	12732	Y	4" Fluid Cylinder, TWS900
1P103304	1L103302	R12	14487	Y	3.75" Fluid Cylinder, TWS900
1P103309	1L103308	R13	8149	Y	5" Fluid Cylinder, TWS900
1P103310	1L103308	R13	10060	Y	4.5" Fluid Cylinder, TWS900
1P103374	1L103373	R12	18108	Y	3.75" Fluid Cylinder, TWS1150 & TWS1600LW
1P105201	1L103302	R12	16630	Y	3.5" Fluid Cylinder, TWS900

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
1P105887	1L103373	R12	20788	Y	3.5" Fluid Cylinder, TWS1150 & TWS1600LW
1P13184	2L104241	R4	6000	N	Discharge Flange, 4" 602F, SPM, GEOQUIP, & OPI, 6000 NSCW
1P13184LT	2L104241	R4	6000	Y	Discharge Flange, 4" 602F, SPM, GEOQUIP, & OPI, 6000 NSCW
2P100134	2P100134	A	15000	N	Discharge Cover, 2" 1502F Gauge Conn. 5.5-6"
2P100134LT	2P100134LT	A	15000	Y	Discharge Cover, 2" 1502F Gauge Conn. 5.5-6"
2P100257	2L103813	R7	8227	N	Suction Cover, 6.5"-6.75" TWS1800 6.5" QWS2000LW
2P100257LT	2L103813	R7	8227	Y	Suction Cover, 6.5"-6.75" TWS1800 6.5" QWS2000LW
2P100270	2P100270	A	15000	N	Discharge Cover, 2" 1502F Gauge Conn. 6.5-5.75"
2P100270LT	2P100270LT	A	15000	Y	Discharge Cover, 2" 1502F Gauge Conn. 6.5-5.75"
2P100354	2P100354	B	15000	N	Discharge Cover, 2" 1502F Gauge Conn. 3.75-4"
2P100354LT	2P100354LT	B	15000	Y	Discharge Cover, 2" 1502F Gauge Conn. 3.75-4"
2P100586	2P100586	A	15000	N	Discharge Cover, 2" 1502F Gauge Conn. 4.5-5"
2P100586LT	2P100586LT	B	15000	Y	Discharge Cover, 2" 1502F Gauge Conn. 4.5-5"
2P101326	1L102969	R9	6802	Y	6" Fluid Cylinder, QWS2000/2500
2P101345	1L18739	R12	12093	Y	4.5" Fluid Cylinder, QWS2000/2500
2P101345L	1L108971	R3	12093	Y	4.5" Fluid Cylinder, Light, QWS2000/2500
2P101349	1L102969	R9	8095	Y	5.5" Fluid Cylinder, QWS2000/2500
2P101349L	1L108972	R3	8095	Y	5.5" Fluid Cylinder, Light, QWS2000/2500
2P101350	1L18739	R12	9795	Y	4" Fluid Cylinder, QWS2000/2500
2P101646	1L104414	R7	15305	Y	4" Fluid Cylinder, QWS2000/2500
2P101648	1L102969	R9	7406	Y	5.75" Fluid Cylinder, QWS2000/2500
2P102100	2L105276	R7	15000	N	Discharge Flange, 2" 1502F GGE CONN 6.5-5.75" TWS Small Block
2P102100LT	2L105276	R7	15000	Y	Discharge Flange, 2" 1502F GGE CONN 6.5-5.75" TWS Small Block
2P104411	1L104414	R7	17413	Y	3.5" Fluid Cylinder, QWS2000/2500
2P105289	2P105289	B	20000	N	Discharge Cover, 2" 2002F Gauge Conn. 3.5-5"
2P105289LT	2P105289LT	A	20000	Y	Discharge Cover, 2" 2002F Gauge Conn. 3.5-5"
2P107324	1L104414	R7	19990	Y	3.75" Fluid Cylinder, QWS2000/2500
2P108705	2P108705	A	20000	N	Discharge Flange, 2" 2002M, 3.25" Boss
2P108705LT	2P108705LT	A	20000	Y	Discharge Flange, 2" 2002M, 3.25" Boss
2P109669	2L109673	R3	8095	Y	5.5" Fluid Cylinder, Grooveless, QWS2000/2500

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2P109671	2L109673	R3	7406	Y	5.75" Fluid Cylinder, Grooveless, QWS2000/2500
2P109672	2L109673	R3	6802	Y	6" Fluid Cylinder, Grooveless, QWS2000/2500
2P109683	2L109684	R1	11491	N	Suction Cover, 5.5-5.75" QWS2500-Grooveless
2P109683LT	2L109684	R1	11491	Y	Suction Cover, 5.5-5.75" QWS2500-Grooveless
2P109815	2P109815	B	17165	N	Suction Cover, 5.5" Bore, Grooveless
2P109815LT	2P109815LT	B	17165	Y	Suction Cover, 5.5" Bore, Grooveless
2P109819	2L109818	R4	12093	Y	Suction Cover, 4.5-5" QWS2500-Grooveless
2P109820	2L109818	R4	9795	Y	Suction Cover, 4.5-5" QWS2500-Grooveless
2P110041L	1L108971	R3	9795	Y	5" Fluid Cylinder, Light QWS2000/2500
2P110060(AF)	2P110060(AF)	IR	15000	Y	Fluid Cylinder, TWS2250 Grooveless 4.5" Autofrettage
2P110061(AF)	2P110061(AF)	IR	12150	Y	Fluid Cylinder, TWS2250 Grooveless 5" Autofrettage
2P110118	2L110117	R3	10042	Y	5.5" Fluid Cylinder, Grooveless, TWS1300/1800/2000/2250
2P110119	2L110117	R3	9187	Y	5.75" Fluid Cylinder, Grooveless, TWS1300/1800/2000/2250
2P110120	2L110117	R3	8438	Y	6" Fluid Cylinder, Grooveless, TWS1300/1800/2000/2250
2P110275	2P110275	C	20000	N	Discharge Flange, 3" 2002F, 4" Boss
2P110275LT	2P110275LT	IR	20000	Y	Discharge Flange, 3" 2002F, 4" Boss
2P110277	2L110276	R0	15000	N	Discharge Flange, Blank, 4" Boss, QWS
2P110277LT	2L110276	R0	15000	Y	Discharge Flange, Blank, 4" Boss, QWS
2P110474	2L110492	R0	15000	N	Discharge Flange, 3" 15K - 3.25" Boss, 15000 NSCWP
2P110474LT	2L110492	R0	15000	Y	Discharge Flange, 3" 15K - 3.25" Boss, 15000 NSCWP
2P110727	2P110727	A	15000	N	Discharge Flange, 3" 15K Safety Iron, 4" Boss
2P110769	2P110769	A	15000	N	Discharge Flange, 3" 1502F, 3.25" Boss
2P110769LT	2P110769LT	A	15000	Y	Discharge Flange, 3" 1502F, 3.25" Boss
2P110794	2L110793	R1	12093	Y	4.5" Fluid Cylinder, PMD, QWS2500
2P110795	2L110793	R1	9795	Y	5" Fluid Cylinder, PMD, QWS2500
2P110821	2L110820	R0	15000	Y	4.5" Fluid Cylinder, TWS1300/1800 - PMD
2P110822	2L110820	R0	12150	Y	5" Fluid Cylinder, TWS1300/1800 - PMD
2P110895	2L110894	R0	20000	N	Discharge Flange, Blank, 4" Boss, 6.5-6.75" TWS2250 & 3.75-5" QWS2500
2P110895LT	2L110894	R0	20000	Y	Discharge Flange, Blank, 4" Boss,

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
					6.5-6.75" TWS2250 & 3.75-5" QWS2500
2P111081	2P111081	A	15000	N	Discharge Flange, 2" 1502F, 3" Boss
2P111081LT	2P111081LT	A	15000	Y	Discharge Flange, 2" 1502F, 3" Boss
2P111261	2L111260	R0	15000	N	Discharge Flange, 3" 1502F, 2" THK, 4" Boss, QWS2000/2400
2P111261LT	2L111260	R0	15000	Y	Discharge Flange, 3" 1502F, 2" THK, 4" Boss, QWS2000/2400
2P111263	2L111262	R0	15000	N	Discharge Flange, 3" 1502M, 2" THK, 4" Boss
2P111263LT	2L111262	R0	15000	Y	Discharge Flange, 3" 1502M, 2" THK, 4" Boss
2P111345	2P111345	A	15000	N	Discharge Flange, 2" 1502M, 3.25" Boss, 1.75" ID
2P111345LT	2P111345LT	A	15000	Y	Discharge Flange, 2" 1502M, 3.25" Boss, 1.75" ID
2P111613	2P111613	A	15000	N	Discharge Flange, 3" 1502M, 3.75" Boss, TWS & QWS
2P111787	2L111786	R0	11491	Y	Fluid Cylinder, Grooveless, 5.5-6" TWS2400
2P111800	2P111800	A	24718	N	Retainer Nut, 2" 1502 Gauge Conn. 6.75"-4 Mod Brit Butt
2P111801	2P111801	A	24718	Y	Retainer Nut, Gauge Conn, 6.75"-4 Mod Brit Butt
2P111806	2L111805	R0	11491	N	5.5" Packing Nut w/ Wiper Groove, TWS2400
2P111807	2L111805	R0	11491	Y	5.5" Packing Nut w/ Wiper Groove, TWS2400
2P112062	2L112061	R1	11491	Y	5.5" Fluid Cylinder, Grooveless, TWS2400, Large Stay Rods-SP
2P112140	2L112139	R1	11491	Y	5.5" Fluid Cylinder, Grooveless, TWS2400, Large Stay Rods-SP-PMD
2P112518	2P112518	E	15000	N	Discharge Flange, 3" 1502F, 2" Thick, 7.71" Long, QWS
2P112518LT	2P112518LT	D	15000	Y	Discharge Flange, 3" 1502F, 2" Thick, 7.71" Long, QWS
2P112567	2L112569	R2	12093	Y	4.5" Fluid Cylinder, Grooveless, PMD, QWS2000/2500
2P112568	2L112569	R2	9795	Y	5" Fluid Cylinder, Grooveless, PMD, QWS2000/2500
2P112641	3L103358	R6	24718	N	Retainer Nut, 3.75-6" DIS/SUC TWS900-QWS2000
2P112759	2L112758	R1	20000	N	Discharge Flange, Blank, 3.25" Boss, 2" Thick, 20000 NSCWP
2P112760LT	2L112758	R1	20000	Y	Discharge Flange, Blank, 3.25" Boss, 2" Thick, 20000 NSCWP
2P112902	2L112919	R1	15000	Y	Fluid Cylinder, 4.5" SLB VFP System, TWS1300/1800 - PMD
2P112918	2L112919	R1	12150	Y	Fluid Cylinder, 5" SLB VFP System, TWS1300/1800 - PMD
2P112934	2P112934	B	21600	N	Suction Cover, 3.75-4" TWS2250 Grooveless, SLB
2P112934LT	2P112934LT	B	21600	Y	Suction Cover, 3.75-4" TWS2250

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
					Grooveless, SLB
2P113002	2L113001	R1	12093	Y	Fluid Cylinder, 4.5" SLB, VFP System, QWS2500
2P113003	2L113001	R1	9795	Y	Fluid Cylinder, 5" SLB, VFP System, QWS2500
2P113012	2L113011	R0	21600	Y	Fluid Cylinder, 3.75" Grooveless, TWS2250
2P113013	2L113011	R0	18895	Y	Fluid Cylinder, 4" Grooveless, TWS2250
2P113043	2L113042	R1	10042	Y	Fluid Cylinder, 5.5" SLB VFP System, TWS1300/1800/2250
2P113044	2L113042	R1	9187	Y	Fluid Cylinder, 5.75" SLB VFP System, TWS1300/1800/2250
2P113045	2L113042	R1	8438	Y	Fluid Cylinder, 6" SLB VFP System, TWS1300/1800/2250
2P113162	2L113161	R3	24718	Y	Fluid Cylinder, 3.75" TWS2400LW, SP, PMD, Grooveless, Large Stay Rods
2P113163	2L113161	R3	21725	Y	Fluid Cylinder, 4" TWS2400LW, SP, PMD, Grooveless, Large Stay Rods
2P113168	2L113167	R0	21725	N	Suction Cover, 3.75-4" TWS2400LW, Grooveless, Large Block
2P113168LT	2L113167	R0	21725	Y	Suction Cover, 3.75-4" TWS2400LW, Grooveless, Large Block
2P113262	2L113261	R0	19990	Y	Fluid Cylinder, 3.5" QWS2000/2500 Grooveless
2P113263	2L113261	R0	17413	Y	Fluid Cylinder, 3.75" QWS2000/2500 Grooveless
2P113264	2L113261	R0	15305	Y	Fluid Cylinder, 4" QWS2000/2500 Grooveless
2P113266	2L113265	R0	19990	Y	Fluid Cylinder, 3.5" QWS2000/2500 Grooveless, VFP SYSTEM
2P113267	2L113265	R0	17413	Y	Fluid Cylinder, 3.75" QWS2000/2500 Grooveless, VFP SYSTEM
2P113268	2L113265	R0	15305	Y	Fluid Cylinder, 4" QWS2000/2500 Grooveless, VFP SYSTEM
2P113491	2L113490	R0	15000	N	Discharge Cover, 2" 1502F Gauge Conn., 4.5-5", 10" Stroke
2P113491LT	2L113490	R0	15000	Y	Discharge Cover, 2" 1502F Gauge Conn., 4.5-5", 10" Stroke
2P113496	2L113495	R1	21600	Y	Fluid Cylinder, 3.75", PMD, TWS1300/2250
2P113497	2L113495	R1	18895	Y	Fluid Cylinder, 4", PMD, TWS1300/2250
2P113643	2P113643	A	15000	N	Discharge Flange, 3" 1502M, 4" Boss QWS, 7.53" Long
2P113643LT	2P113643LT	A	15000	Y	Discharge Flange, 3" 1502M, 4" Boss QWS, 7.53" Long
2P113650	2L113636	R0	15000	N	Discharge Cover w/ 2" 15K SI Gauge Conn. 4.5-5" TWS1800
2P113650LT	2L113636	R0	15000	Y	Discharge Cover w/ 2" 15K SI Gauge Conn. 4.5-5" TWS1800
2P114395	2P114395	R0	17165	Y	Discharge Cover, 4.5-5" TWS2250
2P114396	2P114396	R0	17165	Y	Discharge Cover w/ 2" 1502F Gauge

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
					Conn. 4.5-5" TWS2250
2P114404	2P114404	R0	17165	Y	Suction Cover, 4.5-5" TWS2250 Grooveless - Dual Ring
2P115014	2P115014	B	17165	Y	Plunger, 8" Stroke, 4.5" Diameter, Hard Coat
2P115015	2P115015	C	13904	Y	Plunger, 8" Stroke, 5" Diameter, Hard Coat
2P115016	2P115016	A	11491	Y	Plunger, 8" Stroke, 5.5" Diameter, Hard Coat
2P115017	2P115017	IR	10513	Y	Plunger, 8" Stroke, 5.75" Diameter, Hard Coat
2P115272(AF)	2P115272(AF)	A	15305	Y	Fluid Cylinder, 4" QWS2500 Grooveless, Stainless Steel, Vee Thread, Autofrettage
2P115288(AF)	2P115288(AF)	IR	17165	Y	Fluid Cylinder, 4.5" TWS2400 Grooveless, Autofrettage
2P115289(AF)	2P115289(AF)	IR	13904	Y	Fluid Cylinder, 5" TWS2400 Grooveless, Autofrettage
2P115366	2P115366	E	12150	Y	Packing Nut, 5", 6.75"-4 Butt
2P115367	2P115367	D	15000	Y	Packing Nut, 4.5", 6.75"-4 Butt
2P115368	2P115368	D	18895	Y	Packing Nut, 4", 6.75"-4 Butt
2P115412	2P115412	E	21725	Y	Packing Nut, 7"-8UNS, 4" Plunger
2P115933	2P115933	A	28375	Y	Cover Suction, 4.75" Bore
2P116120	2P116120	C	24718	Y	Retainer Nut, 6.75"-4 Butt
2P117268	2P117268	C	12093	Y	Fluid Cylinder, 4.5" QWS2500 Grooveless, Stainless Steel
2P117491(AF)	2P117491(AF)	IR	15000	Y	Fluid Cylinder, 4.5" TWS2250 Grooveless, Stainless Steel
2P117684	2P117684	C	15305	Y	Fluid Cylinder 4" QWS2500 Grooveless, Stainless Steel
2P117684(AF)	2P117684(AF)	IR	15305	Y	Fluid Cylinder 4" QWS2500 Grooveless, Stainless Steel, Autofrettage
2P118191	2P118191	R1	12150	Y	Fluid Cylinder, 5" TWS2250 Stainless Steel
2P119415	2P119415	A	15305	Y	Fluid Cylinder, 4" QWS2500 Grooveless, Stainless Steel, Vee Thread
2P119415(AF)	2P119415(AF)	A	15305	Y	Fluid Cylinder, 4" QWS2500 Grooveless, Stainless Steel, Vee Thread, Autofrettage
2P120772	2P120772	B	24718	Y	Retainer Nut, 6.75"-4 Mod Brit Butt-2A
2P121205	2P121205	A	17165	N	Suction Cover, 4.5-5" TWS2400 Grooveless
2P121205LT	2P121205LT	IR	17165	Y	Suction Cover, 4.5-5" TWS2400 Grooveless
2P131003	2P131003	IR	24718	Y	Retainer Nut, TWS2400
2P133114(AF)	2P133114(AF)	IR	17165	Y	Fluid Cylinder, 4.5" TWS2400 Grooveless, Stainless Steel
2P134412	2P134412	IR	19990	Y	Fluid Cylinder, 3.5" QWS2500 Grooveless, Autofrettage
2P134775	2P134775	IR	28375	Y	Packing Nut, 7" Vee Thread, w/ Wiper

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
					Groove, 3.5" Plunger
2P134878	2P134878	IR	20000	Y	Discharge Flange, Blank, 4" Boss, 2" Flange
2P134882	2P134882	IR	20000	N	Discharge Flange, 4" 2002F, 4" Boss, 2" Flange
2P134969	2P134969	IR	13904	Y	Packing Nut, 5", 6.75"-4 Butt
2P134974	2P134974	IR	17165	Y	Packing Nut, 4.5", 6.75"-4 Butt
2P134977	2P134977	IR	21725	Y	Packing Nut, 4", 6.75"-4 Butt
3P100132	3P100132	B	15000	N	Discharge Flange, 3" 1502F, 3.25" Boss
3P100132LT	3P100132LT	C	15000	Y	Discharge Flange, 3" 1502F, 3.25" Boss
3P100133	3P100133	A	15000	N	Discharge Flange, Bleed Off Valve, 3.25" Boss, 15000 PSI
3P100133LT	3P100133LT	A	15000	Y	Discharge Flange, Bleed Off Valve, 3.25" Boss, 15000 PSI
3P100135	2L103814	R8	11491	N	Suction Cover, 5.5-5.75" TWS900/1600/1800/2000/QWS
3P100135LT	2L103814	R8	11491	Y	Suction Cover, 5.5-5.75" TWS900/1600/1800/2000/QWS
3P100137	3L103820	R7	11491	N	Discharge Cover, 5.5-6" TWS900/1600/1800/QWS
3P100137LT	3L103820	R7	11491	Y	Discharge Cover, 5.5-6" TWS900/1600/1800/QWS
3P100146	2L18019	R7	11491	N	Packing Nut, 5.5", ACME Thread Style, TWS900-QWS2000
3P100146LT	2L18019	R7	11491	Y	Packing Nut, 5.5", ACME Thread Style, TWS900-QWS2000
3P100146P	2L103315P	R2	11491	N	5.5" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P100146PLT	2L103315P	R2	11491	Y	5.5" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P100231	3P100231	B	17165	N	Discharge Cover, 4.5-5" TWS900-QWS2500
3P100231LT	3P100231LT	B	17165	Y	Discharge Cover, 4.5-5" TWS900-QWS2500
3P100233	3P100233	A	13904	Y	Plunger, 5" TWS1300-QWS2000
3P100256	3L103829	R5	15000	N	Discharge Flange, TX Carbide Bleedoff, 4" Boss, 6.5-6.75" TWS1300-2000 & 3.75-5" QWS2000-2500
3P100256LT	3L103829	R5	15000	Y	Discharge Flange, TX Carbide Bleedoff, 4" Boss, 6.5-6.75" TWS1300-2000 & 3.75-5" QWS2000-2500
3P100258	3L18060	R4	8227	Y	Plunger, 6.5" TWS1800 & QWS2000
3P100259	3L103821	R6	8227	N	Discharge Cover, 6.5-6.75" TWS Large Block & QWS
3P100259LT	3L103821	R6	8227	Y	Discharge Cover, 6.5-6.75" TWS Large Block & QWS
3P100261	3P100261	A	10000	N	Discharge Flange, 3" 1002F, 4" Boss
3P100261LT	3P100261LT	A	10000	Y	Discharge Flange, 3" 1002F, 4" Boss
3P100268	2L18019	R7	8227	N	Packing Nut, 6.5", ACME Thread

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
					Style, TWS900-QWS2000
3P100268LT	2L18019	R7	8227	Y	Packing Nut, 6.5", ACME Thread Style, TWS900-QWS2000
3P100268P	2L103315P	R2	8227	N	6.5" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P100268PLT	2L103315P	R2	8227	Y	6.5" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P100336	3L103811	R6	28375	N	Suction Cover, 3.75-4" TWS900-QWS2000
3P100336LT	3L103811	R6	28375	Y	Suction Cover, 3.75-4" TWS900-QWS2000
3P100337	3P100337	C	28375	N	Discharge Cover, 3.75-4" TWS900-QWS2500
3P100337LT	3P100337LT	C	28375	Y	Discharge Cover, 3.75-4" TWS900-QWS2500
3P100339	3P100339	C	21725	Y	Plunger, 8" Stroke, 4" Diameter
3P100366	2L104036	R3	13904	Y	5.00" Plunger, TWS900
3P100366RW	2L104036RW	00	13904	Y	5.00" Plunger, TWS900 RW
3P100654	3P100654	B	17165	Y	Plunger, 8" Stroke, 4.5" Diameter
3P100725	2L104062	R2	17165	Y	4.5" Plunger, TWS900
3P100725RW	2L104062RW	00	17165	Y	4.5" Plunger, TWS900 RW
3P100772	2L104062	R2	21725	Y	4" Plunger, TWS900
3P100772RW	2L104062RW	00	21725	Y	4" Plunger, TWS900 RW
3P101300	3L103826	R4	15000	N	Discharge Flange, 3" 1502F w/ 4.25" Boss
3P101300LT	3L103826	R4	15000	Y	Discharge Flange, 3" 1502F w/ 4.25" Boss
3P101327	2L103812	R6	9655	N	Suction Cover, 6" TWS900/1600/1800/2000/QWS
3P101327LT	2L103812	R6	9655	Y	Suction Cover, 6" TWS900/1600/1800/2000/QWS
3P101347	3L103828	R3	20000	N	Discharge Flange, 4.25" Boss w/ Bleedoff
3P101347LT	3L103828	R3	20000	Y	Discharge Flange, 4.25" Boss w/ Bleedoff
3P101348	3P101348	A	15000	N	Discharge Flange, 3" 1502F, 4" Boss, QWS
3P101348LT	3P101348LT	A	15000	Y	Discharge Flange, 3" 1502F, 4" Boss, QWS
3P101351	3L105281	R4	6000	N	Discharge Flange, 4" 602F, QWS2000 w/ 4.25" Boss
3P101351LT	3L105281	R4	6000	Y	Discharge Flange, 4" 602F, QWS2000 w/ 4.25" Boss
3P101353	2L18019	R7	9655	N	Packing Nut, 6", ACME Thread Style, TWS900-QWS2000
3P101353LT	2L18019	R7	9655	Y	Packing Nut, 6", ACME Thread Style, TWS900-QWS2000
3P101353P	2L103315P	R2	9665	N	6" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P101353PLT	2L103315P	R2	9665	Y	6" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P101407	3L18060	R4	7629	Y	Plunger, 6.75" TWS1800 & QWS2000

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
3P101423	2L104036	R3	11491	Y	5.50" Plunger, TWS900
3P101423RW	2L104036RW	0	11491	Y	5.50" Plunger, TWS900 RW
3P101424	2L104036	R3	9655	Y	6.00" Plunger, TWS900
3P101652	2L104036	R3	10513	Y	5.75" Plunger, TWS900
3P101893	3P101893	A	15000	N	Discharge Flange, 3" 1502M, 4" Boss, QWS
3P101893LT	3P101893LT	A	15000	Y	Discharge Flange, 3" 1502M, 4" Boss, QWS
3P101894	3L105280	R3	15000	N	Discharge Flange, 3" 1502M, QWS2000 w/ 4.25" Boss
3P101894LT	3L105280	R3	15000	Y	Discharge Flange, 3" 1502M, QWS2000 w/ 4.25" Boss
3P101895	3L105325	R2	10000	N	Discharge Flange, 3" 1002M w/ 4" Boss
3P101895LT	3L105325	R2	10000	Y	Discharge Flange, 3" 1002M w/ 4" Boss
3P102045	3L105279	R4	6000	N	Discharge Flange, 4" 602F
3P102045LT	3L105279	R4	6000	Y	Discharge Flange, 4" 602F
3P102099	3L105275	R4	8227	N	Discharge Cover, 6.5-6.75" TWS1300/2000 Small Block
3P102099LT	3L105275	R4	8227	Y	Discharge Cover, 6.5-6.75" TWS1300/2000 Small Block
3P102109	3P102109	A	24718	Y	Plunger, 8" Stroke, 3.75" Diameter
3P102110P	2L103316P	R4	24718	N	3.75" Packing Nut, TWS600/900-QWS, Butt W-G & Nylon Plug
3P102110PLT	2L103316P	R4	24718	Y	3.75" Packing Nut, TWS600/900-QWS, Butt W-G & Nylon Plug
3P102112	3P102112	B	15000	N	Discharge Flange, Blank, 3.25" Boss, 15000 NSCWP
3P102112LT	3P102112LT	B	15000	Y	Discharge Flange, Blank, 3.25" Boss, 15000 NSCWP
3P103152	3P103152	A	15000	N	Discharge Flange, 3" 1502M, 3.25" Boss, 2.30" ID
3P103152LT	3P103152LT	A	15000	Y	Discharge Flange, 3" 1502M, 3.25" Boss, 2.30" ID
3P103422	3P103422	A	15000	N	Discharge Flange, 2" 1502F, 3.25" Boss, 15000 NSCWP
3P103422LT	3P103422LT	B	15000	Y	Discharge Flange, 2" 1502F, 3.25" Boss, 15000 NSCWP
3P104144	2L104062	R2	24718	Y	3.75" Plunger, TWS900
3P104144RW	2L104062RW	00	24718	Y	3.75" Plunger, TWS900 RW
3P105202	3P105202	R1	28375	Y	Plunger, 3.5" TWS900
3P105203P	2L103316P	R4	28375	N	3.5" Packing Nut, TWS600/900-QWS, Butt W-G & Nylon Plug
3P105203PLT	2L103316P	R4	28375	Y	3.5" Packing Nut, TWS600/900-QWS, Butt W-G & Nylon Plug
3P105353	3L105354	R3	20000	N	Discharge Flange, 3" 2002F, 3.25" Boss
3P105353LT	3L105354	R3	20000	Y	Discharge Flange, 3" 2002F, 3.25" Boss
3P105404	2L18019	R7	10513	N	Packing Nut, 5.75", ACME Thread Style, TWS900-QWS2000

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
3P105404LT	2L18019	R7	10513	Y	Packing Nut, 5.75", ACME Thread Style, TWS900-QWS2000
3P105404P	2L103315P	R2	10513	N	5.75" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P105404PLT	2L103315P	R2	10513	Y	5.75" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
3P106935	3P106935	A	17165	N	Suction Cover, 4.5-5" TWS900-QWS, High Pressure
3P106935LT	3P106935LT	B	17165	Y	Suction Cover, 4.5-5" TWS900-QWS, High Pressure
3P107060	2L107059	R1	11491	Y	5.5" Plunger, TWS1300-QWS2500
3P107060RW	2L107059RW	R0	11491	Y	5.5" Plunger, TWS1300-QWS2500
3P107061	2L107059	R1	10513	Y	5.75" Plunger, TWS1300-QWS2500
3P107061RW	2L107059RW	R0	10513	Y	5.75" Plunger, TWS1300-QWS2500
3P107062	2L107059	R1	9655	Y	6" Plunger, TWS1300-QWS2500
3P107062RW	2L107059RW	R0	9655	Y	6" Plunger, TWS1300-QWS2500
3P107325	3P107325	A	28375	Y	Plunger, 3.5" TWS1300 - QWS
3P107398	3L107399	R3	15000	N	Discharge Flange, 2" 1502F, 4" Boss, QWS2000/2400
3P107398LT	3L107399	R3	15000	Y	Discharge Flange, 2" 1502F, 4" Boss, QWS2000/2400
3P107797	3L107796	R1	20000	N	Discharge Flange, Blank w/ 4.25" Boss
3P107797LT	3L107796	R1	20000	Y	Discharge Flange, Blank w/ 4.25" Boss
3P11916	3P11916	R1	15000	N	Discharge Flange, 3" 1502M, 3.25" Boss, 15000 NSCWP
4P100130	3L103358	R6	24718	N	Retainer Nut, 3.75-6" DIS/SUC TWS900-QWS2000
4P100130LT	3L103358	R6	24718	Y	Retainer Nut, 3.75-6" DIS/SUC TWS900-QWS2000
4P100271	3L103372	R3	8227	N	Retainer Nut, DIS/SUC 6.5-6.75" TWS1800/QWS
4P100271LT	3L103372	R3	8227	Y	Retainer Nut, DIS/SUC 6.5-6.75" TWS1800/QWS
4P100280	3L103822	R2	8227	N	Retainer Nut, Discharge Gauge Conn. 6.5-6.75" TWS1800/2000
4P100280LT	3L103822	R2	8227	Y	Retainer Nut, Discharge Gauge Conn. 6.5-6.75" TWS1800/2000
4P101259	4P101259	C	21600	N	Retainer Nut, 2" 1502 Gauge Conn. 6.75"-4 Butt-2A
4P101259LT	4P101259LT	D	21600	Y	Retainer Nut, 2" 1502 Gauge Conn. 6.75"-4 Butt-2A
4P101410	2L18019	R7	7629	N	Packing Nut, 6.75", ACME Thread Style, TWS900-QWS2000
4P101410LT	2L18019	R7	7629	Y	Packing Nut, 6.75", ACME Thread Style, TWS900-QWS2000
4P101410P	2L103315P	R2	7629	N	6.75" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
4P101410PLT	2L103315P	R2	7629	Y	6.75" Packing Nut w/ Wiper Groove, TWS900-QWS2500 - Nylon Plug
P14896	P14896	A	28375	N	Stud, 1"-8UNC x 3.5" Long, A193-B7

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Part #	Drawing #	Rev.	Pressure (psi)	Low Temp	Description
P14896C	P14896C	A	28375	Y	Stud, 1"-8UNC x 3.5" Long, A320-L7
P26391C	P26391C	C	21600	Y	Stud, 1"-8UNC x 4.5 Long, A320-L7
P29445	3L103656	R7	28375	Y	Stud, 1"-8UNC
P14897	P14897	A	21725	N	Nut, 1"-8UNC Heavy Hex
P114255	3L103656	R7	28375	N	Nut, 1"-8UNC Heavy Hex
P14897C	P14897C	A	21725	Y	Nut, 1"-8UNC Heavy Hex
2P142020	2P131529	B	12150	Y	Machining, Packing Nut, 6.75-4 Buttress, 5.00 Plunger
2P116119	2P149508LT	A	12150	Y	Retainer Nut, 6.75-4 Buttress, Suction & Discharge, Low Temp, Coated
2P147004	2P147004	IR	12150	Y	Machining, Plunger, 8.00" Stroke, 5.00" Dia
2P149513LT	2P149513LT	A	12150	Y	Retainer Nut, Gauge Connection, 6.75-4 Buttress 2-1502, Low Temp, Coated

Fluid Cylinder Note: Fluid Cylinder Part numbers ending in '(AF)' represent two unique parts. IE: 2P119415(AF) is calling out 2P119415 and 2P119415AF. They are identical fluid cylinders with identical dimensions and material, with the 'AF' part number being Autofrettaged post machining.

Note: Other part numbers or updated revisions may be acceptable under this Certificate, provided critical aspects of the design remain the same. Changes shall be documented and approved (via Engineering Change Notice or similar) by the Manufacturer's Engineering and/or Quality department as appropriate. DNV GL's local surveyor shall verify the change before issuance of Product Certificate.

Type Approval documentation

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Tests carried out

Prototype testing is not required for this certificate renewal.

Marking of product

For traceability the following marking is to be carried out on each fluid end assembly:

1. Serial Number
2. Manufacturer's name and trademark
3. Safe Operating Loads

Certificate retention survey

For retention of the Type Approval Certificate, DNV GL's surveyor shall perform a survey after two and three-and-a-half years, in accordance with DNV GL's Class Programme for Type Approval, DNVGL-CP-0338.

Other conditions/comments

1. Refer to DNV GL Project Number A0696163.

END OF CERTIFICATE