



DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. D-3548

This Certificate consists of 4 pages & replaces D-2693

This is to certify that the

Pipe Fittings

with type designation(s)

1", 1-1/2", 2" & 3" Fig 1502 Union Components and Pup Joint Assemblies

Manufactured by

GKD Industries Ltd.
CALGARY, ALBERTA - CANADA

is found to comply with

DNV's Offshore Standard DNV-OS-E101 "Drilling Plant" October 2006

and Det Norske Veritas' understanding of the implementation and interpretation of:

- PSA's "Regulations relating to the Design and Outfitting of Facilities etc. in the Petroleum Activities (the Facilities Regulations)", Chapter IV, last amended December 2007.

Application

See design limitations on page 2

Place and date

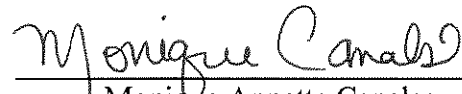
Houston, 11 February 2009
for DET NORSKE VERITAS (USA) INC.


Brandon Caraway
Senior Engineer



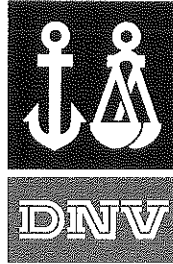
Local Office
DNV Houston

This Certificate is valid until
28 February 2013


Monique Annette Canales
Project Engineer

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid.

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas



Cert. No.: D-3548
 File No.: 523.83
 Job ID No.: 262.1-007184-1
 DNV Project No.: 47001283

Product description

1", 1 1/2", 2" & 3" Fig 1502 Union Components and Pup Joint Assemblies (See Drawings referenced below for type approved products)

Application/Limitation

-1 Assembly (Standard Service)*

- Minimum Design Temperature	: -20 °C	(-4 °F)
- Maximum Design Temperature	: 121 °C	(250 °F)
- Maximum Working Pressure	: 103.4 MPa	15,000 psi
- Service	Standard	

-2 Assembly H₂S Service*

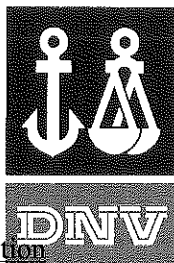
- Minimum Design Temperature	: -20 °C	(-4 °F)
- Maximum Design Temperature	: 121 °C	(250 °F)
- Maximum Working Pressure	: 68.9 MPa	10,000 psi
- Service	H ₂ S	

*Type of service is distinguished by either -1 or -2 in the assembly number, as referenced in the drawings listed.

Type Approval documentation

Drawings:

Drawing No.	Rev.	Description
PJ-1-1502-MM-A-E	1	GKD Union, 1" Fig 1502 Pup Joint M x M - Assembly
PJ-1-1502-MF-A-E	1	GKD Union, 1" Fig 1502 Pup Joint M x F - Assembly
CO-1DM-1M-1502-A-E	1	GKD Union - Changeover, 1"DM x 1"M Fig 1502 - Assembly
PJ-1-1502-FF-A-E	1	GKD Union, 1" Fig 1502 Pup Joint F x F - Assembly
PJ-1-1502-FF	1	GKD Union, 1" Fig 1502 Pup Joint F x F - RL
PJ-1-1502-MM	1	GKD Union, 1" Fig 1502 Pup Joint M x M - RL
PJ-1-1502-MF	1	GKD Union, 1" Fig 1502 Pup Joint M x F - RL
CO-1DM-1M-1502	1	GKD Union - Changeover, 1"DM x 1"M Fig 1502
SEG-1-1502	1	GKD Union, 1" Fig 1502 Segments
WN-1-1502	1	GKD Union, 1" Fig 1502 Wing Nut
PJ-15-1502-MM-A-E	1	GKD Union, 1 1/2" Fig 1502 Pup Joint M x M - Assembly
PJ-15-1502-MF-A-E	1	GKD Union, 1 1/2" Fig 1502 Pup Joint M x F - Assembly
CO-15DM-15M-1502-A-E	1	GKD Union - Changeover, 1 1/2"DM x 1 1/2"M Fig 1502 - Assembly
PJ-15-1502-FF-A-E	1	GKD Union, 1 1/2" Fig 1502 Pup Joint F x F - Assembly
PJ-15-1502-FF	1	GKD Union, 1 1/2" Fig 1502 Pup Joint F x F - RL
PJ-15-1502-MM	1	GKD Union, 1 1/2" Fig 1502 Pup Joint M x M - RL
PJ-15-1502-MF	1	GKD Union, 1 1/2" Fig 1502 Pup Joint M x F - RL
CO-15DM-15M-1502	1	GKD Union - Changeover, 1 1/2"DM x 1 1/2"M Fig 1502
SEG-15-1502	1	GKD Union, 1 1/2" Fig 1502 Segments



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<u>Drawing No.</u>	<u>Rev.</u>	<u>Description</u>
WN-15-1502	1	GKD Union, 1 1/2" Fig 1502 Wing Nut
PJ-2-1502-MM-A-E	1	GKD Union, 2" Fig 1502 Pup Joint M x M – Assembly
PJ-2-1502-MF-A-E	1	GKD Union, 2" Fig 1502 Pup Joint M x F – Assembly
CO-2M-1F-1502-A-E	1	GKD Union – Changeover, 2"M x 1"F Fig 1502 – Assembly
PJ-2-1502-FF-A-E	1	GKD Union, 2" Fig 1502 Pup Joint F x F – Assembly
PJ-2-1502-FF	1	2" Fig 1502 Pup Joint F x F – RL
PJ-2-1502-MM	1	GKD Union, 2" Fig 1502 Pup Joint M x M – RL
PJ-2-1502-MF	1	GKD Union, 2" Fig 1502 Pup Joint M x F – RL
CO-2M-1F-1502	1	GK Union – Changeover, 2"M x 1"F Fig 1502
SEG-2-1502	1	GKD Union, 2" Fig 1502 Segments
WN-2-1502	1	GKD Union, 2" Fig 1502 Wing Nut
PJ-3-1502-MM-A-E	1	GKD Union, 3" Fig 1502 Pup Joint M x M – Assembly
PJ-3-1502-MF-A-E	1	GKD Union, 3" Fig 1502 Pup Joint M x F – Assembly
CO-3M-2F-1502-A-E	1	GKD Union – Changeover, 3"M x 2"F Fig 1502 – Assembly
PJ-3-1502-FF-A-E	1	GKD Union, 3" Fig 1502 Pup Joint F x F – Assembly
PJ-3-1502-FF	1	GKD Union, 3" Fig 1502 Pup Joint F x F – RL
PJ-3-1502-MM	1	GKD Union, 3" Fig 1502 Pup Joint M x M – RL
PJ-3-1502-MF	1	GKD Union, 3" Fig 1502 Pup Joint M x F – RL
CO-3M-2F-1502	1	GKD Union – Changeover, 3"M x 2"F Fig 1502
SEG-3-1502	1	GKD Union, 3" Fig 1502, Fig 1002, Fig 602 Segments
WN-3-1502	1	GKD Union, 3" Fig 1502 Wing Nut

Material Specifications:

Assembly using Standard Service

AISI 4140 Heat Treated	Minimum Yield: 100 ksi	Hardness: 28-32 Rc
AISI 4140 P110 (Segments only)	Minimum Yield: 110 ksi	Hardness: 32-36 Rc

Assembly using H₂S Service

AISI 4140 L80	Minimum Yield: 80 ksi	Hardness: 18-22 Rc
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Calculations:

- "GKD Design Calculations", submitted 11 November 2004.

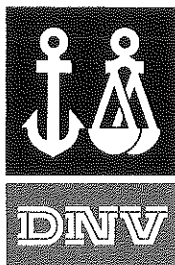
Fabrication Procedures

Test Procedures:

1. See Comments.

NDE Procedures:

1. See Comments.



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Marking of product

For traceability to this Type Approval Certificate the products are as a minimum to be marked as follows:

- "NV D-3548"
- Manufacturer's name and trademark
- Additional marking at manufacturer's option

Certificate retention survey

The arrangement is to be in accordance with Certification Notes No. 1.2, dated December 1996, paragraph 4.3.

Documentation to be accompanied with each product/delivery

1. Data book index
2. Equipment name, number, purchaser, etc.
3. Manufacturer's statement of compliance
4. Assembly drawing
5. Actual material certificates as purchased and Charpy impact test records as applicable
6. Heat treatment records/charts when applicable
7. Pressure test reports
8. DNV Product Certificate
9. DNV Type Approval Certificate

Other conditions/comments

- This document may be used as part of the documentation required to comply with European Union (EU) Directives referenced in PSA's Acts, regulations and provisions for the petroleum's activities. It should however be noted that the scope covered by this document does not necessarily cover all aspects required to issue the EU Declaration of Conformity and to affix the CE-mark. It is the manufacturer's/operator's responsibility to ensure compliance with relevant EU Directives.
- This certificate may be used to help the duty holder discharge their duties toward the verification scheme required by SI 1992/2885, *The Offshore Installations (Safety Case) Regulations 1992*.
- The elastomeric seal material shall withstand both the medium and the maximum/minimum working temperature.
- Unions shall be pressure tested at 1.5 x Maximum Working Pressure.
- For unions used in sour service, hardness testing on all wetted surfaces to be in accordance with ISO 15156.
- For equipment used in less than 0°C conditions, charpy impact testing is to be conducted in accordance with DNV-OS-E101 'Drilling Plant'.
- 100% traceability is required.
- For well control applications, compliance with the Quality Control requirements as specified in the current edition of API 6A "Specification for Wellhead and Christmas Tree Equipment" (PSL 3) is required.

END OF CERTIFICATE