TYPE APPROVAL CERTIFICATE

Certificate no.:
TAD000016E
Revision No:
1

This is to certify:

that the Hoisting, Rotation and Pipehandling Equipment

with type designation(s)
Expandable Pin Assembly

issued to
Expander System Sweden AB
Åtvidaberg, Östergötlands Län, Sweden

is found to comply with
DNV-OS-E101 – Drilling facilities, Edition July 2024
DNV statutory interpretations DNV-SI-0166 – Verification for compliance with Norwegian shelf regulations, Edition July 2021

Application:

See next page.

Issued at **Høvik** on **2026-03-05**

This Certificate is valid until **2031-03-04**.
DNV local unit: **Oslo Drilling Systems**

Approval Engineer: **Axel Janson**

for **DNV**
Digitally Signed By: Moen, Jan Olav
Location: DNV Høvik, Norway

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.

Product description

The Expander system (expandable pin assembly) is a pivot assembly for securing a pair of mounting lugs and stabilizing a machine member. The machine member is often a bearing or a bushing. The system consists of an axle with tapered ends and a locking mechanism on each side. The locking mechanism comprises a sleeve and a bolt or a nut and sometimes a tension washer. When a force is applied to the sleeve via the fastener or the washer, the tapered end of the axle will work as a guide for the sleeve, and it will expand radially. A high tension is established in the contact material of the axle, sleeve and lug ear. The tension causes friction between the tapered axle end and the sleeve, and between the sleeve and lug ear. The friction between these surfaces creates a very strong locking of the expander system.

Reference Standards

[1] DNV-ST-0378 “Offshore and platform lifting Appliances“ Ed. 2021

[2] API 8C “Specification for Drilling and Production Hoisting Equipment” 5th ed. 2014

Fabrication sites

Expander System Sweden AB
CIM Number 10125317
ÅTVIDABERG, Sweden
Local office: DNV Stockholm

DNV fabrication audit carried out: 2026.01.13 (Surveyor: Roger Johansson)

Expander Americas Inc.
223 Industrial Street
DeWitt, IA 52742 USA
Local Office: DNV New York

DNV fabrication audit carried out: 2026.02.26 (Surveyor: Cyril Jose)

Application/Limitation

Design Parameter	Range	Description/Options
Straight pin		
Internal thread and bolt	Single bolt	Without internal greasing
	Single bolt	With internal greasing (one or two outlets)
	Multi bolt	Without internal greasing
	Multi bolt	With internal greasing (one or two outlets)
External thread and nut	Single bolt	Without internal greasing
	Single bolt	With internal greasing (one or two outlets)
Through bolt	Single bolt	Without internal greasing
	Single bolt	With internal greasing (one or two outlets)
Pin outside diameter range	20 – 700mm	
Safe Working Load (SWL)	Up to 5000 tonnes	
Stepped pin		
Internal thread and bolt	Single bolt	Without internal greasing
	Single bolt	With internal greasing (one or two outlets)
	Multi bolt	Without internal greasing
	Multi bolt	With internal greasing (one or two outlets)
External thread and nut	Single bolt	Without internal greasing
	Single bolt	With internal greasing (one or two outlets)
Pin outside diameter range	20 – 700mm	
Safe Working Load (SWL)	Up to 5000 tonnes	

Type Approval documentation

Drwg./Doc. No.	Rev.	Title
DNV-EXP001	7	Design Calculations
DNV-EXP003	5	Design Calculation Method
SKM-13-1474		DNV Survey report (prototype test) endorsed by DNV Stockholm, date: 2013-04-18
535332:2	1	Prototype test report
DNV-EXP101	0	Straight pin, Internal thread and bolt, Single bolt
DNV-EXP102	0	Straight pin, Internal thread and bolt, Multi bolt
DNV-EXP103	0	Straight pin, External thread and bolt, Single bolt
DNV-EXP104	0	Straight pin, Through bolt, Single bolt
DNV-EXP105	0	Stepped pin, Internal thread and bolt, Single bolt
DNV-EXP106	0	Stepped pin, Internal thread and bolt, Multi bolt
DNV-EXP107	0	Stepped pin, External thread and nut, Single bolt
DVR-262.1-014691-J-2	0	DNV Design verification report
Form TA 401	2026.02.26	Type Approval Assessment Report (Expander Americas, Inc.)
Form TA 401	2026.01.13	Type Approval Assessment Report (Expander System Sweden AB)

Materials

Each product components are to to be Charpy Impact tested according to applicable standards:

Component	Material	Min.Yield Strength	Charpy (min.)
Axle	SS 2541-03/EN 1.6582/34CrNiMo6/AISI 4340 SS 2244-05/EN 1.7225/42CrMo4V/AISI 4140 EN 1.7220/34CrMo4/AISI 4135/SCM435H SS 2328/EN 1.4410/X2CrNiMoN25-7-4/ASTM A182 F53/UNS S32750	500-900 N/mm^2 (depends on mtrl & dimension)	27**J at -20 °C 42***J at -20 °C
	1.6580/30CrNiMo8/A320L43 SS 2387-05/EN 1.4418/X4CrNiMo16-5-1 1.4542/X5CrNiCuNb17-4/ASTMA564 type 630/17-4PH		
Sleeve & Washer	SS 2541-03/EN 1.6582/34CrNiMo6/AISI 4340 SS 2244-05/EN 1.7225/42CrMo4V/AISI 4140 1.7220/34CrMo4/AISI 4135/SCM435H SS 2172/EN 1.0577/St 52-3/S355J2 1.1191/C45E/AISI 1045/S45C 1.1219/C56E2/S55C Imatra 520M Imatra 550M 1.8931/S690Q/Dillimax690B, 1.8928/S690QL/Welldox700E/Dillimax690T ASTM A514 or equivalent 1.6580/30CrNiMo8/A320L43 SS 2387-05/EN 1.4418/X4CrNiMo16-5-1 1.4542/X5CrNiCuNb17-4/ASTM A564 type 630/17-4PH SS 2328/EN 1.4410/X2CrNiMoN25-7-4/ASTM A182 F53/UNS S32750	275-900 N/mm^2 (depends on mtrl & dimension)	N/A
Bolt & Nut	SS 2541-03/EN 1.6582/34CrNiMo6/AISI 4340 SS 2244-05/1.7225 QT/42CrMo4/AISI 4140 1.7220/34CrMo4/AISI 4135/SCM435H 8.8 grade (ISO 898-1) 1.6580/30CrNiMo8/A320L43 SS2387-05/EN 1.4418/X4CrNiMo16-5-1 1.4542/X5CrNiCuNb17-4/ASTM A564 type 630/17-4PH A4-80 SS 2328/EN 1.4410/X2CrNiMoN25-7-4/ASTM A182 F53/UNS S32750	540-800N/mm^2 (depends on mtrl & dimension)	27J at -20 °C

** This Charpy impact value is according to DNGL-ST-0378
*** This impact property is according to DNVGL-OS-E101 and API 8C

- Material selection and properties shall comply with applicable standard.
- Method, extent and acceptance criteria of NDE shall be in accordance with applicable standards.
- Axle materials hardened and/or surface treated (for example hard chrome plated, NiCr plated) where applicable according to order specification.

Documentation which are to accompany each product/delivery

- Material certificate 3.1 type (per EN 10204:2004)
- Material Traceability List
- GA drawings with relevant dimensions
- NDT reports
- Installation procedure
- Maintenance procedure

Conditions and Comments

- Expandable pin assembly shall be delivered with material certificate equivalent to 3.1 type according to EN 10204:2004.
- If DNV certification is required by end user or state authority, the product may be proof tested and surveyed during fabrication in accordance with the requirements specified in DNV-OS-E101, followed by issuance of DNV Survey report.
- End user shall consider fatigue in each individual installation. Normally fatigue is not a problem for a properly pretensioned pin assembly. Bolts shall provide sufficient preload to avoid any rotation or slippage of the mating faces during operation and be designed according to Design Calculation DNV-EXP001 Rev.7.
- It is recommended that end user of the product performs inspection once per annum to ensure that preload is sufficient and no loosening occurs.
- Safe working load (SWL) shall be specified by the end user.
- Documentation which are to accompany each product/delivery to be kept by manufacturer over a period of at least 10 years.
- This Type Approval Certificate replaces the expired certificate TAD000016E rev.0, and it is effectively valid from 2024-11-18.

Marking of product

For traceability each product shall be marked in accordance with applicable standards.

Periodical assessment

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNV-CP-0338.

This certificate is only valid if periodical assessments are performed with satisfactory results. To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com

END OF CERTIFICATE