



CERTIFICATE NUMBER	21-2200437-PDA
EFFECTIVE DATE	13-Jan-2022
EXPIRY DATE	12-Jan-2027
ABS TECHNICAL OFFICE	Houston ESD - Piping

CERTIFICATE OF Product Design Assessment

This is to certify that a representative of this Bureau did, at the request of

LOKRING TECHNOLOGY, LLC

located at

**38376 APOLLO PARKWAY, WILLOUGHBY, OH, United States,
44094**

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: Elastic Strain Preload (ESP) Fittings
Model: LTCS-333
Endorsements:
Tier: 3 - Type Approved, unit certification not required

This Product Design Assessment (PDA) Certificate remains valid until 12/Jan/2027 or until the Rules and/or Standards used in the assessment are revised or until there is a design modification warranting design reassessment (whichever occurs first).

Acceptance of product is limited to the "Intended Service" details prescribed in the certificate and as per applicable Rules and Standards.

This Certificate is valid for installation of the listed product on ABS units which exist or are under contract for construction on or previous to the effective date of the ABS Rules and standards applied at the time of PDA issuance. Use of the Product for non-ABS units is subject to agreement between the manufacturer and intended client.

American Bureau Of Shipping

Yongjin Lee

Yongjin Lee, Engineer/Consultant

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in this certificate becoming null and void. This certificate is governed by ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010)

LOKRING TECHNOLOGY

38376 APOLLO PARKWAY

WILLOUGHBY OH

United States 44094

Telephone: 440-942-0880

Fax: 440-942-1186

Email: dmaron@lokring.com

Web: www.lokring.com

Tier: 3 - Type Approved, unit certification not required

Product: Elastic Strain Preload (ESP) Fittings

Model: LTCS-333

Endorsements:

Intended Service:

Offshore applications PROCESS piping ONLY.

May be used for B31.1 power if limited to process power only.

Description:

LTCS -333 Fittings

Rating:

For Fittings, Sizes, Pressure Rating, etc. see attached "pdf" for details.

For specific service applications, please consult LOKRING Applications guide.

Service Restriction:

Unit Certification is not required for this product. If the manufacturer or purchaser request an ABS Certificate for compliance with a specification or standard, the specification or standard, including inspection standards and tolerances, must be clearly defined.

The LTCS fittings HAVE NOT been qualified to the IACS testing requirements and may not be used in any marine systems.

Use is limited to process piping and process power only on the topsides of a unit. May be used in minimum temperatures -50 degrees F (-46 degrees celcius)

Comments:

The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.

Notes/Drawing/Documentation:

Drawing no. 16-005, Proposed Test Plan Procedure for extension of American Bureau of Shipping PDA, 2016

Drawing no. 6090128R6, Guideline for Designing ASME B31 Pressure Piping Using Lokring™ Fittings with Elastic Strain Preload® (ESP®) Technology, 2015

Drawing no. 6090127 Lokring Fitting Applications Guide, 2014

Drawing no. TR 10-017- ABS ReCert 111912, Test Report Requirements for Mechanical Joints- Lokring Fittings & Sizes, dated November 2012

Drawing no. 10-014 TSSA Subm 020311, Test Report 10-014 TSSA of LLTCS-333 Fittings, 2011, Lokring Technology

Drawing no. 11-022 Lokring API 6FB Fire test 020212, Test Report 11-022 of LTCS-333 and MAS-3000 product lines, 2011, Lokring Technology

Drawing no. USCG Acceptance Letter (Web) 022409, USCG Acceptance Letter (Web) 022409

Drawing no. Project 08-16456 - Pressure & Vibration Waveforms test, dated 21 Dec. 2011, Southwest Research Institute

TP 08-020 LTCS P24 Qual Flex Burst Test Calcs

TP 09-009 LTCS P16 Qual Flex Burst Test Calcs

TP 09-024 LTCS P08 Qual Flex Burst Test Calcs

TP 09-025 LTCS P12 Qual Flex Burst Test Calcs

TP 09-026 LTCS P32 Qual Flex Burst Test Calcs

TP 10-009 LTCS P48 Qual Flex Burst Test Calcs

TP 10-011 LTCS P64 Qual Flex Burst Test Calcs

Terms of Validity:

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STANDARDS**ABS Rules:**

The Rules for Conditions of Classification, Offshore Units and Structures, 2022 Mobile Offshore Units 1-1-4/9.7, 1-1-A2, 1-1-A3, which covers the following:
2022 Rules for Building and Classing Facilities on Offshore Installations: 3-3/11.1.

National:

NA

International:

ASME B31.1:2020 - Power Piping
ASME B31.3:2020 - Process Piping

Government:

NA

EUMED:

NA

OTHERS:

NA

Design Pressures for LTCS-333 fittings on **ASTM A333 Grade 6 pipe**:

LOKRING Fitting	NPS (inches)	Pipe OD (inches)	ASTM A333 Grade 6 pipe Pipe wall thickness (inches)/schedule	B31.1 Pressure Rating(psi)	B31.3 Pressure Rating (psi)
LTCS-333-P08	½"	0.840	0.109/40	5530	6470
			0.147/80	7420	8670
			0.187/160	7920	9260
LTCS-333-P12	¾"	1.050	0.113/40	4050	4740
			0.154/80	5950	6960
			0.218/160	6960	8150
LTCS-333-P16	1"	1.315	0.133/40	3800	4440
			0.179/80	5700	6670
			0.250/160	5570	6520
LTCS-333-P24	1-1/2"	1.900	0.145/40	2910	3410
			0.200/80	3800	4440
			0.281/160	4690	5480
LTCS-333-P32	2"	2.375	0.154/40	2090	2450
			0.218/80	3250	3800
			0.343/160	4180	4890
LTCS-333-P48	3"	3.500	0.216/40	2010	2350
			0.300/80	2970	3470
LTCS-333-P64	4"	4.500	0.237/40	1900	2220
			0.337/80	2920	3410

Design Pressures for LTCS-333 fittings on **ASTM A106B/A53B/API5L B pipe:**

LOKRING Fitting	NPS (inches)	Pipe OD (inches)	<u>ASTM A106B/A53B/API5L B pipe</u> Pipe wall thickness (inches)/schedule	B31.1 Pressure Rating(psi)	B31.3 Pressure Rating (psi)
LTCS-333-P08	½"	0.840	0.109/40	5530	6470
			0.147/80	7420	8670
			0.187/160	7920	9260
LTCS-333-P12	¾"	1.050	0.113/40	4310	5040
			0.154/80	4810	5630
			0.218/160	6080	7110
LTCS-333-P16	1"	1.315	0.133/40	4180	4890
			0.179/80	5450	6370
			0.250/160	4310	5040
LTCS-333-P24	1-1/2"	1.900	0.145/40	2770	3240
			0.200/80	3570	4170
			0.281/160	4360	5100
LTCS-333-P32	2"	2.375	0.154/40	2590	3030
			0.218/80	3490	4080
			0.343/160	4330	5060

Design Pressures for LTCS-333 fittings on **ASTM A106B/A53B/API5L B pipe, continued**

LOKRING Fitting	NPS (inches)	Pipe OD (inches)	<u>ASTM A106B/A53B/API5L B pipe</u> Pipe wall thickness (inches)/schedule	B31.1 Pressure Rating(psi)	B31.3 Pressure Rating (psi)
LTCS-333-P48	3"	3.500	0.216/40	2140	2500
			0.300/80	3070	3590
LTCS-333-P64	4"	4.500	0.237/40	2030	2370
			0.337/80	2180	2550