

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Compensator, Bellow of Rubber Material**

with type designation(s)

Type 1, Type 2, Type GS

Issued to

**Reiflexa P. Reischl GmbH
Oststeinbek Schleswig-Holstein, Germany**

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems**DNV GL class programme DNVGL-CP-0183 – Type approval – Flexible hoses****Application :****Compensation of lateral and axial movement in piping systems, relative movement between flexible mounted machinery and fixed piping as well as reduction of vibration loads. Compensators shall not be used to compensate pipe misalignment. Refer to certificate. Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.**

Type:	Temperature range:	Max. working press.:	Sizes:
Type 1	up to 90°C, Double Red up to 130°C	16 bar	up to DN 300
Type 2	up to 90°C	25 bar	up to DN 400
Type GS	up to 100°C	16 bar	up to DN 300

This Certificate is valid until **2022-03-21**.Issued at **Hamburg** on **2017-03-22**DNV GL local station: **Hamburg**Approval Engineer: **Hagen Markus**for **DNV GL**

**Olaf Drews
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.

Product description

Rubber compensator with reinforcement made of Nylon and Aramide (Type 1), Kevlar (Type 2) and Steel wire cord (Type GS), fitted with loose flanges made of carbon steel ready for installation.

For applications where fire resistance is required by the Rules the entire compensator, including flanges, is to be protected by the fire sleeve of type F3000.

Product types

Types	Length overall	Description
Type 1A Type 1B Type 1S	130 mm 150 mm 160 mm	Standard design for axial, lateral and angular movement. Non- fire resistant.
Type 2	180 mm up to 300	Standard design for axial, lateral and angular movement. Non- fire resistant.
GS ¹	130 mm	Standard design for axial, lateral and angular movement. Fire resistant.
F3000	According to data sheet Type F3000	Fire sleeve made of several layers of asbestos free fabric with silicon aluminium coating. For application on Type 1 and Type 2 compenstors and applications where fire resitance is required by the Rules.

Compensator design

Type	Reinforcement	Liner	Cover	Colour ring	Flanges	Material
Type 1	Nylon cord	NBR,ECO	ECO, NBR	Yellow	With special profil machining to bear the bellow retaining ring of the sealing face.	S235JR, hot dip calvanised.
		EPDM	EPDM	Red		
		Hypalon	CR	Green ²		
		White NBR	ECO	White ²		
	Aramide	EPDM	EPDM	Double Red		
Type 1 HO	Aramide	HNBR	HNBR	Double Yellow		
Type 2 (ditec)	Kevlar	EPDM	EPDM	Red - Blue - Red		
		NBR	NBR	Yellow - Blue - Grey		
		FPM	FPM	Violett - Blue - Violett		
		IIR	IIR	Brown - Blue - Brown		
		CR	CR	Grey - Blue - Grey		
		CSM	CSM	Green - Blue - Green		
GS ¹	Steel wire cord	NBR	CR	Yellow		

Notes

¹ Type approval certificate 83 345 – 80 HH

² Type approval certificate 35 669 – 84 HH

Maximum working pressure and temperatures

Type	Liner material	Size DN	Maximum design Temperature			
			70 °C	90 °C	110°C	130°C
Type 1 Red, Yellow	EPDM / NBR	25 up to 300	16 bar	10 bar	n.a.	
Type 1 Double Red	Special EPDM	25 up to 150	16 bar (up to 100 °C)			10 bar
		200 up to 300	10 bar (up to 100 °C)			6 bar
Type 1 Double Yellow	HNBR	25 up to 150	16 bar		10 bar	n.a.
		200 up to 300	10 Bar		6 bar	n.a.
Type 1 White	NBR	32 up to 300	16 bar	16 bar	n.a.	
Type 2	EPDM	25 up to 500	25 bar	25 bar	n.a.	
	NBR					
	FPM					
	IIR					
	CR					
CSM						
GS	NBR	25 up to 300	16 bar	16 bar	16 bar (100°C)	n.a.

Production places

Production places	DNV GL local station
Bellows	
Trelleborg Izarra, S.A.U.	Bilbao
Izarra, Spain	
Size range up to DN 300	
Dichtungstechnik GmbH	Augsburg
ditec	
Kitzingen, Germany	
Size range >DN 300 up to DN 500	
Compensators , Fire sleeve	
Reiflexa P. Reischl GmbH	Hamburg
Oststeinbek, Germany	
Size range up to DN500	

Responsibility

The company Reiflexa P. Reischl GmbH takes the responsibility that both design and production of the rubber bellows are in compliance with Rules, Standards and/or Regulations listed on page 1 of this certificate.

Application / Limitation

The compensators are type approved for application in the following piping systems:

Type 1, 2 (Enclosed by fire sleeve of type REIFLEXA F3000), Type GS	Type 1A, 1S (without fire sleeve), Type GS
<ul style="list-style-type: none">- Ballast systems- Fuel oil , lubricating oil, hydraulic oil systems (excluding EPDM)- Bilge systems- Sea water systems (where failure may result in flooding)- Permanently water filled fire extinguishing systems- Compressed air systems	<ul style="list-style-type: none">- Fresh cooling water systems- Sanitary piping systems- Other auxiliary systems where fire resistance capability is not required.

For selection and installation of the compensators the manufacturer's instructions are to be observed.

Remarks

The compensators shall

- be installed at visible and accessible positions.
- be limited to a quantity necessary to compensate vibration load or admit relative movements between flexible mounted machinery and fixed piping or components and should not be used to compensate for pipe misalignment.

The compensators are not approved for installation :

- in piping systems where pressure pulses other than water hammer may occur.
- in diving systems or drilling equipment.
- in permanently pressurized starting air lines of diesel engines.
- in cargo lines of tankers.
- at the ship's side.

Production testing

Each compensator shall be subjected to hydrostatic pressure test at 1.5 times maximum working pressure. Appropriate pressure test report with reference to this type approval certificate is to be issued.

Type Approval documentation

According to the following legacy certificates:

- DNV P-14634 (262.1-015958-1, Trelleborg, Izarra)
- GL 85324-81HH, 14 592-99HH and GL 35 66-84HH.

In addition the following documents:

- Reiflexa data sheets of compensators 1A, 1B, 1S, Typ 2
- Data sheet "REIFLEXA Flammenschutzhülle Type F3000
- ditec drawing 15914-1 – DN400 – LE 200, dated 2015-10-30
- Fire resistance test reports according to ISO 15540/41 issued by Dr. -Ing. T. Bäumer, test report IBB 1646, dated 2016-09-14
- Endurance test reports issued by Dr. -Ing. T. Bäumer, No. IBB 1702, 1668
- DNVGL Assessment reports dated 2016-11-11 (Reiflexa) and 2016-11-15 (ditec)
- Ditec documentation compensator type U110A-DN400-LE200, order AB024366, dated 2015-12-15, TÜV test reports 600014897
- TÜV EC Type Examination (Module B) - IS-ATA5-MUC-15-11-314281-002
- TÜV Conformity Module C1 - IS-ATA5-MUC-15-11-314281-004

Job Id: **262.1-022010-1**
Certificate No: **TAP00000SD**

Tests carried out

Oil resistance, Ozone resistance, Burst pressure, Dimensional Check test, Endurance test, Fire resistance according to ISO15540/41:2016 (performed on compensators fully enclosed by fire sleeve of type REIFLEXA F3000)

Marking of product

For traceability to this type approval certificate, the compensators are to be marked with:

- Manufacturer's trade mark.
- Type
- Rubber material designation by colour ring
- Size
- Max. working pressure

The fire sleeve is marked as follows:

Manufacturers name – Fire Sleeve F3000
DN xxx, GL-Approval 85 324-81 HH

Periodical assessment

For retention of the type approval certificate periodical assessments shall be carried out at production places in co-ordination with the DNVGL local station Hamburg.

The objective of the periodical assessment is to verify that the design and production conditions for the type approval have not been altered.

Main scope of the assessment:

- verification of the production and quality control system
- review of quality control documentation of recent deliveries
- review of drawings in production to verify any design changes which may have an impact on data specified in the type approval certificate, performance and range of application
- verification of the product marking

Periodical assessment is to be performed after 2 years and after 3.5 years and a renewal assessment at renewal of the certificate.

In connection with the renewal assessment, a surveyor shall witness / review test reports with respect to the following tests on every 3rd size:

- dimensional check test
- change in length test
- burst test
- production test

End of the certificate