Certificate No.: 2505301111053740

TÜRK LOYDU

TYPE APPROVAL CERTIFICATE

This is to certify that the

Flexible Hoses of metallic material with permanently fitted couplings

TL Project No	**25-0879**
Manufacturer	**SENIOR FLEXONICS GMBH**
Address	**Frankfurter Str. 199, 34121 Kassel, Germany**
Product Type	**MW22 / MW23, DW32, DW72, MU22, ZW22 / ZW23**
Reference Rule	**TL Rules, Part C,Chapter 8 - Chemical Tankers , 01.07.2019** **TL Rules, Part E, Chapter 103 - Metallic Materials, Special Materials for Naval Ships, 01.01.2022** **TL Rules, Part E, Chapter 107 - Naval Ship Technology, Ship Operation Installations and Auxiliary System, 01.01.2022** **TL Rules, Part A, Chapter 2, Material, 01.07.2024** **TL Rules, Part B, Chapter 4, Machinery, 01.07.2024** **TL Rules, Part C, Chapter 10, Liquefied Gas Tankers, 01.07.2024**
Expire Date of Previous Certificate	**-**
Place and Date	**İSTANBUL / 30.05.2025**

Subject to the conditions referred to in the following pages, this certificate is valid until 30.05.2030.

Emrah SÖĞÜTÇÜ

New Building Division Manager

135392

This certificate is subject to terms and conditions described below:

- Any significant change in design or construction may render this Certificate invalid. Type Approval Certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. This certificate is not valid for products without marking above mentioned. The manufacturer should notify TÜRK LOYDU of any modifications or changes to equipment in order to obtain valid certificate. This certificate shows that tested specimens as representative of the product complies of the TÜRK LOYDU rules, and revelant international instruments that apply to it.

Product : Flexible Hoses of metallic material with permanently fitted couplings

Type of Product : MW22 / MW23, DW32, DW72, MU22, ZW22 / ZW23

Product Description : Tuboflex® stainless steel corrugated hoses without fittings and Hose assemblies with hose end fittings, ready for installation.

Single wall hoses:
Medium wall thickness, standard pitch: MW22, DW32, DW72
Same as above but close pitch: MW23
Medium wall thickness, low pitch: MU22
Heavy wall thickness, standard pitch: DW72, DW32

Double wall hoses:
Standard pitch / close pitch: ZW22 / ZW23

Hose types designation:
U0 without braiding type
U1 with single braiding type
U2 with double braiding type

Materials:

Hose Type	Size Range	Material Designation
MW22	DN12-DN300	1.4541(AISI 321)
MW23	DN12-DN200	1.4541(AISI 321)
MW22	DN125-DN300	1.4571(AISI 316Ti)
MW23	DN125-DN200	1.4571(AISI 316Ti)
DW72/ DW32	DN12-DN300	1.4571(AISI 316Ti)
MW22	DN8-DN100	1.4404(AISI 316L)
MW23	DN8-DN100	1.4404(AISI 316L)
MU22	DN6-DN50	1.4404(AISI 316L)
ZW22/ ZW23	DN16-DN100	1.4404(AISI 316L)

*Hoses made of material acc. to DIN EN 10028-7. 1.4404 (316L) + 1.4541 (321) +1.4571 (316Ti) are accepted for all hose types
*Braiding of the hoses made of 1.4301 (AISI 304), 1.4571 (AISI 316Ti) or 1.4404 (AISI 316L)
Hose end fittings:
All standard hose end fittings as specified in the Senior Flexonics product catalogue "TUBOFLEX® Corrugated metal hoses" (excl. K615 and K625) or acc. to other international standards (for e.g. ASME B16.5, DIN EN 1092-1, ...).
For the pipe connection part of the hose end fittings limitations depending on pipe class, media and temperature has to be observed.

Temperature Range:
The temperature range of the hose assembly depends on the hose/ hose end fittings material combination

Material
Stainless steel: -196°C (Min.) +550°C (Max.)
Malleable cast iron: -20°C (Min.) +200°C (Max.)
Steel: -10°C (Min.) +300°C (Max.)
Brass: -55°C (Min.) +200°C (Max.)

Approval No / Date : PAE-EPAS/021470/25-0879/FP; 30.05.2025

Design Pressure : Please See "Others" part.

Surveyor Name : Onur KOCABEY

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Performed Tests : The following tests have been performed and documented for TUBOFLEX® metal hose assemblies:
-Hydrostatic pressure test (1.5 x design pressure)
-Burst test
-Cyclic flexing test in accordance with ISO 10380
-Cyrogenic test

Test Place : Kassel/ Germany

Last Inspection Date : 30.05.2025

Surveyor Remarks : -

Application/Limitation:

The TUBOFLEX® corrugated stainless steel hose assemblies are intended for use in flexible piping connections for marine and industrial applications, such as cooling water, compressed air, fuel oil and exhaust systems. The hose assemblies are suitable for vibration absorption and thermal expansion compensation in non-rigid pipeline sections, as specified in the approved catalogue and technical documentation. Assemblies shall be installed in accordance with manufacturer installation instructions and ISO 10380.

-For service temperatures above 20°C, pressure derating factors shall be applied as per manufacturer catalogue.
-Installation in tank boundaries or fire-rated divisions (A-60 class or higher) requires fire insulation verification and class approval.
-End fittings shall comply with pressure-temperature ratings of connected pipe classes.
-External mechanical protection is to be provided where hoses are exposed to mechanical damage.
-Usage in bilge or cargo oil systems requires material compatibility check and approval of the entire flexible joint configuration.

Others :

Overview Maximum allowable working pressure (M.A.W.P. in barg)[4]:

Pressures values with safety factor SF4 are applicable for service temperatures above -55°C whereas values in column SF 5 are applicable for service temperatures below – 55°C. For application at service temperatures above 20°C pressure reduction factors as specified in Senior Flexonics product catalogue "TUBOFLEX® Corrugated metal hoses" are to be observed.

DN	MW22 U1		MW22 U2		MW23 U1		DW72/32 U1[3]		DW72/32 U2[3]		MU 22 U1[1]	ZW22/23 U1[1,2]	ZW22/23 U2[1,2]
	SF4	SF5	SF4	SF5	SF4	SF5	SF 4	SF5	SF4	SF5	SF4	SF4	SF4
6	-	-	-	-	-	-	-	-	-	-	157	-	-
8	115	93	135	108	115	93	--	--	--	--	112	--	--
10	97	78	142	114	97	78	--	--	--	--	90	--	--
12	82	66	95	95	82	66	93	75	123	99	82	-	-
16	63	51			63	51	75	60	120	96	60	93	116
20	60	48			60	48	32	66	105	84	52	120	137
25	37	30			37	30	67	54	90	72	45	86	112
32	30	24			30	24	60	48	67	54	30	56	74
40	33	27			33	27	60	48	78	63	33	48	71
50	30	24			30	24	45	36	63	50	30	39	54
65	22	18			22	18	37	30	45	36		22	36
80	21	16			21	16	27	22	33	27		30	45
100	14	11			14	11	24	19	30	24		30	37
125	15	12			15	12	20	16	28	22			
150	17	13			17	13	20	16	28	22			
200	11	9			11	9	12	9	18	15			
250	6	4.5					8	6	14	11			
300	4,5	3.5					5	4	9	7			

Notes
1 Not approved for cryogenic application
2 Type ZW 23 DN16 to DN65, from DN80 Type ZW22
3 Type DW72 DN12 up to DN80, DN100 and above Type DW32
4 For M.A.W.P. for hose types ...00 refer to Senior Flexonics product catalogue "TUBOFLEX® Corrugated metal hoses" Referring the higher test pressure factor 1.5, the pressure values deviate to Senior Flexonics product catalogue "TUBOFLEX® Corrugated metal hoses"

Approval Conditions : Each hose assembly sall be permanently marked with the following minimum information, either by label, engraving or durable tag:
-Manufacturer's name or logo
-Hose type and nominal size
-Maximum allowable working pressure
-Date of manufacture or batch number
-Type approval reference (if available)

The marking shall remain legible and durable under operating conditions and shall allow full traceability for inspection and certification purposes.

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