Certificate no.:
TAK00002F8

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Synthetic Fibre Ropes

with type designation(s)
X2 Mooring Lines

issued to
Garware Technical Fibres Limited
Pune, Maharashtra, **India**

is found to comply with
DNV class programme DNV-CP-0100 – Type approval – Synthetic fibre ropes for towing, mooring and anchoring
OCIMF Mooring Equipment Guidelines (MEG4), Fourth Edition 2018 [test requirements]

Application:

Mooring and Towing of Ships and HSLCs.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Hamburg** on **2024-12-11**
This Certificate is valid until **2029-12-10**.
DNV local unit: **India CMC MES**

for **DNV**

Approval Engineer: **Gisle Hersvik**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

X2: 8-strand braided synthetic fibre rope

- Fibre material: Mixed polyolefin fibres
- Specific gravity: 0.91 (floats in seawater)

Compliance with OCIMF Mooring Equipment Guidelines (MEG4)

Mooring Line Base Design Certificate – For X2 28 mm and 112 mm
Ref No.: GTF/MLBDC/X2/24/E1 **Issue date**: 2024-10-15
Mooring Line Certificate will be issued with reference to Mooring Line Base Design Certificate.

Garware Technical Fibres Limited has performed the full test scenario as per OCIMF MEG4.

Rope Characteristics

The Rope characteristics are tabulated on the next page observing the following:

Fibre ropes are to be delivered with a linear mass ±5% of the nominal linear mass given in the table.

All BF (Break Force) values are given for the un-spliced ropes.
All LDBF (Line Design Break Force) values are given for the spliced ropes.

X2: 8-strand braided synthetic fibre ropes

Diameter [mm]	Line Linear Density (LLD) [kg/m]	Line Tenacity (LT) [T/kg/m]	BF -unspliced [ton]	LDBF -spliced [ton]
28	0.355	42.34	16.7	15.03
29	0.380	42.39	17.9	16.11
30	0.407	42.35	19.15	17.24
31	0.430	42.80	20.45	18.41
32	0.459	42.75	21.8	19.62
33	0.470	44.39	23.18	20.86
34	0.522	42.43	24.61	22.15
35	0.535	43.52	25.87	23.28
36	0.586	41.70	27.15	24.44
37	0.620	41.62	28.67	25.80
38	0.652	41.76	30.25	27.23
39	0.690	41.20	31.59	28.43
40	0.727	40.79	32.95	29.66
41	0.745	41.81	34.61	31.15
42	0.797	41.01	36.32	32.69
43	0.820	41.56	37.87	34.08
44	0.882	40.26	39.45	35.51
45	0.900	41.25	41.25	37.13
46	0.956	40.58	43.11	38.80
47	0.980	41.00	44.64	40.18
48	1.04	39.94	46.2	41.58
49	1.09	39.74	48.13	43.32
50	1.13	39.90	50.1	45.09
51	1.17	39.78	51.72	46.55
52	1.22	39.42	53.35	48.02
53	1.26	39.59	55.42	49.88
54	1.32	39.30	57.55	51.80
55	1.36	39.14	59.15	53.24
56	1.42	38.56	60.75	54.68
57	1.46	38.79	62.93	56.64
58	1.52	38.58	65.16	58.64
59	1.57	38.55	67.24	60.52
60	1.63	38.24	69.35	62.42
61	1.68	38.38	71.65	64.49
62	1.74	38.25	74	66.60
63	1.79	38.45	76.47	68.82
64	1.85	38.43	79	71.10
65	1.90	38.60	81.48	73.33
66	1.97	38.38	84	75.60
67	2.03	38.39	86.58	77.92
68	2.09	38.39	89.2	80.28
69	2.15	38.44	91.84	82.66
70	2.21	38.42	94.52	85.07
71	2.27	38.32	96.65	86.99
72	2.34	37.98	98.8	88.92
73	2.40	38.12	101.62	91.46

Diameter [mm]	Line Linear Density (LLD) [kg/m]	Line Tenacity (LT) [T/kg/m]	BF -unspliced [ton]	LDBF -spliced [ton]
74	2.46	38.25	104.5	94.05
75	2.53	38.16	107.28	96.55
76	2.61	37.98	110.1	99.09
77	2.67	38.09	113	101.70
78	2.75	37.96	116	104.40
79	2.82	37.85	118.6	106.74
80	2.90	37.64	121.3	109.17
81	3.00	37.30	124.33	111.90
82	3.04	37.74	127.4	114.66
83	3.15	37.29	130.5	117.45
84	3.20	37.66	133.7	120.33
85	3.27	37.67	136.88	123.19
86	3.36	37.48	140.1	126.09
87	3.43	37.49	142.89	128.60
88	3.51	37.37	145.7	131.13
89	3.58	37.47	149.05	134.15
90	3.67	37.41	152.45	137.21
91	3.76	37.30	155.85	140.27
92	3.82	37.49	159.3	143.37
93	3.93	37.28	162.78	146.50
94	4.00	37.42	166.3	149.67
95	4.08	37.43	169.68	152.71
96	4.16	37.41	173.1	155.79
97	4.25	37.42	176.7	159.03
98	4.34	37.41	180.38	162.34
99	4.42	37.48	184.07	165.66
100	4.52	37.41	187.8	169.02
101	4.60	37.47	191.5	172.35
102	4.70	37.41	195.4	175.86
103	4.79	37.41	199.08	179.17
104	4.89	37.37	202.9	182.61
105	4.98	37.36	206.7	186.03
106	5.08	37.37	210.8	189.72
107	5.17	37.38	214.73	193.26
108	5.27	37.37	218.8	196.92
109	5.36	37.41	222.78	200.50
110	5.47	37.37	227	204.30
111	5.56	37.33	230.6	207.54
112	5.67	37.24	234.5	211.05

The data in the table is provided by Garware Technical Fibres Limited.

Application/Limitation

The OCIMF MEG4 approval range covers ropes with diameter from 28 mm to and including 112 mm.

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**, and according to:

- OCIMF's Mooring Equipment Guidelines (MEG4) [requirements to testing].
- Manufacturer's Standard: GTF/X2/0114/56, QAD/D/26 Issue No. 1 of 2020-10-15.
- DNV-CP-0100.

The fibre ropes are manufactured in accordance with:

- Product Specification (X2), QAD/D/85 of 2024-09-25.

Marking of product

Product shall be marked with *manufacturer's name*: **Garware Technical Fibres Limited, India**, *type designation* and *diameter*.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Periodical assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-CP-0338.

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

END OF CERTIFICATE