TCN FENDER DATA SHEET

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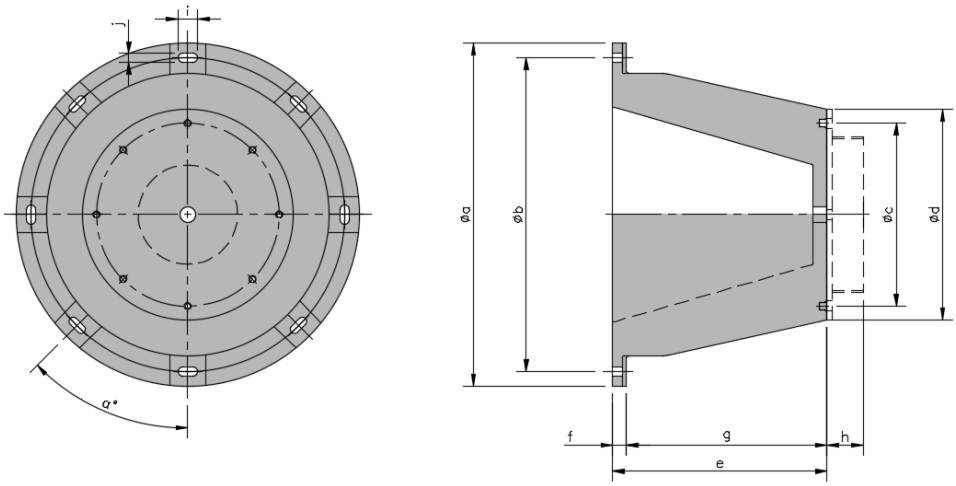
Rev.	Date	Description	Prepared by	Checked by	Approved by
0	06/03/2014	First Issue	BFA	DBL	GEB
1	30/03/2015	General Revision	BFA	DBL	GEB
2	19/06/2015	General Revision	BFA	DBL	GEB
3	24/06/2015	General Revision	BFA	DBL	GEB
4	09/09/2016	General Revision	IUM	DBL	GEB

1. TCN FENDERS

Features	Applications
High deformation capacity	All kind of berths (coastal, river, tidal and non-tidal)
Strong and durable design	All types of jetties (open pile, dolphins, monopiles, mass structures…)
Large frames can be installed	All types of ships (general cargo, bulk carrier, oil tanker, gas carrier, passenger…)

2. DIMENSIONS



Fender	a	b	c	d	e	f	g	h	i	j	α	Weight (kg)	NºAnchors/ Metric
TCN-300	520	450	245	295	300	20	280	51	50	26	90	33	4xM.20
TCN-400	670	585	340	393	400	28	372	68	64	32	90	78	4xM.24
TCN-500	820	730	425	491	500	35	465	85	64	32	90	172	4xM.24
TCN-600	960	875	515	589	600	50	550	102	90	40	90	335	4xM.30
TCN-700	1120	1020	600	685	700	55	645	119	90	40	90	378	4xM.30
TCN-800	1280	1165	685	785	800	55	745	136	90	45	60	590	6xM.30
TCN-900	1440	1313	770	885	900	55	845	153	90	45	60	896	6xM.36
TCN-1000	1600	1460	855	982	1000	70	930	170	90	45	60	1123	6xM.36
TCN-1100	1760	1605	940	1080	1100	70	1030	187	100	45	45	1525	8xM.36
TCN-1200	1920	1750	1025	1175	1200	70	1130	204	110	55	45	1889	8xM.42
TCN-1300	2080	1900	1100	1275	1300	70	1230	221	120	60	45	2354	8xM.48
TCN-1400	2240	2040	1195	1370	1400	70	1330	238	135	60	45	2855	8xM.48
TCN-1600	2560	2335	1365	1571	1600	75	1525	272	135	60	45	4438	8xM.48
TCN-1800	2880	2625	1525	1765	1800	80	1720	306	135	66	36	6117	10xM.56
TCN-2000	3200	2920	1710	1964	2000	120	1880	340	135	66	36	8787	10xM.56

All dimension in mm unless otherwise specified

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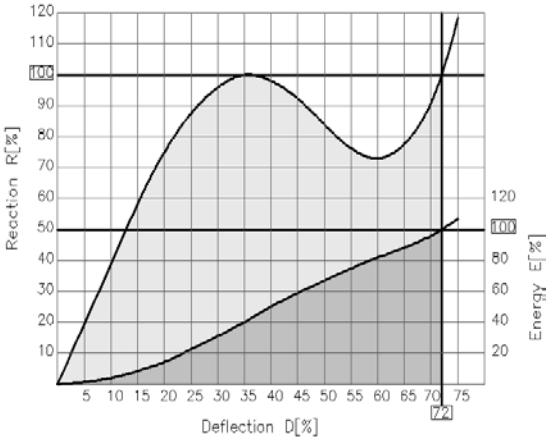
3. NOMINAL FENDER PERFORMANCE*

Fender		Grade A	Grade B	Grade C
TCN-300	R	104	86	64
	E	14.4	11.4	8.6
TCN-400	R	186	145	114
	E	34.6	27.6	20.5
TCN-500	R	286	226	186
	E	67.5	54	43
TCN-600	R	401	315	253
	E	121	90	71
TCN-700	R	570	452	356
	E	205	164	130
TCN-800	R	746	583	463
	E	311	245	192
TCN-900	R	936	746	586
	E	438	342	276
TCN-1000	R	1163	926	726
	E	604	471	375
TCN-1100	R	1413	1115	875
	E	806	635	500
TCN-1200	R	1683	1327	1046
	E	1052	825	650
TCN-1300	R	1979	1559	1226
	E	1336	1045	825
TCN-1400	R	2286	1801	1420
	E	1668	1305	1032
TCN-1600	R	2986	2356	1855
	E	2486	1956	1536
TCN-1800	R	3779	2990	2356
	E	3531	2775	2185
TCN-2000	R	4660	3682	2904
	E	4840	3802	2986

Also available other grades.



- **Temperature factor:**

Temperature (ºC)	TF
+50	0.90
+40	0.94
+30	0.97
+23	1
+10	1.05
0	1.09
-10	1.16
-20	1.25
-30	1.35

- **Angle factor:**

Angle (º)	AF
0	1
3	1.02
5	1.02
8	1.01
10	0.99
15	0.9
20	0.8

- **Velocity factor:**

Fender	Impact velocity (mm/s) 1	50	100	150	200	250	300
TCN-300	0.87	0.92	0.96	1	1.03	1.06	1.09
TCN-400	0.87	0.92	0.96	1	1.03	1.06	1.09
TCN-500	0.89	0.93	0.97	1	1.03	1.05	1.08
TCN-600	0.89	0.93	0.97	1	1.03	1.05	1.08
TCN-700	0.90	0.94	0.97	1	1.02	1.05	1.07
TCN-800	0.90	0.94	0.97	1	1.02	1.05	1.07
TCN-900	0.91	0.95	0.98	1	1.02	1.04	1.06
TCN-1000	0.91	0.95	0.98	1	1.02	1.04	1.06
TCN-1100	0.92	0.95	0.98	1	1.02	1.04	1.06
TCN-1200	0.92	0.95	0.98	1	1.02	1.04	1.06
TCN-1300	0.93	0.96	0.99	1	1.01	1.03	1.05
TCN-1400	0.93	0.96	0.99	1	1.01	1.03	1.05
TCN-1600	0.94	0.97	0.99	1	1.01	1.02	1.04
TCN-1800	0.94	0.97	0.99	1	1.01	1.02	1.04
TCN-2000	0.94	0.97	0.99	1	1.01	1.02	1.04

Intermediate grades											
A0	A1	A2	A3	B1	B1	B2	B3	C0	C1	C2	C3
17%	13%	8%	5%	17%	13%	8%	5%	17%	13%	8%	5%

Intermediate deflections																
D (%)	5	10	15	20	25	30	35	40	45	50	55	60	65	70	**72**	75
R (%)	19	39	59	75	87	96	100	98	92	84	76	73	77	91	**100**	118
E (%)	1	4	9	14	23	31	40	50	59	67	75	83	88	96	**100**	107

All dimension in mm, kN or kNm unless otherwise specified.
* (E) Energy [kNm] and (R) Reaction [kN] values according to PIANC 2002

4. ALLOWABLE STATIC WEIGHT

Although TCN fenders support a lot of static weight, if the frame weight exceeds the values of the following table shall be necessary to install lifting chains.

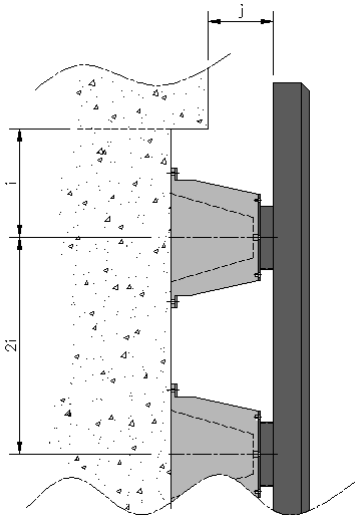
Fender		Grade				
		A	B	C	D	E
TCN-300	H	50	46	43	40	36
	V	63	59	56	53	46
TCN-400	H	117	109	101	94	86
	V	148	140	133	125	109
TCN-500	H	258	241	224	206	189
	V	327	310	392	275	241
TCN-600	H	503	469	436	402	369
	V	637	603	570	536	469
TCN-700	H	567	529	491	454	416
	V	718	680	643	605	529
TCN-800	H	885	826	767	708	649
	V	1121	1062	1003	944	826
TCN-900	H	1344	1254	1165	1075	986
	V	1702	1613	1523	1434	1254
TCN-1000	H	1685	1572	1460	1348	1235
	V	2134	2021	1909	1797	1572
TCN-1100	H	2288	2135	1983	1830	1678
	V	2898	2745	2593	2440	2135
TCN-1200	H	2834	2645	2456	2267	2078
	V	3589	3400	3211	3022	2645
TCN-1300	H	3531	3296	3060	2825	2589
	V	4473	4237	4002	3766	3296
TCN-1400	H	4283	3997	3712	3426	3141
	V	5425	5139	4854	4568	3997
TCN-1600	H	6657	5213	5769	5326	4882
	V	8432	7988	7545	7101	6213
TCN-1800	H	9176	8564	7952	7340	6729
	V	11622	11011	10399	9787	8564
TCN-2000	H	13181	12302	11423	10544	9666
	V	16695	15817	14938	14059	12302

All weight in kg unless otherwise specified.
(H) Single or multiple Horizontal. (V) Multiple Vertical

5. FENDER POSITIONING

Fender	i	j
TCN-300	330	240
TCN-400	440	320
TCN-500	550	400
TCN-600	660	480
TCN-700	770	560
TCN-800	880	640
TCN-900	990	720
TCN-1000	1100	800
TCN-1100	1210	880
TCN-1200	1320	960
TCN-1300	1430	1040
TCN-1400	1540	1120
TCN-1600	1760	1280
TCN-1800	1980	1440
TCN-2000	2200	1600

Distance i, is the minimum clearance that should be left on each side of the fender.
Distance j, is the minimum clearance that should be left between the frame and the cantilever of the jetty



6. TOLERANCES

Dimension	Tolerances
General dimensions	±3% or 2mm*
Distances between fixing centres	±4mm (Non-cumulative)
Flange thickness	±15mm
Diameters of the fixing points	±5mm
Energy performance	±10%
Reaction performance	±10%

* Whichever is the greater dimension.