



Physical Properties.

ShibataFender Team's rubber fender components are manufactured from the highest quality Natural Rubber (NR) and Styrene Butadiens (SBR) based compounds which meet or exceed the performance requirements of European Union specification EAU-E 62 "Acceptance Requirements for Fender Elastomers" and A STM D2000 " Standard Classification System for Rubber Products". Typical specifications are listed in the table on the following page.

In addition to NR and SBR, other rubber compounds like EPDM and Polyurethane are available on request for specialized applications and certain products. Please consult ShibataFender Team for further details.

SAFIM AS AGENT

RUBBER PROPERTIES

Property	Testing Standard	Condition	Requirement
Tensile Strength	JIS K6251 – Dumbbell No. 5; A STM D412 – Die C; ISO 37 – S1; BS 903, Part A2 – S1	Original	16 M Pa (min)
		Aged for 96 hours at 70° C	12.8 M Pa (min)
	DIN 53504	Original	15 M Pa (min)
		Aged for 168 hours at 70° C	12.75 M Pa (min)
Elongation at Break	JIS K6251 – Dumbbell No. 5	Original	350 % (min)
		Aged for 96 hours at 70° C	280 % (min)
	ASTM D412 – Die C; ISO 37 – S1; BS 903, Part A2 – S1	Original	400 % (min)
		Aged for 96 hours at 70° C	320 % (min)
	DIN 53504	Original	300 % (min)
		Aged for 168 hours at 70° C	280 % (min)
Hardness	JIS K6253 – Shore A	Original	72° (max)
		Aged for 96 hours at 70° C	Original Value + 8° points increase (max)
	ASTM D2240 – Shore A; ISO 7619 – Shore A; BS 903, Part A57 – Shore A	Original	78° (max)
		Aged for 96 hours at 70° C	Original Value + 6° points increase (max)
	DIN 53505 – Shore A	Original	75° (max)
		Aged for 168 hours at 70° C	Original Value + 5° points increase (max)
Compression Set	JIS K6262; A STM D395 – Method B; BS 903, Part A6; ISO 815	Aged for 22 hours at 70° C	30 % (max)
	DIN 53517	Aged for 24 hours at 70° C	40 % (max)
Tear Resistance	JIS K6252 – Crescent Type; ASTM D624 – Die B; BS 903, Part A3 – Method C; ISO 34-1 – Method C	Crescent Type	70 kN/m (min)
			DIN 53507
Ozone Resistance	JIS K6259; A STM D1149; ISO 1431-1; BS 903.A43; DIN53509	50 pphm at 20 % strain at 40° C for 100 hours	No cracking visible by eye
Seawater Resistance	ASTM D471; ISO 1817	28 days in artificial seawater at 95° C at ± 2° C	Hardness ± 10° (max) Volume + 10 / - 5 % (max)
Abrasion Resistance	BS 903, Part A9 – Method A;	1,000 revolutions	Volume Loss 0.5 cc (max)
	DIN 53516; ISO 4649 – Method A; ASTM D5963 – Method A	–	100 mm ³ (max)
Bond Strength Steel to Rubber	BS 903, Part A21; A STM D429 – Method B; ISO 813	–	7 N/mm (min)
Dynamic Fatigue*	ASTM D430-95 – Method B	15,000 cycles	Grade 0 - 1

* Dynamic fatigue testing is optional at extra cost.

The values above are based on tests, carried out under strict laboratory conditions using specimens taken from batches of unvulcanised rubber compound. All tests will be done on specially prepared samples as per applicable standard. The results of samples taken from finished product may differ.

TOLERANCES

All ShibataFender Team fenders are subject to standard manufacturing and performance tolerances. Smaller tolerances may be agreed if required for special applications.

Fender Type	Dimensional Tolerances	
Molded Fenders		
SPC, CSS, FE, V	Outside dimensions Bolt hole spacing	$\pm 3\%$ or $\pm 2\text{ mm}^*$ $\pm 2\text{ mm}$
Komposite Fenders	Cross-section Length	$\pm 3\%$ or $\pm 2\text{ mm}^*$ $\pm 2\%$ or $\pm 25\text{ mm}^*$
	Drilled hole centres Counterbore depth	$\pm 4\text{ mm}$ (non-cumulative) $\pm 4\text{ mm}$ (under-head depth)
M & W Fenders	Cross-section Length	$\pm 3\%$ or $\pm 2\text{ mm}^*$ $\pm 3\%$ or $\pm 20\text{ mm}^*$
	Fixing hole centres Fixing hole diameter	$\pm 3\text{ mm}$ $\pm 3\text{ mm}$
Cylindrical Fenders		
Cylindrical Fenders (wrapped)	Outside diameter Inside diameter Length	$\pm 4\%$ $\pm 4\%$ $- 0 / + 40\text{ mm}$
Extruded Fenders		
Extruded Fenders	Cross-section Length	$\pm 5\%$ $\pm 2\%$ or $\pm 10\text{ mm}^*$
	Drilled hole centres Counterbore depth	$\pm 4\text{ mm}$ (non-cumulative) $\pm 4\text{ mm}$ (under-head depth)
PE Sliding Plates and Fenders		
HD-PE Sliding Fenders **	Cross-section Length	$\pm 4\%$ $\pm 2\%$ or $\pm 20\text{ mm}^*$
	Drilled hole centres Counterbore depth	$\pm 4\text{ mm}$ (non-cumulative) $\pm 4\text{ mm}$ (under-head depth)
UHMW- PE Plates **	Length and width Thickness planed	$\pm 5\text{ mm}$ $\pm 0.3\text{ mm}$
	Thickness unplanned Drilled hole centres	$\pm 3\text{ mm}$ $\pm 2\text{ mm}$ (non-cumulative)
Fender Type	Performance Tolerances	
SPC, CSS, SX, SX-P, SH	Reaction, Energy	$\pm 10\%$ ***
Cylindricals (wrapped)	Reaction, Energy	$\pm 10\%$
Cylindricals (extruded)	Reaction, Energy	$\pm 20\%$
Extruded Fenders	Reaction, Energy	$\pm 20\%$
Pneumatic Fenders	Reaction, Energy	see p. 69 and p. 73
Foam Fenders	Reaction, Energy	$\pm 15\%$ ***

* Whichever is the greater dimension

** Any HD-PE and UHMW-P E tolerances (length, cross-section and machining) are strictly applicable to a material temperature of 18° C

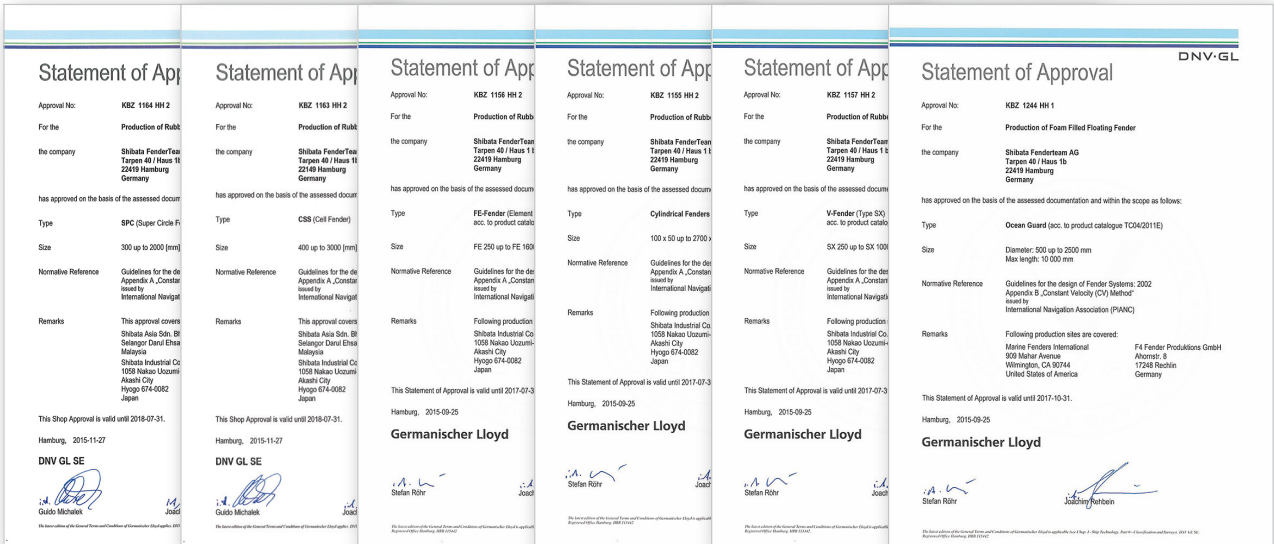
*** For special tolerances, please contact your local SFT office

Performance Tolerances apply to Rated Performance Data (RPD) only and not to energy and/or reaction at intermediate deflections | The nominal rated deflection when the RPD is achieved may vary and is provided as a guidance only | For detailed advice on fender types that are not listed above, please contact your local SFT office

QUALITY CERTIFICATES



- ▶ ISO 14001:2015 – Certified production facility (Shibata Industrial Co. Ltd.)
- ▶ ISO 9001:2015 – Certified supply chain (Shibata Industrial Co. Ltd.)
- ▶ ISO 9001:2008 – Certified supply chain (Shibata FenderTeam AG)
- ▶ EN 1090-2:2008+ A1:2011 – EXC3 Certified workshops (Shibata FenderTeam Produktions GmbH)



Type approval certificates according to P IANC 2002 for:

- ▶ SPC Cone Fenders
- ▶ CSS Cell Fenders
- ▶ FE Element Fenders
- ▶ Cylindrical Fenders
- ▶ V Fenders
- ▶ Ocean Guard Fenders