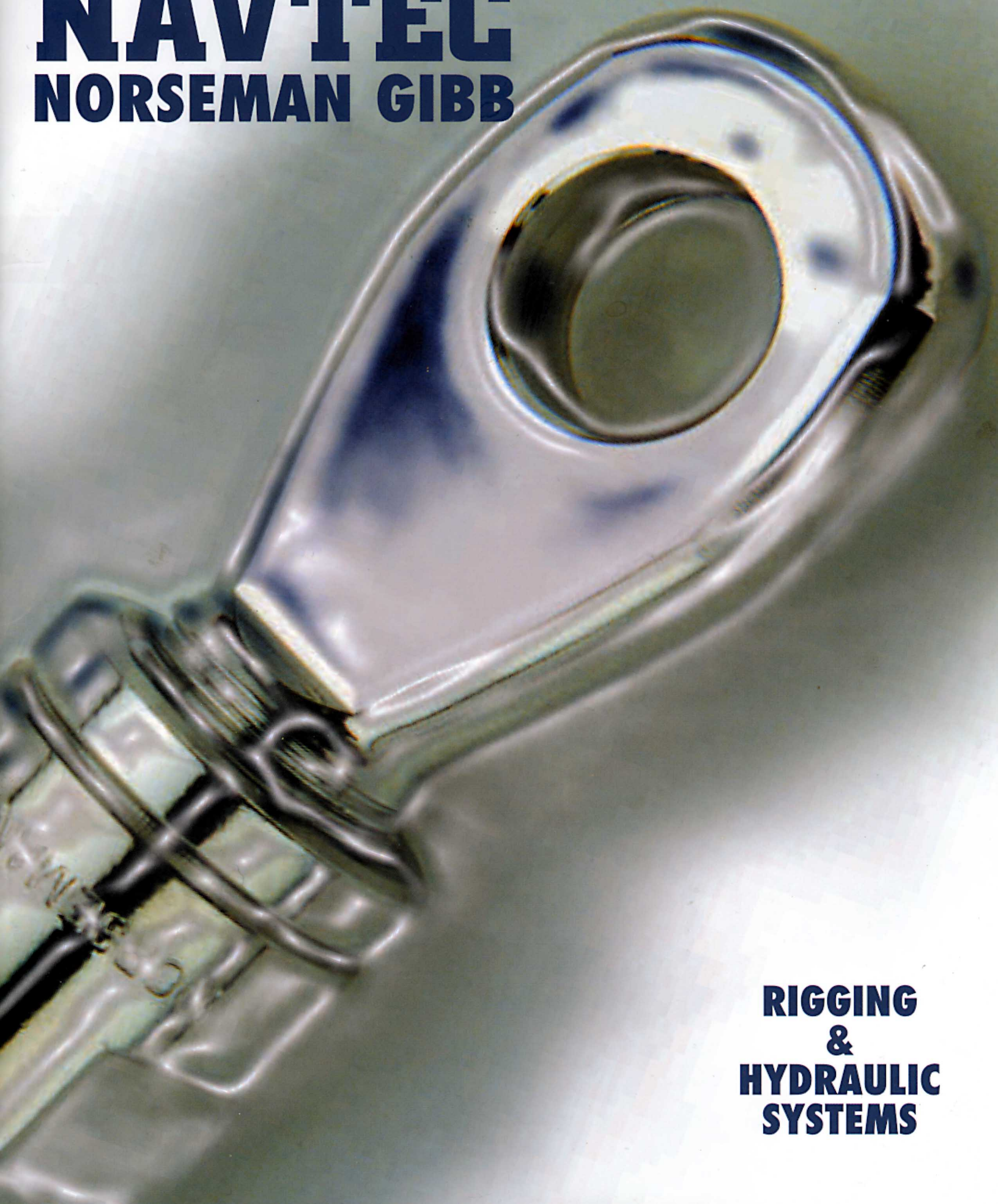


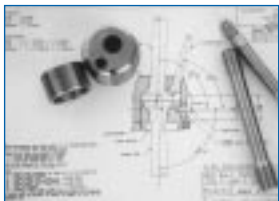
NAVTEC
NORSEMAN GIBB



**RIGGING
&
HYDRAULIC
SYSTEMS**

NAVTEC NORSEMAN GIBB

Navtec Norseman Gibb now designs, manufactures (ISO 9002 accredited) and distributes a wider range of rigging and hydraulic products than ever before. Manufacturing plants are located in both England and the US. With wholly owned distribution and service facilities located in England, France and the US, Navtec Norseman Gibb is well positioned to service all your rigging and hydraulic requirements.



DESIGN

Product development and design is based on extensive research and testing, customer feedback and our own experiences. The Engineering and Sales teams are comprised of active racing and cruising sailors with lengthy sailing resumes including several America's Cup

campaigns. Only after we satisfy ourselves do we introduce new products. No other rigging company is driven by sailors themselves.



PRODUCTION

The very latest in CNC machining equipment is installed in our production facilities. This offers both modern manufacturing efficiency and repeatable accuracy resulting in unequalled product quality.

Our Retford plant is also ISO 9002 accredited.



SERVICE

We recognise and value the importance of quality service. We have field staff, product manuals, technical data sheets and a WEB site all designed around after sales support. The WEB site contains FAQ's, owners manuals in .PDF file format for immediate download and sales & customer service hot links aimed at

efficiently answering common questions.

This comprehensive combination design, manufacturing and distribution enables us to provide "turn key" solutions for all your rigging and hydraulic system needs.



Our catalogs are printed on paper that is made from pulp, farmed for printing purposes and capable of being recycled.

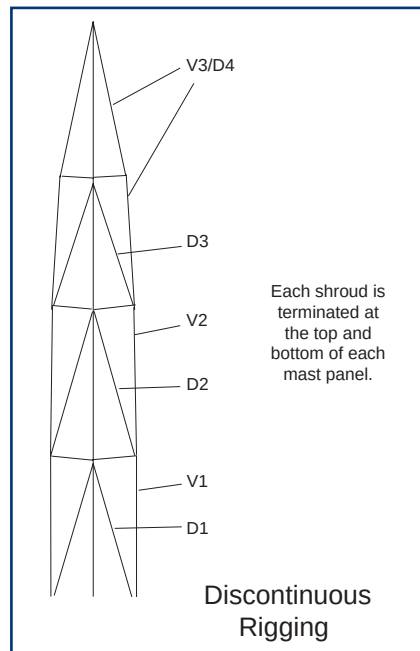
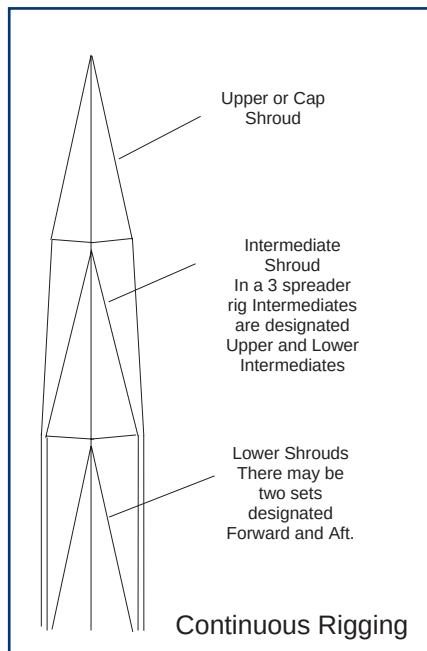
Paper in this catalog is manufactured by Chlorine Free method and is environmentally friendly.

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Product dimensions & specification detailed within this catalog may change without prior notification.

CONTINUOUS OR DISCONTINUOUS RIGGING



Navtec Norseman Gibb rigging systems are the marine industry standard for many yachts and manufacturers selecting wire rigging systems.

Navtec Discontinuous Rod Rigging is fitted to most Grand Prix Racing Yachts, many of the finest performance Superyachts and large cruising yachts, requiring low maintenance with long use under high load.

STRETCH IN WIRE ROPE

All wire ropes and strands stretch under load. The amount of stretch is determined by two components, permanent stretch and elastic stretch.

PERMANENT STRETCH is caused by settling of the wires in the rope or strand when the initial load is applied. DYFORM strand gives very little, if any, permanent stretch as this is removed during the manufacturing process.

ELASTIC STRETCH is typical of any metallic material under load and elastic stretch will be proportional to the applied load (Hookes Law). Resistance to stretch is determined by the "modulus of elasticity".

Rather than using Youngs Modulus for the material of the strand, we quote a **STRAND MODULUS**. Load extension data from an actual strand is used together with the nominal diameter of the strand to calculate the cable modulus. This gives a direct comparison between strand types.

ELASTIC STRETCH MAY BE CALCULATED FROM THE FORMULA:-

$$\text{Elastic stretch (mm)} = \frac{W \times L}{E \times A}$$

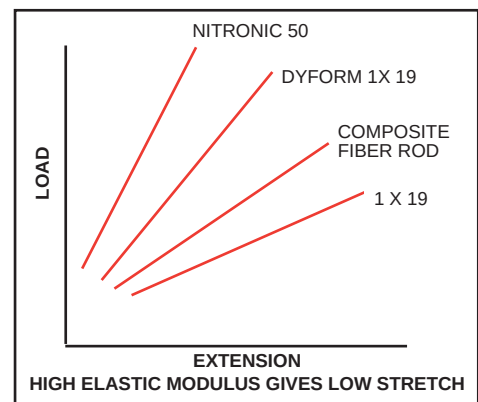
where W = Applied Load (KN) L = Wire Length (mm)
E = Strand modulus (KN/mm²)

$$A = \text{Cross sectional wire area} = \frac{D^2 \times \pi}{4}$$

where D = Nominal Diameter (mm)

Typical values for E are:

Conventional 1 x 19 Wire	107.5 KN/mm ²	15.59 x 10 ⁶ psi
Dyform 1 x 19 Wire	133.7 KN/mm ²	19.39 x 10 ⁶ psi
Nitronic 50 Rod Rigging	193.0 KN/mm ²	28.00 x 10 ⁶ psi
Pultruded Kevlar Rod	124.0 KN/mm ²	18.00 x 10 ⁶ psi



STAINLESS STEEL WIRE

MARINE STAINLESS STEEL WIRE

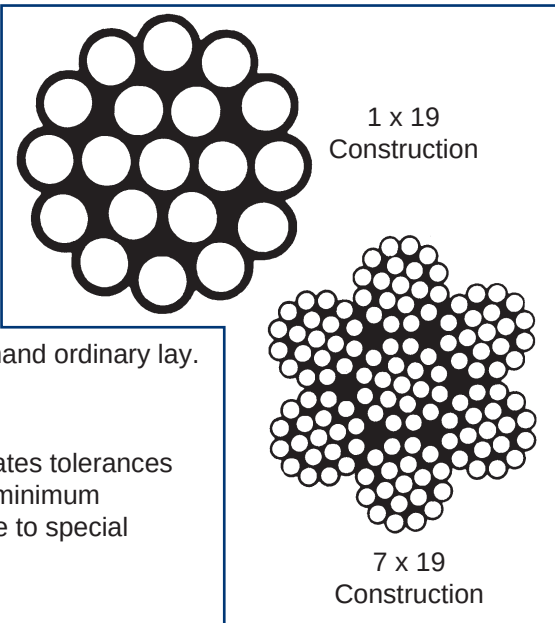
The high tensile steel wire used in strand and rope for yacht standing and running rigging is 316S31 material in the fully austenitic condition to give maximum corrosion resistance.

CONSTRUCTION

All strand and rope is of balanced design and will unlay and relay easily. 1 x 19 strands have a left hand lay finish to make for easier assembly of Norseman Swageless Terminals. 7 x 19 ropes are right hand ordinary lay.

SIZE AND STRENGTH

The dimensions and tensile grades conform to BS MA 29 which stipulates tolerances on nominal diameter and minimum tensile strength for wire sizes and minimum breaking force for strands and ropes. Sizes above 28mm are available to special order.



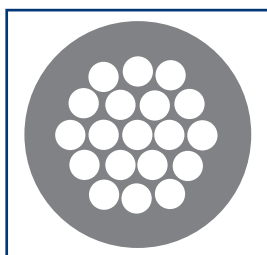
STANDING RIGGING 1 x 19							RUNNING RIGGING 7 x 19				
NOMINAL DIAMETER (mm) (in)	PART NO.	MINIMUM BREAKING LOAD (kg) (lb)		APPROXIMATE WEIGHT (kg/100m) (lb/100ft)			PART NO.	MINIMUM BREAKING LOAD (kg) (lb)		APPROXIMATE WEIGHT (kg/100m) (lb/100ft)	
2	S19-020	320	704	1.95	1.31		R19-020	226	499	1.53	1.03
2.5	S91-025	500	1100	3.05	2.05		R19-025	355	782	2.38	1.60
3	1/8 S19-030	720	1584	4.49	2.95		R19-030	510	1122	3.34	2.24
4	5/32 S19-040	1280	2816	7.81	5.25		R19-040	907	2134	5.94	3.99
	3/16 S19-047	1800	3960	10.60	7.12		R19-047	1285	2827	8.41	5.65
5	S19-050	2000	4400	12.20	8.20		R19-050	1420	3124	9.29	6.24
	7/32 S19-055	2470	5295	15.10	10.10		R19-055	1753	3857	11.50	7.73
6	S19-060	2880	6336	17.60	11.80		R19-060	2040	4488	13.40	9.00
	1/4 S19-063	3220	7084	19.40	13.00		R19-063	2287	5031	15.00	10.10
7	9/32 S19-070	3550	7810	23.90	16.10		R19-070	2780	6116	18.20	12.20
8	5/16 S19-080	4640	10208	31.20	20.90		R19-080	3630	7986	23.80	16.00
	3/8 S19-095	6580	14476	43.20	29.00		R19-095	5150	11330	33.70	22.60
10	S19-100	7250	15950	48.80	32.80		R19-100	5670	12474	37.20	25.00
	7/16 S19-110	8770	19294	59.10	39.70						
12	S19-120	10400	22880	70.30	47.20		R19-120	8160	17952	53.50	35.90
	1/2 S19-127	11650	25630	79.30	53.30		R19-127	9147	20123	59.90	40.20
14	9/16 S19-140	14180	31196	95.70	64.30		R19-140	11100	24420	72.80	48.90
16	5/8 S19-160	18560	40832	125.00	84.00		R19-160	13600	29988	99.00	66.53
19	3/4 S19-190	21620	47564	176.00	118.00						
*22	7/8 S19-220	29070	63954	236.00	158.00						
*26	1 S19-260	40600	89320	330.00	222.00						
*28	1 1/8 S37-280	52600	115720	383.00	257.38						
*30	1 3/16 S37-300	58800	129654	443.00	297.70	1 x 37					
*32	1 1/4 S37-320	62800	138474	500.00	336.00						

* Generally supplied not polished

Note: Cable breaking loads are shown British style and are MINIMUM breaking loads. American practice is to quote NOMINAL breaking load, which is subject to a 2 1/2 % underload tolerance, which consequently makes American break loads seem higher.

STAINLESS STEEL GUARDRAIL WIRE

Norseman guard rail wire is selected extensively for its high strength and resistance to wear. Constructed from 1 x 19 Stainless Steel, a hard coating of white PVC is applied to protect crew from abrasion.



Guardrail wire is complemented by a comprehensive selection of securing fittings to complete your system, detailed on page 23.

1 x 19 stainless steel strand covered with hard white PVC

PART NO.
P19-040-6mm
P19-050-7mm
P19-050-9mm

NOMINAL DIAMETER
4mm Covered 6mm
5mm Covered 7mm
5mm Covered 9mm

THE HIGH-TECH LOW STRETCH WIRE RIGGING FOR YACHTS & DINGHIES

DYFORM is the high performance wire strand which has a higher modulus of elasticity, offering the user less stretch and greater strength when compared with conventional wire of similar size.

Developed by Bridon Plc., the world's leading rope maker, it is backed by years of technical know-how and the famous Norseman name. This wire strand has always been in great demand and is an essential performance requirement on many racing craft and cruising yachts seeking higher performance and greater margins of safety.

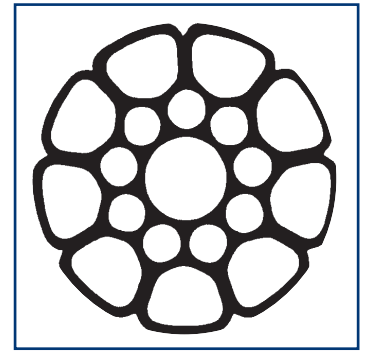
The cross section shows how the unique DYFORM process creates specially shaped wires which fill a greater proportion of the strand cross section. This means a high breaking load and more resistance to stretch (a higher modulus of elasticity).

With just a 7 wire construction this version has virtually no constructional stretch and very low elastic stretch. Comparison between a 3mm diameter 1 x 7 DYFORM and 3mm diameter 1 x 19 conventional strand with equivalent tensile loads, shows a difference in apparent elastic modulus:-

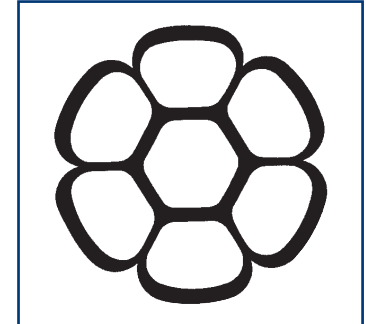
3mm 1 x 7 wire DYFORM	14.01 x 10 ³ KGmm ²
3mm 1 x 19 conventional	10.96 x 10 ³ KGmm ²

MANY KEELBOAT CLASSES USE DYFORM YACHT WIRE INCLUDING:

J24, HUNTER 707, MELGES 24, ETCHHELLS, CONTESSA 32, 49er, TORNADO, INT. 14, 505.



DYFORM 1 x 19 for Yachts



DYFORM 1 x 7 for Dinghies

DYFORM FEATURES

- * More than 30% increase in breaking strength.
- * Approved for use with conventional type swage and swageless fittings.
- * The ideal low stretch rigging for restricted design yachts which only permit 1 x 19 rigging.
- * Provides the corrosion resistance of marine grade 316S31 stainless steel.
- * Smoother surface gives lower aerodynamic drag.

DYFORM dinghy rigging is suitable for use with Swage type terminals. Talurit secured type terminations are not recommended.

DYFORM & CONVENTIONAL WIRE COMPARISON

NOMINAL DIAMETER (mm)	PART NO.	DYFORM 1 X 7				CONVENTIONAL 1 X 19	
		MINIMUM BREAKING LOAD (kg)	(lb)	APPROXIMATE WEIGHT (kg/100m)	(lb/100ft)	MINIMUM BREAKING LOAD (kg)	(lb)
2.5	D07-025	690	1518	3.40	2.28	500	1100
3	D07-030	1000	2200	4.90	3.28	720	1584
3.5	D07-035	1350	2970	6.70	4.49		
4	D07-040	1780	3916	8.80	5.91	1280	2816
NOMINAL DIAMETER (mm)	PART NO.	DYFORM 1 X 19				CONVENTIONAL 1 X 19	
		MINIMUM BREAKING LOAD (kg)	(lb)	APPROXIMATE WEIGHT (kg/100m)	(lb/100ft)	MINIMUM BREAKING LOAD (kg)	(lb)
5	D19-050	2440	5368	13.50	9.10	2000	4400
6	D19-060	3550	7810	19.40	13.00	2880	6336
7	D19-070	4910	10802	26.00	17.40	3550	7810
8	D19-080	6150	13530	34.50	23.20	4640	10208
10	D19-100	9770	21494	54.00	36.30	7250	15950
12	D19-120	14400	31746	80.70	54.20	10400	22880
*14	D25-140	19300	42460	115.00	77.30	14180	31196
*16	D25-160	25600	56320	147.00	98.80	18560	40832
#19	D31-190	32000	70400	206.60	138.00	21620	47576

* 14mm & 16mm Dyform are 1 x 25 Construction
19mm Dyform is 1 x 31 Construction

DYFORM is only available in Metric sizes (5mm=3/16).

DYFORM is a registered trade mark of Bridon Plc.

SOLID ROD

NITRONIC 50

This high strength, corrosion resistant rod is the industry standard, developed originally by Navtec. It is cold drawn in coil form up to -76 size to the required tensile strength levels.

For special requirements, larger size coils may be ordered. For shipping purposes Coils are 200 x Diameter. The elastic memory is not affected.

In sizes -76 and above, it is generally cold drawn in bar form to develop required tensile strength and is known as "Gamma" rod.

Navtec Nitronic 50 is used by cruising yachts of all sizes including many of the world's outstanding Superyachts. High performance race yachts, including America's Cup contenders and defenders select Navtec Rod.

Many of the fastest ocean catamarans and trimarans are also rigged with Navtec Rod Systems.

SIZE IDENTIFICATION

Solid Rod is quoted in DASH sizing.

This denotes Breaking Strength in 1000's of lbs.

Example:

-10 = 10,000lbs Breaking Strength.

STANDARD NAVTEC ROD SPECIFICATIONS

ROD SIZE	PART NUMBER	NOMINAL DIAMETER		MIN. BREAKING STRENGTH		WEIGHT	
		(in)	(mm)	(lbs)	(kg)	(lbs/ft)	(kg/m)
NITRONIC 50 COIL							
-4	R505-004	0.172	4.37	4700	2140	0.079	0.118
-6	R505-006	0.198	5.03	6300	2860	0.105	0.157
-8	R505-008	0.225	5.72	8200	3730	0.136	0.202
-10	R505-010	0.250	6.35	10300	4680	0.168	0.250
-12	R505-012	0.281	7.14	12500	5680	0.212	0.316
-15	R505-015	0.296	7.52	14250	6480	0.235	0.350
-17	R505-017	0.330	8.38	17500	7950	0.293	0.435
-22	R505-022	0.375	9.53	22500	10200	0.379	0.562
-30	R505-030	0.437	11.10	30000	13600	0.513	0.764
-40	R505-040	0.500	12.70	38000	17300	0.672	1.000
-48	R505-048	0.562	14.27	48000	21800	0.848	1.263
-60	R505-060	0.660	16.76	60000	27300	1.170	1.742
-76	R508-076	0.705	17.91	76000	34500	1.335	1.987
NITRONIC 50 BAR (GAMMA)							
-76	R508-P-076	0.705	17.91	76000	34500	1.335	1.987
-91	R508-P-091	0.768	19.51	90000	40900	1.584	2.36
-115	R508-P-115	0.875	22.23	115000	52300	2.06	3.06
-150	R508-P-150	1.000	25.40	150000	68200	2.69	4.00
-170	R508-P-170	1.066	27.08	170000	77300	3.05	4.54
-195	R508-P-195	1.125	28.58	190000	86400	3.40	5.06
-220	R508-P-220	1.191	30.25	217000	98600	3.81	5.67
-260	R508-P-260	1.313	33.35	260000	118000	4.63	6.89
-320	R508-P-320	1.500	38.10	320000	145000	6.04	9.00
-400	R508-P-400	1.750	44.45	400000	182000	8.23	12.25

1. Rod sizes up to -76 are available in coil form or straightened in any length.
2. Rod sizes -76 and up are available in lengths up to 36 feet.
3. Large sizes, especially -115 and above may be in stock in higher strengths than listed. Contact Navtec for details.

NAVTEC COMPOSITE FIBER ROD

Aramid rigging applications have been developed during the last few seasons and have been exhaustively tested on yachts from America's Cup yachts to International 14 racing dinghies.

Navtec Composite Fiber Rod offers significant weight savings and is primarily used for diagonals and verticals on performance applications to dramatically reduce weight aloft.

COMPOSITE FIBER ROD SPEC.

STRETCH EQUIV. N.50 ROD	KEVLAR ROD SIZE	KEVLAR DIAMETER		MIN. BREAKING STRENGTH		ROD WEIGHT	
		(in)	(mm)	(lbs)	(kg)	(lbs/ft)	(gm/m)
-4	-4	0.220	5.6	6462	2931	0.02	32
-6	-6	0.250	6.4	8345	3785	0.03	42
-10	-10	0.312	7.9	12997	5894	0.05	72
-12	-12	0.375	9.5	18776	8515	0.07	99
-17	-17	0.437	11.1	25498	11564	0.08	125
-22	-22	0.500	12.7	33379	15138	0.11	164
-30	-30	0.625	15.9	52155	23653	0.14	210
-40	-40	0.750	19.1	75104	34061	0.26	380
-48	-48	0.750	19.1	75104	34061	0.26	380
-60	-60	0.875	22.2	102224	46360	0.32	480
-76	-76	0.875	22.2	102224	46360	0.32	480
-91	-91	1.000	25.4	133518	60552	0.42	625

KEVLAR is a registered trade mark of Du Pont.

NAVTEC FIBER CABLE

ARAMID FIBERS - HIGH MODULUS POLYETHYLENE COVERED (HMPE)

Light and durable Navtec high modulus fiber cable can replace metallic rods or wire and is recommended for straight line applications. This cable comprises parallel laid high modulus fibers such as Kevlar 49® or Twaron 1055® which are held together and protected by a grey polyethylene sheath. The parallel construction is compact and uniform and the orientation of the fibers is in line with the working stress on the cable. This results in the optimum utilisation of the fiber properties and guarantees a very high modulus and a very low stretch cable. The polyethylene cover is highly resistant to physical abrasion as well as chemical and atmospheric attack. The cable which is flexible when off tension offers significant weight savings and is primarily used for backstays, running backstays and checkstays.



FITTINGS

A range of stainless steel fittings has been developed for terminal bodies and reducers. Standard end fittings are made from 316 stainless steel. Turn to page 46/47 for details. Titanium options are also available.

ARAMID FIBER CABLE SPECIFICATION

CABLE CODE	MINIMUM BREAKING STRENGTH		DIAMETER OVER SHEATH		CABLE WEIGHT		1 x 19 WEIGHT EQUIVALENT	
	(kg)	(lb)	(mm)	(in)	(g/m)	(lb/ft)	(g/m)	(lb/ft)
1.5T	1500	3300	6.0	0.24	28	0.019	78	0.052
3.0T	3000	6600	8.0	0.31	49	0.033	176	0.118
3.8T	3800	8360	8.5	0.33	55	0.037	194	0.130
5T	5000	11000	9.9	0.39	74	0.050	239	0.161
7T	7000	15400	12.0	0.47	109	0.073	312	0.210
9T	9000	19800	13.1	0.52	128	0.086	488	0.328
12T	12000	26400	15.0	0.59	168	0.113	703	0.472
15T	15000	33000	16.8	0.66	211	0.142	793	0.533
20T	20000	44000	19.1	0.75	271	0.182	957	0.643
25T	25000	55000	22.0	0.87	359	0.241	1250	0.840
31T	31000	68200	25.0	0.98	462	0.310	1760	1.183
43T	43000	94600	28.9	1.14	513	0.412	2360	1.586
54T	54000	118800	32.3	1.27	763	0.513	3300	2.218

Note: Only Navtec Fiber Cable using Navtec terminal bodies and cones will be covered by the standard Navtec warranty policy.

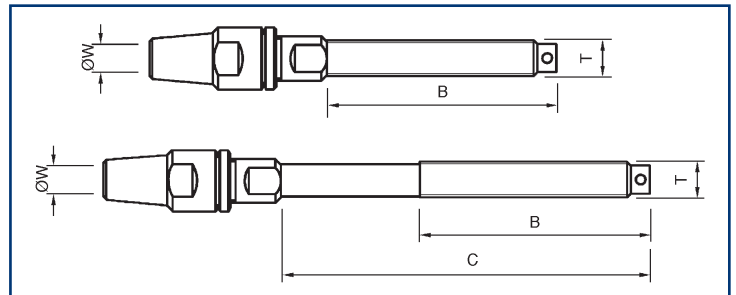
NORSEMAN SWAGELESS TERMINALS

Norseman Terminals provide a completely secure end fitting on good conventionally constructed strand, Dyform strand and rope for any one using ordinary tools and following the fitting instructions. They have an international reputation for quality, efficiency, versatility and safety.

They feature:

1. Accuracy is achieved first time when rigging, giving economy of labour and materials.
2. Inspection can be undertaken at any time simply by undoing the assembly.
3. In emergency, Norseman Terminals can be fitted at sea in minutes as they do not require power presses, correct temperature conditions or curing time.
4. Terminals can be reused but **MUST** have a new cone.

SWAGELESS STUD TERMINAL



SWAGELESS LONG STUD TERMINAL



The Norseman Terminal is made from 316 Stainless Steel.

The standard terminal can be used on 1 x 19 strand, 1 x 19 Dyform and 7 strand rope constructions, using the appropriate cone design.

Full technical information is available on request

All fitting supplied with 1 x 19 cones unless otherwise specified.

METRIC PART NO.	WIRE CONSTRUCTION		USA PART NO.
N30	1 x 19	Stud	N030 -
N31	7 Strand	Stud	N031 -
N32	DYFORM	Stud	N032 -

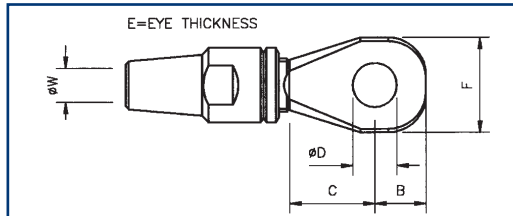
When ordering:-
Part No. followed by Size Ref.
To order long studs, add 'LONG' after Size Ref.
Our standard threads are RIGHT HAND.
For LEFT HAND add 'L' to the Part No., i.e., N30-060-1/2L.

SWAGELESS STUD TERMINAL

SIZE REF	WIRE Ø (mm)	THREAD Ø (UNF)	B (mm)	C (mm)
N30-025-1/4	2.5	1/4	42.0	
N30-030-1/4	3	1/4	42.0	
N30-040-5/16	4	5/16	48.0	
N30-050-5/16	5	5/16	48.0	77.0
N30-050-3/8	5	3/8	65.0	104.0
N30-060-7/16	6	7/16	75.0	120.0
N30-060-3/8	6	3/8	65.0	104.0
N30-060-1/2	6	1/2	83.0	133.0
N30-070-1/2	7	1/2	83.0	133.0
N30-080-1/2	8	1/2	83.0	133.0
N30-080-5/8	8	5/8	98.0	157.0
N30-100-5/8	10	5/8	98.0	157.0
N30-120-3/4	12	3/4	115.0	
N30-120-7/8	12	7/8	138.0	
N30-140-7/8	14	7/8	138.0	
N30-160-1	16	1	155.0	
N30-190-1 1/8	19	1 1/8	180.0	
N30-220-1 1/4	22	1 1/4	200.0	
N30-260-1 3/8	26	1 3/8	219.0	
USA - IMPERIAL DIMENSIONS				
	(ins)	(ins)	(ins)	(ins)
NO30-0308	3/32	1/4	1.654	
NO30-0408	1/8	1/4	1.654	
NO30-0510	5/32	5/16	1.890	
NO30-0610	3/16	5/16	1.890	3.031
NO30-0612	3/16	3/8	2.559	4.094
NO30-0714	7/32	3/8	2.559	4.094
NO30-0812	1/4	3/8	2.559	4.094
NO30-0814	1/4	7/16	2.953	4.724
NO30-0816	1/4	1/2	3.268	5.236
NO30-0916	9/32	1/2	3.268	5.236
NO30-1016	5/16	1/2	3.268	5.236
NO30-1020	5/16	5/8	3.858	6.181
NO30-1220	3/8	5/8	3.858	6.181
NO30-1424	7/16	3/4	4.528	
NO30-1624	1/2	3/4	4.528	
NO30-1628	1/2	7/8	5.433	
NO30-1828	9/16	7/8	5.433	
NO30-2032	5/8	1	6.102	
NO30-2436	3/4	1 1/8	7.087	
NO30-2840	7/8	1 1/4	7.874	
NO30-3244	1	1 3/8	8.622	

Metric Stud Threads available up to 10mm

SWAGELESS EYE TERMINAL



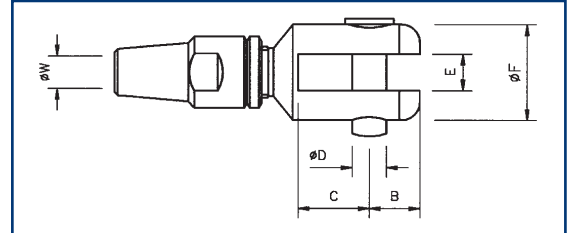
SWAGELESS EYE TERMINAL

SIZE REF	WIRE Ø (mm)	B (mm)	C (mm)	ØD (mm)	E (mm)	F (mm)
METRIC DIMENSIONS						
N10-025-1/4	2.5	7.0	11.0	6.5	5.5	13.0
N10-030-1/4	3	7.0	11.0	6.5	5.5	13.0
N10-040-5/16	4	8.2	16.0	8.1	6.7	16.0
N10-050-5/16	5	10.0	16.0	8.1	8.0	16.0
N10-050-3/8	5	10.0	18.0	9.7	8.0	19.0
N10-060-3/8	6	11.0	17.0	9.7	9.0	19.0
N10-060-7/16	6	12.5	19.0	11.3	9.5	23.0
N10-060-1/2	6	13.5	23.5	13.0	9.5	26.0
N10-070-1/2	7	13.5	23.0	13.0	10.8	27.0
N10-080-1/2	8	15.0	24.0	13.0	12.5	27.0
N10-080-5/8	8	18.0	28.0	16.0	12.5	33.0
N10-100-5/8	10	18.0	28.0	16.0	13.5	33.0
N10-120-3/4	12	21.0	39.0	19.2	18.0	40.0
N10-120-7/8	12	25.0	41.0	22.5	18.0	47.5
N10-140-7/8	14	25.0	41.0	22.5	21.0	47.5
N10-160-1	16	27.5	44.0	25.7	24.0	54.0
N10-190-11/8	19	30.0	50.0	29.0	25.7	57.0
N10-220-11/4	22	38.0	55.0	32.0	28.6	63.0
N10-260-13/8	26	42.0	61.0	35.5	31.3	69.0
USA DIMENSIONS						
NO10-0308	3/32	0.276	0.433	0.256	0.217	0.512
NO10-0408	1/8	0.276	0.433	0.256	0.217	0.512
NO10-0510	5/32	0.323	0.630	0.319	0.264	0.630
NO10-0612	3/16	0.394	0.709	0.382	0.315	0.748
NO10-0716	7/32	0.492	0.748	0.445	0.374	0.906
NO10-0816	1/4	0.531	0.925	0.512	0.374	1.024
NO10-0916	9/32	0.531	0.906	0.512	0.425	1.063
NO10-1016	5/16	0.591	0.945	0.512	0.492	1.063
NO10-1020	5/16	0.709	1.102	0.630	0.492	1.299
NO10-1220	3/8	0.709	1.102	0.630	0.531	1.299
NO10-1424	7/16	0.827	1.535	0.756	0.709	1.575
NO10-1624	1/2	0.827	1.535	0.756	0.709	1.575
NO10-1828	9/16	0.984	1.614	0.886	0.827	1.870
NO10-2032	1.870	1.732	1.012	0.945	2.126	6.890
NO10-2436	3/4	1.181	1.969	1.142	1.012	2.244
NO10-2840	7/8	1.496	2.165	1.260	1.126	2.480
NO10-3244	1	1.654	2.402	1.398	1.232	2.717

METRIC PART NO.	WIRE CONSTRUCTION		USA PART NO.
N10	1 x 19	Eye	N010 -
N11	7 Strand	Eye	N011 -
N12	DYFORM	Eye	N012 -

When ordering - Part No. followed by Size Ref.

SWAGELESS FORK TERMINAL



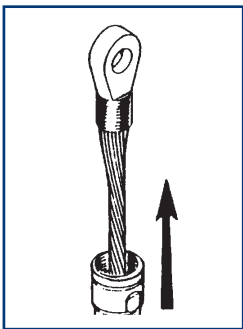
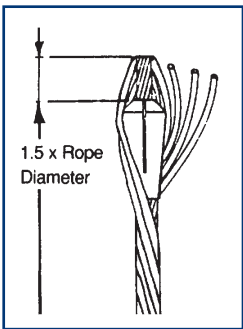
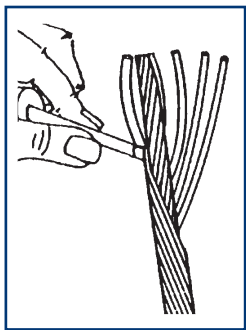
SWAGELESS FORK TERMINAL

SIZE REF	WIRE Ø (mm)	A (mm)	B (mm)	C (mm)	ØD (mm)	E (mm)
METRIC DIMENSIONS						
N20-025-1/4	2.5	8.0	13.0	6.3	6.3	14.0
N20-030-1/4	3	8.0	13.0	6.3	6.3	14.0
N20-040-5/16	4	10.0	16.0	7.9	7.9	19.0
N20-050-5/16	5	10.0	16.0	7.9	7.9	19.0
N20-050-3/8	5	12.0	19.0	9.5	9.5	22.0
N20-060-3/8	6	12.0	19.0	9.5	9.5	22.0
N20-060-7/16	6	14.0	22.0	11.1	11.1	28.5
N20-060-1/2	6	16.0	25.5	12.7	12.7	31.5
N20-070-1/2	7	16.0	25.5	12.7	12.7	31.5
N20-080-1/2	8	16.0	25.5	12.7	12.7	31.5
N20-080-5/8	8	20.0	32.0	15.8	15.8	38.0
N20-100-5/8	10	20.0	32.0	15.8	15.8	38.0
N20-120-3/4	12	24.0	38.0	19.0	19.0	47.5
N20-120-7/8	12	28.0	44.5	22.2	22.2	54.0
N20-140-7/8	14	28.0	44.5	22.2	22.2	54.0
N20-160-1	16	32.0	51.0	25.4	25.4	63.5
N20-190-11/8	19	36.0	57.0	28.5	28.5	70.0
N20-220-11/4	22	40.0	63.5	31.7	31.7	76.0
N20-260-13/8	26	44.0	70.0	35.0	35.0	82.5
USA - IMPERIAL DIMENSIONS						
NO20-0308	3/32	0.315	0.512	0.248	0.248	0.551
NO20-0408	1/8	0.315	0.512	0.248	0.248	0.551
NO20-0510	5/32	0.394	0.630	0.311	0.311	0.748
NO20-0610	3/16	0.394	0.630	0.311	0.311	0.748
NO20-0712	7/32	0.472	0.748	0.374	0.374	0.866
NO20-0812	1/4	0.472	0.748	0.374	0.374	0.866
NO20-0816	1/4	0.551	0.866	0.437	0.437	1.122
NO20-0916	9/32	0.630	1.004	0.500	0.500	1.240
NO20-1016	5/16	0.630	1.004	0.500	0.500	1.240
NO20-1020	5/16	0.787	1.260	0.622	0.622	1.496
NO20-1220	3/8	0.787	1.260	0.622	0.622	1.496
NO20-1424	7/16	0.945	1.496	0.748	0.748	1.870
NO20-1624	1/2	0.945	1.496	0.748	0.748	1.870
NO20-1828	9/16	1.102	1.752	0.874	0.874	2.126
NO20-2032	5/8	1.260	2.008	1.000	1.000	2.500
NO20-2436	3/4	1.417	2.244	1.122	1.122	2.756
NO20-2840	7/8	1.575	2.500	1.248	1.248	2.992
NO20-3244	1	1.732	2.756	1.378	1.378	3.248

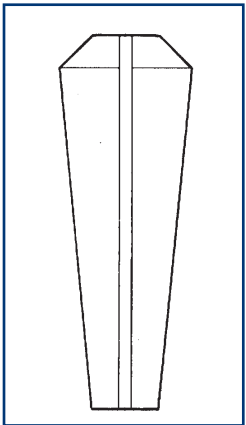
METRIC PART NO.	WIRE CONSTRUCTION		USA PART NO.
N20	1 x 19	Fork	N020 -
N21	7 Strand	Fork	N021 -
N22	DYFORM	Fork	N022 -

SWAGELESS FITTING METHOD

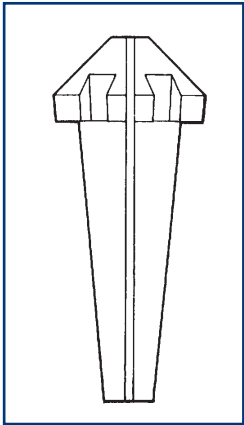
May be hand fitted without the use of special tools. Simply slip the body of the terminal over the full diameter of the cable. Unlay the outer wires and fit the cone over the centre core. Re-lay the outer wires. Ease the ends of the wires into the head of the fitting. Draw the body up to the head and screw together.



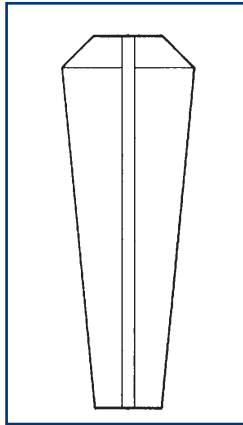
Note * One of the unfortunate characteristics of stainless steel threaded components is a slight risk of thread galling or seizing. On certain sizes of Norseman terminals the male thread has been coated with a special anti-friction compound, to eliminate the risk of thread galling or seizing. Care has been taken only to apply this coat to approximately half the threaded length, in order that there is sufficient uncoated steel for the recommended thread locking compound to take hold.



1 x 19



7 STRAND



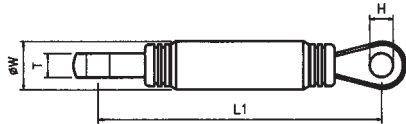
DYFORM

S - Self Colour
Y - Yellow
B - Blue
G - Green
R - Red
W - White

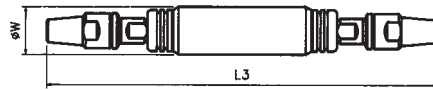
CONES						
PART NO.	SIZE		COLOUR			USA PART NO.
	(mm)	(in)	1 x 19	7 Strand	Dyform	
CC-025	2.5	3/32	B	Y	-	NCC-03
CC-030	3		S	R	-	
CC-032		1/8	G	Y	-	NCC-04
CC-040	4	5/32	S	R	-	NCC-05
CC-050	5	3/16	S	R	W	NCC-06
CC-055		7/32	B	Y	-	NCC-07
CC-060	6		S	R	W	
CC-063		1/4	G	Y	W	NCC-08
CC-070	7	9/32	S	R	W	NCC-09
CC-080	8	5/16	S	S	W	NCC-10
CC-090	9		B	Y	-	
CC-095		3/8	G	Y	W	NCC-12
CC-100	10		S	S	W	
CC-110	11	7/16	B	Y	W	NCC-14
CC-120	12		S	S	W	
CC-127		1/2	G	R	W	NCC-16
CC-140	14	9/16	S	S	W	NCC-18
CC-160	16	5/8	S	S	W	NCC-20
CC-190	19	3/4	S	S	W	NCC-24
CC-220	22	7/8	S	S	-	NCC-28
CC-260	26	1	S	S	-	NCC-32
CC-280	28		S	-	-	
CC-300	30		S	-	-	
CC-320	32		S	-	-	
CC - 1 x 19			CS - 7 Strand		CD - Dyform	

NORSEMAN AERIAL RIGGING INSULATORS

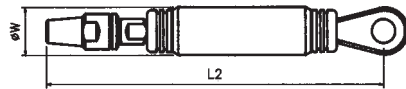
For converting high tensile yacht rigging into antennae for transmission and reception, Norseman Insulators provide a completely secure method of converting yacht backstays into aerials. They have been approved by Lloyd's for many years and the Norseman Insulator is recommended by leading marine electronic distributors. Insulators are manufactured from marine stainless steel to specification 316 Stainless Steel for the end fittings, an approved insulant, and anodised high strength aluminum. Fully tested in an approved environmental laboratory, electrical performance was found satisfactory after exposure to salt spray and to 95% relative humidity at 35°C for four periods of seven days.



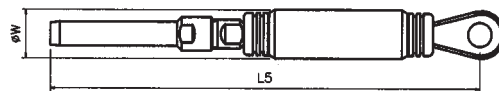
N50 Eye to Eye



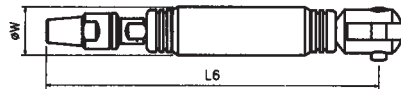
N53 Swageless Terminal to Terminal



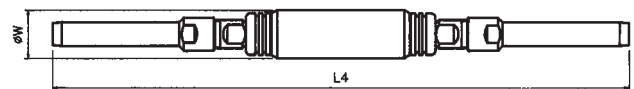
N51 Eye to Swageless Terminal



N54 Eye to Swage Terminal



N52 Fork to Swageless Terminal



N55 Swage to Swage

US Part Numbers have the prefix NI - for more details on US Part Numbers please see the price list.

INSULATORS

SIZE REF.	WIRE DIA.	H	T	W	N50 L1	N51 L2	N53 L3	N55 L4	N54 L5	N52 L6	BREAKING LOAD
METRIC DIMENSIONS											
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg)
-050	5	9.7	8.0	29.0	152	178	211	290	220	190	2440
-060	6	11.3	9.5	29.0	165	198	229	315	238	203	3550
-070	7	13.0	10.8	33.0	185	216	241	360	271	215	4910
-080	8	16.0	12.5	33.0	191	229	262	376	283	218	6150
-100	10	16.0	13.5	44.0	365	308	308	510	402	253	9770
-110	11	19.2	18.0	44.0	277	341	401	598	443	535	12100
-120	12	19.2	18.0	44.0	277	341	401	640	465	535	14400
-140	14	22.5	21.0	57.0	381	473	514	820	607	465	19300
-160	16	25.7	24.0	57.0	406	479	552	844	638	499	25600
-190	19	29.0	25.7	63.5	487	549	610	999	753	563	32000
USA - IMPERIAL DIMENSIONS											
	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(lb)
-06	3/16	0.382	0.315	1.142	5.984	7.008	8.307	11.417	8.661	7.480	5378
-07	7/32	0.512	0.315	1.142	5.984	7.008	8.307	11.417	8.661	7.480	5378
-08	1/4	0.512	0.374	1.142	6.496	7.795	9.016	12.402	9.370	7.972	7824
-09	9/32	0.512	0.394	1.338	7.283	8.504	9.488	14.173	10.669	8.445	10802
-10	5/16	0.512	0.492	1.299	7.520	9.016	10.315	14.803	11.142	8.563	13555
-12	3/8	0.640	0.531	1.732	14.370	12.126	12.126	20.079	15.827	9.961	21533
-14	7/16	0.640	0.709	1.732	10.906	13.425	15.787	23.543	17.441	21.063	26668
-16	1/2	0.758	0.709	1.732	10.906	13.425	15.787	25.197	18.307	21.063	31738
-18	9/16	0.758	0.827	2.244	15.000	18.622	20.236	32.283	23.898	18.307	42537
-20	5/8	0.886	0.945	2.244	15.984	18.858	21.732	33.228	25.118	19.646	56422
-24	3/4	1.013	1.012	2.500	19.173	21.614	24.016	39.331	29.646	22.165	70528

NOTE:-

Swageless Terminals can be used with 3 different types of cable - this is designated at the end of the part number as follows:-
-1 = 1 x 19 Strand; **-7** = 7 x 19 Rope; **D** = Dyform Strand, i.e. N51-060-1 = Eye/Swageless Insulator with 1 x 19 Cone

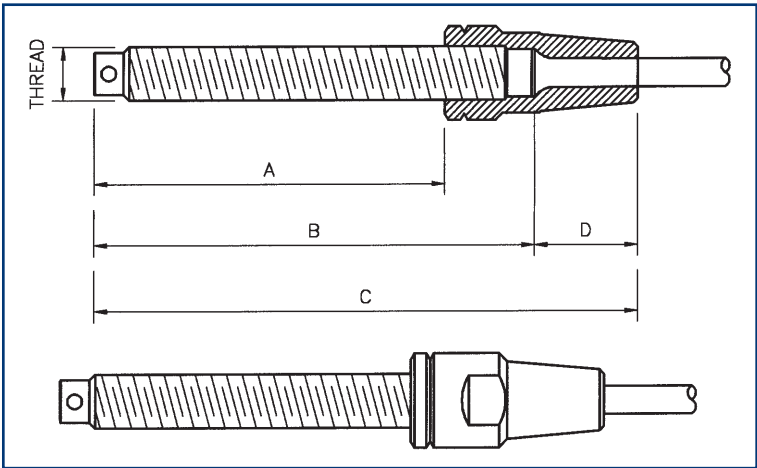
NORSEMAN ROD STUDS

NEW PRODUCT



These rod studs were developed to have the same distinguished styling as Norseman Swageless Terminals. Designed to be used with our 674 Turnbuckles (see page 18), they provide the most economical way to rig a boat with rod.

Available in sizes from -04 to -22.



NORSEMAN ROD STUD

METRIC DIMENSIONS

PART #	ROD Ø	THREAD	A	B	C	D	674 C/L PIN TO ROD SEAT			RIGGING SCREW WEIGHT
							OPEN	CLOSED	STROKE	
		(UNF)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(kg)
N90-004-3/8	-4	3/8	66	84	99	17	292	203	89	0.27
N90-006-7/16	-6	7/16	74	94	114	20	330	229	102	0.40
N90-008-7/16	-8	7/16	74	94	114	20	330	229	102	0.40
N90-008-1/2	-8	1/2	84	104	130	25	381	279	102	0.71
N90-010-1/2	-10	1/2	84	104	130	25	381	279	102	0.71
N90-012-1/2	-12	1/2	84	104	130	25	381	279	102	0.71
N90-012-5/8	-12	5/8	102	127	155	28	457	330	127	1.27
N90-017-5/8	-17	5/8	102	127	155	28	457	330	127	1.27
N90-022-3/4	-22	3/4	114	145	179	33	521	381	140	2.23

USA - IMPERIAL DIMENSIONS

PART #	ROD Ø	THREAD	A	B	C	D	N690 C/L PIN TO ROD SEAT			RIGGING SCREW WEIGHT
							OPEN	CLOSED	STROKE	
		(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(lb)
N090-0412	-4	3/8 - 24	2.6	3.3	3.9	.65	11.5	8	3.5	.59
N090-0614	-6	7/16-20	2.9	3.7	4.5	.80	13	9	4	.87
N090-0814	-8	7/16 - 20	2.9	3.7	4.5	.80	13	9	4	.87
N090-0816	08	1/2 - 20	3.3	4.1	5.1	1.00	15	11	4	1.57
N090-1016	-10	1/2 - 20	3.3	4.1	5.1	1.00	15	11	4	1.57
N090-1216	-12	1/2 - 20	3.3	4.1	5.1	1.00	15	11	4	1.57
N090-1220	-12	5/8 - 18	4.0	5.0	6.1	1.10	18	13	5	2.80
N090-1720	-17	5/8 - 18	4.0	5.0	6.1	1.10	18	13	5	2.80
N090-2224	-22	3/4 - 16	4.5	5.7	7.0	1.30	20.5	15	5.5	4.90

N090 screwed into an N674 = N690 Turnbuckle
See price sheet for listing of N690 Turnbuckle

WIRE & DYFORM RIGGING SYSTEMS

SWAGE TERMINALS

Swage terminals are principally used to terminate 1 x 19 stainless steel wire strand and Dyform. They may also be used on flexible wire ropes with a wire core. All swaging machines work by firmly squeezing the material of the terminal into the interstices of the wire. In the Wire Teknik roller swaging machine (detailed on page 29) the terminal is drawn through passive rollers. All types of machine can produce a swage as strong as the wire when adjusted and used correctly. Other acceptable methods of swaging include hydraulic presses with suitable die sets and rotary hammer swaging.

Gibb swage terminals are manufactured from 316 stainless steel. Lesser grades do not have sufficient corrosion resistance, particularly in tropical waters. Material hardness is controlled to ensure ease of swaging. Gibb swage terminal dimensions comply with the US military standard that has been used exclusively for many years in the USA, UK and Australia. All terminals are compatible with current UK and US practice as regards pin sizes and fork widths.

Gibb swage terminals are available in several different forms.

EYE TERMINALS are widely used to attach to most tangs and to rigging screw forks. The traditionally styled 546 eye terminals are machined from solid bar.

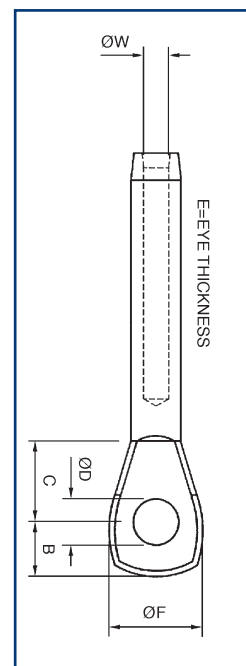
FORK TERMINALS are not as common, but are useful in split backstays, for example, or wherever a single link plate is fitted.

STUD TERMINALS are the most commonly used turnbuckle to wire connections.

TOGGLE FORK TERMINALS can be selected where the wire terminal is subjected to fluctuating side loads and fatigue, such as running backstays and lifelines.

We are pleased to quote for cable sizes outside the range detailed here.

EYE SWAGE TERMINAL						
PART#	WIRE Ø	B	C	Ø D	E	Ø F
	mm	mm	mm	mm	mm	mm
METRIC DIMENSIONS						
546-2.5-1/4	2.5	6.5	11.5	6.5	5.5	13.0
546-3-1/4	3	7.0	11.0	6.5	5.5	13.0
546-4-5/16	4	8.2	13.0	8.1	6.7	16.0
546-5-3/8	5	11.0	17.0	9.7	8.0	19.0
546-6-7/16	6	12.5	19.5	11.3	9.5	23.0
546-7-1/2	7	14.5	22.5	13.0	10.8	27.0
546-8-1/2	8	16.0	23.0	13.0	12.5	27.0
546-8-5/8	8	18.0	25.0	16.2	12.5	33.0
546-10-5/8	10	18.0	28.0	16.2	13.5	33.0
546-12-3/4	12	21.0	39.0	19.2	18.0	40.0
546-14-7/8	14	25.0	41.0	22.5	21.0	47.5
546-16-1	16	27.5	44.5	25.7	24.0	54.0
546-19-11/8	19	30.0	50.0	29.0	25.7	57.0
546-22-11/4	22	38.0	55.0	32.0	33.0	63.0
546-26-11/4	26	42.0	61.0	35.0	31.3	69.0
USA - IMPERIAL DIMENSIONS						
	ins	ins	ins	ins	ins	ins
N546-0308	3/32	0.256	0.453	0.256	0.217	0.512
N546-0408	1/8	0.256	0.453	0.256	0.217	0.512
N546-0510	5/32	0.323	0.512	0.319	0.264	0.630
N546-0612	3/16	0.394	0.669	0.382	0.315	0.748
N546-0716	7/32	0.492	0.768	0.445	0.374	0.906
N546-0816	1/4	0.531	0.945	0.512	0.374	1.024
N546-0916	9/32	0.571	0.886	0.512	0.425	1.063
N546-1016	5/16	0.630	0.906	0.512	0.492	1.063
N546-1020	5/16	0.709	0.984	0.638	0.492	1.299
N546-1220	3/8	0.709	1.102	0.638	0.531	1.299
N546-1424	7/16	0.827	1.535	0.756	0.709	1.575
N546-1624	1/2	0.827	1.535	0.756	0.709	1.575
N546-1828	9/16	0.984	1.614	0.886	0.827	1.870
N546-2032	5/8	1.083	1.752	1.012	0.945	2.126
N546-2436	3/4	1.181	1.969	1.142	1.012	2.244
N546-2840	7/8	1.496	2.165	1.300	1.126	2.480
N546-3244	1	1.654	2.402	1.378	1.232	2.717

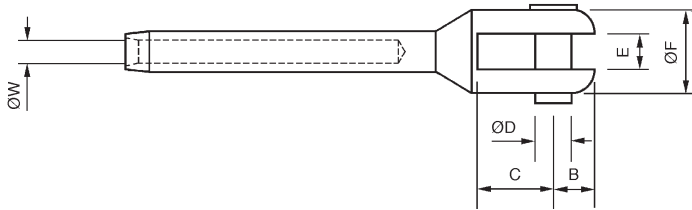


SWAGE TERMINALS



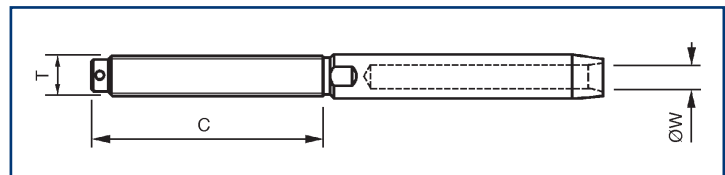
FORK SWAGE TERMINAL

PART#	WIRE Ø mm	B mm	C mm	ØD mm	E mm	ØF mm
METRIC DIMENSIONS						
547-2.5-1/4	2.5	8.0	13.0	6.3	6.3	14.0
547-3-1/4	3	8.0	13.0	6.3	6.3	14.0
547-4-5/16	4	10.0	16.0	7.9	7.9	19.0
547-5-3/8	5	12.0	19.0	9.5	9.5	22.0
547-6-7/16	6	14.0	22.0	11.1	11.1	28.5
547-7-1/2	7	16.0	25.5	12.7	12.7	31.5
547-8-1/2	8	16.0	25.5	12.7	12.7	31.5
547-8-5/8	8	20.0	32.0	15.8	15.8	37.8
547-10-5/8	10	20.0	32.0	15.8	15.8	37.8
547-12-3/4	12	24.0	38.0	19.0	19.0	47.3
547-14-7/8	14	28.0	44.5	22.2	22.2	54.0
547-16-1	16	32.0	51.0	25.4	25.4	63.3
547-19-11/8	19	36.0	57.0	28.5	28.5	69.6
547-22-11/4	22	40.0	63.5	31.7	31.7	76.0
547-26-13/8	26	44.0	70.0	35.0	35.0	82.5
USA - IMPERIAL DIMENSIONS						
	ins	ins	ins	ins	ins	ins
N547-0308	3/32	0.315	0.512	0.248	0.248	0.551
N547-0408	1/8	0.315	0.512	0.248	0.248	0.551
N547-0510	5/32	0.394	0.630	0.311	0.311	0.748
N547-0612	3/16	0.472	0.748	0.374	0.374	0.866
N547-0714	7/32	0.551	0.866	0.417	0.437	1.122
N547-0814	1/4	0.630	1.004	0.430	0.500	1.240
N547-0916	9/32	0.630	1.004	0.500	0.500	1.240
N547-1016	5/16	0.630	1.004	0.500	0.500	1.240
N547-1020	5/16	0.787	1.260	0.622	0.622	1.488
N547-1220	5/8	0.787	1.260	0.622	0.622	1.488
N547-1424	7/16	0.945	1.496	0.748	0.748	1.862
N547-1624	1/2	0.945	1.496	0.748	0.748	1.862
N547-1828	9/16	1.102	1.752	0.874	0.874	2.126
N547-2032	5/8	1.260	2.008	1.000	1.000	2.492
N547-2436	3/4	1.417	2.244	1.122	1.122	2.740
N547-2840	7/8	1.575	2.500	1.248	1.248	2.992
N547-3244	1	1.732	2.756	1.378	1.378	3.248



SWAGE STUD TERMINAL

PART#	WIRE Ø mm	THREAD UNF	C mm
METRIC DIMENSIONS			
555-030-1/4	3	1/4	41.0
555-040-5/16	4	5/16	51.0
555-050-5/16	5	5/16	51.0
555-050-3/8	5	3/8	65.0
555-060-3/8	6	3/8	65.0
555-060-7/16	6	7/16	72.0
555-070-7/16	7	7/16	72.0
555-070-1/2	7	1/2	80.0
555-080-1/2	8	1/2	80.0
555-080-5/8	8	5/8	95.0
555-100-5/8	10	5/8	95.0
555-120-3/4	12	3/4	110.0
555-140-7/8	14	7/8	138.0
555-160-1	16	1	155.0
555-190-1 1/8	19	1 1/8	176.0
555-220-1 1/4	22	1 1/4	206.0
555-260-1 3/8	26	1 3/8	219.0
USA - IMPERIAL DIMENSIONS			
	in	UNF	in
N555-0408	1/8	1/4	1.614
N555-0612	3/16	3/8	2.559
N555-0814	1/4	7/16	2.835
N555-0816	1/4	1/2	3.150
N555-0916	9/32	1/2	3.150
N555-1016	5/16	1/2	3.150
N555-1020	5/16	5/8	3.740
N555-1220	3/8	5/8	3.740
N555-1624	1/2	3/4	4.331
N555-1828	7/16	7/8	5.433
N555-2032	5/8	1	6.102
N555-2436	3/4	1 1/8	6.929
N555-2840	7/8	1 1/4	8.110
N555-3244	1	1 3/8	8.622

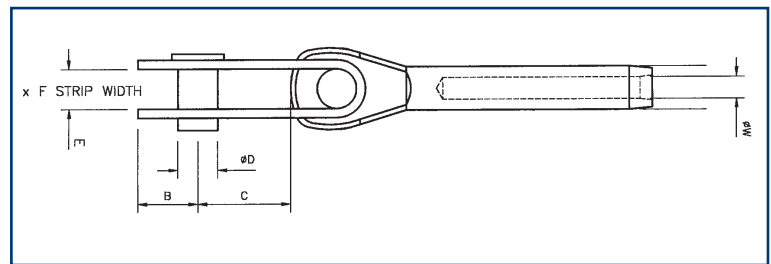


This list covers only part of our range. Larger sizes are available and we would be glad to quote for special lengths, thread specifications, etc. Order by cable dia. and thread dia. Our standard threads are RIGHT HAND. For LEFT HAND add 'L' to the part number, ie, 555 - 030 - 1/4L.

SWAGE TERMINALS

TOGGLE FORK SWAGE TERMINAL

PART NO.	WIRE Ø	B	C	ØD	E	F
METRIC DIMENSIONS						
	mm	mm	mm	mm	mm	mm
551-1/4-3	3	8.0	16	6.3	7.0	16.0
551-5/16-4	4	10.0	18	7.9	9.0	20.0
551-3/8-5	5	12.0	20	9.5	11.0	20.0
551-7/16-6	6	16.0	26	11.1	14.0	25.0
551-1/2-7	7	20.0	38	12.7	18.0	30.0
551-1/2-8	8	20.0	35	12.7	18.0	30.0
551-5/8-8	8	20.0	44	15.8	19.0	40.0
551-5/8-10	10	20.0	44	15.8	19.0	40.0
551-3/4-12	12	28.0	52	19.0	23.0	50.0
551-7/8-14	14	28.0	60	22.2	25.0	50.8
551-1-16	16	32.0	63	25.4	28.0	63.5
551-11/8-19	19	36.0	66	28.0	31.5	63.5
551-11/4-22	22	40.0	79	31.8	34.5	76.2
551-13/8-26	26	43.5	100	35.0	38.0	76.2
USA - IMPERIAL DIMENSIONS						
	ins	ins	ins	ins	ins	ins
N551-0308	3/32	0.315	0.630	0.248	0.276	0.630
N551-0408	1/8	0.315	0.630	0.248	0.276	0.630
N551-0510	2/31	0.394	0.709	0.311	0.354	0.787
N551-0612	3/16	0.472	0.787	0.374	0.433	0.787
N551-0712	7/32	0.500	1.024	0.437	0.551	0.984
N551-0816	1/4	0.787	1.496	0.500	0.709	1.181
N551-0916	9/32	0.787	1.496	0.500	0.709	1.181
N551-1016	5/16	0.787	1.378	0.500	0.709	1.181
N551-1020	5/16	0.787	1.732	0.622	0.748	1.575
N551-1220	3/8	0.787	1.732	0.622	0.748	1.575
N551-1424	7/16	1.102	2.047	0.748	0.906	1.969
N551-1624	1/2	1.102	2.047	0.748	0.906	1.969
N551-1828	9/16	1.102	2.362	0.874	0.984	2.000
N551-2032	5/8	1.260	2.480	1.000	1.102	2.500
N551-2436	3/4	1.417	2.598	1.102	1.240	2.500
N551-2840	7/8	1.575	3.110	1.252	1.358	3.000
N551-3244	1	1.713	3.937	1.378	1.496	3.000



SWAGE DIMENSIONS

Detailed below is a table of BEFORE and AFTER swage dimensions. This is an essential reference point to ensure that the correct dies have been used and that the swage has been completed successfully.

REFERENCE TABLE FOR SWAGE DIMENSIONS

WIRE DIA.		DIAMETER BEFORE SWAGING		DIAMETER AFTER SWAGING	
(mm)	(in)	(mm)	(in)	(mm)	(in)
2.5	3/32	5.53/5.41	0.218/0.213	4.82/4.70	0.190/0.185
3.0	1/8	6.35/6.22	0.250/0.245	5.56/5.44	0.219/0.214
4.0	5/32	7.54/7.42	0.297/0.292	6.35/6.23	0.250/0.245
5.0	3/16	9.12/9.00	0.359/0.354	7.95/7.83	0.313/0.308
5.5	7/32	10.84/10.72	0.427/0.422	9.50/9.35	0.375/0.368
6.0	1/4	12.54/12.42	0.494/0.489	11.12/10.95	0.438/0.431
7.0	9/32	14.30/14.18	0.563/0.558	12.70/12.50	0.500/0.492
8.0	5/16	16.13/16.01	0.635/0.630	14.30/14.07	0.563/0.554
9.0 - 10	3/8	17.85/17.73	0.703/0.698	15.90/15.70	0.625/0.618
11	7/16	19.84/19.71	0.781/0.776	17.47/17.27	0.688/0.680
12	1/2	21.44/21.32	0.844/0.839	19.05/18.82	0.750/0.741
14	9/16	25.00/24.88	0.984/0.979	22.23/22.00	0.875/0.866
16	5/8	28.17/28.05	1.109/1.104	25.40/25.15	1.000/0.990
19	3/4	34.52/34.40	1.359/1.354	31.75/31.44	1.250/1.238
22	7/8	40.46/40.21	1.593/1.583	36.50/36.20	1.437/1.425
26	1	46.02/45.77	1.812/1.802	41.28/40.97	1.625/1.613

NOTE: 3.5mm Wire uses 4mm Dies

MAST TERMINAL SYSTEMS

SHROUD TERMINAL 841

This shroud termination system has resulted from a long test program to determine the optimum design for a quick release terminal. It retains all the advantages of the conventional T terminal, while offering higher strength and markedly improved service life under heavy load conditions, ideal for use with Dyform rigging wire.

The redesigned backing plate provides improved articulation with the head of the terminal and also allows the reduction of the angle of the head which is the key to higher strength.

Only a circular hole is required in the mast.

The Gibb secondary bend is retained to ensure correct alignment of cable and terminal.

It is available for metric and imperial cable from 6mm (7/32") diameter and suitable for all forms of swaging equipment, or with the Norseman terminal version for fitting by hand. The use of the retaining plug is recommended to ensure accidental disengagement is not possible when shrouds are released, or in applications such as running backstays and babystays.

WIRE PLUG Ø	SWAGE PART NO.	SWAGELESS PART NO.	BACKING PLATE PART NO.	RETAINING PART NO.
METRIC DIMENSIONS				
6	841-6	N80-060	840-6	842-6
7	841-7	N80-070	840-7	842-8
8	841-8	N80-080	840-8	842-8
10	841-10	N80-100	840-10	842-10
12	841-12	N80-120	840-12	842-12
USA - IMPERIAL DIMENSIONS				
7/32	N841-07	N080-07	N840-07	N842-07
1/4	N841-08	N080-08	N840-07	N842-07
9/32	N841-09	N080-09	N840-09	N842-09
5/16	N841-10	N080-10	N840-10	N842-09
3/8	N841-12	N080-12	N840-12	N842-12
7/16	N841-14	N080-14	N840-14	N842-14
1/2	N841-16	N080-16	N840-14	N842-14



'T' BALL TERMINAL 741

The traditional T ball terminal, manufactured from quality 316 Stainless Steel with either swage or swageless fitting.

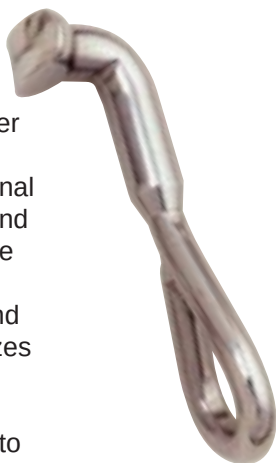


WIRE Ø	SWAGE PART NO.	SWAGELESS PART NO.	BACKING PLATE PART NO.	RETAINING PLUG PART NO.
METRIC DIMENSIONS				
2	741-2	-	740-3	742-3
2.5	741-2.5	N70-025	740-3	742-3
3	741-3	N70-030	740-3	742-3
4	741-4	N70-040	740-4	742-4
5	741-5	N70-050	740-5A	742-5A
6	741-6	N70-060	740-7	742-7
7	741-7	N70-070	740-7	742-7
8	741-8	N70-080	740-10	742-10
10	741-10	N70-100	740-10	742-10
USA - IMPERIAL DIMENSIONS				
3/32	N741-03	N070-03	N740-03	N742-03
1/8	N741-04	N070-04	N740-03	N742-03
5/32	N741-05	N070-05	N740-05	N742-05
3/16	N741-06	N070-06	N740-06	N742-06
7/32	N741-07	N070-07	N740-07	N742-07
1/4	N741-08	N070-08	N740-07	N742-07
9/32	N741-09	N070-09	N740-07	N742-07
5/16	N741-10	N070-10	N740-10	N742-10
3/8	N741-12	N070-12	N740-10	N742-10

T RINGS 743

T Rings are designed to allow advanced high performance fiber ropes to be connected to spars through a conventional T Terminal backing plate. Using T Rings and rope considerable weight can be saved for quick connection applications such as runners and backstays on yachts and trapezes on dinghies.

This product can be retro fitted to masts already fitted with T Terminal mast slots. There are 4 sizes covering every requirement from dinghy to 50' yacht.

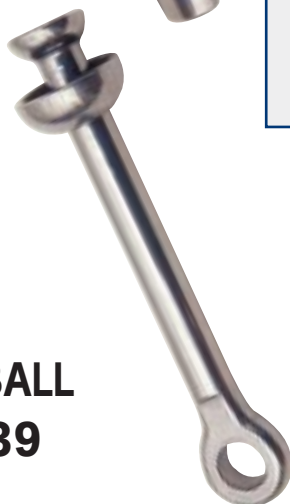


NEW PRODUCT

METRIC PART NO.	1 x 19 EQUIVALENT	BREAK LOAD	FITS BACKING PLATE #	USA PART #
743-3	3mm	720 kg	N740-03	N743-03
743-4	4mm	1280 kg	N740-05	N743-05
743-5	5mm	2000 kg	N740-06	N743-06
743-6	6mm	2880 kg	N740-07	N743-07

STEMBALL TERMINAL 641

For mast attachment, please see the Navtec K200 Tang detailed on page 34.

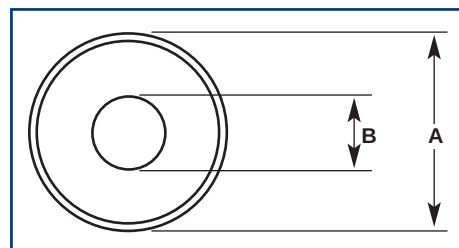


WIRE Ø	SWAGE PART NO.	SWAGELESS PART NO.	CUP PART NO.
METRIC DIMENSIONS			
3	641-3	N60-030	640-4
4	641-4	N60-040	640-4
5	641-5	N60-050	640-5
6	641-6	N60-060	640-7
7	641-7	N60-070	640-7
8	641-8	N60-080	640-12
10	641-10	N60-100	640-12
USA - IMPERIAL DIMENSIONS			
1/8	N641-04	N060-04	N640-04
5/32	N641-05	N060-05	N640-04
3/16	N641-06	N060-06	N640-06
7/32	N641-07	N060-07	N640-07
1/4	N641-08	N060-08	N640-08
9/32	N641-09	N060-09	N640-08
5/16	N641-10	N060-10	N640-10
3/8	N641-12	N060-12	N640-10

SWAGELESS STEMBALL TERMINAL N60



STEMBALL CUP 640



STEMBALL EYE 639

METRIC PART NO.	CUP Ø (mm)	PIN Ø (in)	USA PART NO.
639 - 26 - 3/8	26	3/8	N639-3212
639 - 26 - 7/16	26	7/16	N639-3214
639 - 26 - 1/2	26	1/2	N639-3216
639 - 34 - 1/2	34	1/2	N639-4416
639 - 34 - 5/8	34	5/8	N639-4420

METRIC PART NO.	A Ø (mm)	B Ø (mm)	USA PART NO.
640-4	26	9.00	N640-04
640-5	26	11.00	N640-06
640-6	26	13.25	N640-07
640-7	26	16.30	N640-08
640-12	34	20.00	N640-10

TURNBUCKLES FOR WIRE

TOGGLE - FORK 671

Fork and Toggle (open body) - chrome bronze body with 316 stainless steel fork and toggle. UNF threads.



CHROME BRONZE
BODY

671 - OPEN BODY TOGGLE - FORK TURNBUCKLE

PART NO	THREAD DIA U.N.F.	PIN DIA (mm)	METRIC DIMENSIONS				BREAKING LOAD (kg)
			LENGTH OPEN (mm)	LENGTH CLOSED (mm)	FORK GAP (mm)	FORK DEPTH * (mm)	
671-1/4	1/4	6.4	192	137	6.4	13.0	1500
671-5/16	5/16	7.9	228	165	7.9	16.0	2272
671-3/8	3/8	9.5	297	205	9.5	19.0	3727
671-7/16	7/16	11.1	339	233	11.1	22.0	4955
671-1/2	1/2	12.7	381	269	12.7	25.5	6675
671-5/8	5/8	15.8	467	336	15.8	32.0	10682
671-3/4	3/4	19.0	498	356	19.0	38.0	16590
671-7/8	7/8	22.2	641	461	22.0	44.5	20265
671-1	1	25.4	770	545	25.4	51.0	26880
671-1 1/8	1 1/8	28.5	862	635	28.5	57.0	33600
671-1 1/4	1 1/4	31.7	980	712	31.7	63.5	38100
671-1 3/8	1 3/8	35.0	1096	794	35.0	70.0	45360
	U.N.F.	(in)	USA - IMPERIAL DIMENSIONS				(lb)
			(in)	(in)	(in)	(in)	
N671-080808	0.250	0.252	7.559	5.394	0.252	0.512	3307
N671-101010	0.313	0.311	8.976	6.496	0.311	0.630	5009
N671-121212	0.375	0.374	11.693	8.071	0.374	0.748	8217
N671-141414	0.438	0.437	13.346	9.173	0.437	1.004	10923
N671-161616	0.500	0.500	15.000	10.591	0.500	1.004	14716
N671-202020	0.625	0.622	18.386	13.228	0.622	1.260	23551
N671-242424	0.750	0.748	19.606	14.016	0.748	1.752	36576
N671-282828	0.875	0.874	25.236	18.150	0.866	1.752	44679
N671-323232	1.000	1.000	30.315	21.457	1.000	2.008	59262
N671-363636	1.125	1.122	33.937	25.000	1.122	2.244	74077
N671-404040	1.250	1.248	38.583	28.031	1.248	2.500	84000
N671-444444	1.375	1.378	43.150	31.260	1.378	2.765	100004

NOTE * Measured pin center to bottom of fork

TOGGLE - SWAGE 673

Swage and Toggle (open body) - chrome bronze body with 316S31 stainless steel toggle and swage ends. UNF threads.



**CHROME BRONZE
BODY**

673 - OPEN BODY TOGGLE - SWAGE TURNBUCKLE

PART NO	WIRE Ø (mm)	THREAD DIA U.N.F.	PIN DIA (mm)	TOGGLE GAP (mm)	TOGGLE DEPTH * (mm)	LENGTH OPEN ** (mm)	LENGTH CLOSED ** (mm)	BREAKING LOAD (kg)
METRIC DIMENSIONS								
673 - 1/4 - 3	3	1/4	6.4	7.00	16	182	126	1500
673 - 5/16 - 4	4	5/16	7.9	9.00	18	218	154	2272
673 - 5/16 - 5	5	5/16	7.93	9.00	18	285	192	2272
673 - 3/8 - 5	5	3/8	9.52	11.00	20	285	192	3727
673 - 3/8 - 6	6	3/8	9.52	11.00	20	324	222	3727
673 - 7/16 - 6	6	7/16	11.11	14.00	26	324	222	4955
673 - 7/16 - 7	7	7/16	11.11	14.00	26	347	245	4955
673 - 1/2 - 7	7	1/2	12.70	18.00	38	355	253	6675
673 - 1/2 - 8	8	1/2	12.70	18.00	35	382	271	6675
673 - 5/8 - 8	8	5/8	15.87	19.00	44	457	325	10682
673 - 5/8 - 10	10	5/8	15.87	19.00	44	457	325	10682
673 - 3/4 - 12	12	3/4	19.05	23.00	52	530	384	16590
673 - 7/8 - 14	14	7/8	22.22	25.00	60	650	460	20265
673 - 1 - 16	16	1	25.40	28.00	63	753	525	26880
673 - 1 1/8 - 19	19	1 1/8	28.57	31.50	66	842	613	33600
673 - 1 1/4 - 22	22	1 1/4	31.75	34.50	79	957	689	38100
673 - 1 3/8 - 26	26	1 3/8	35.00	38.00	100	1070	766	45360
USA - IMPERIAL DIMENSIONS								
	(in)	U.N.F.	(in)	(in)	(in)	(in)	(in)	(lb)
N673-040808	1/8	1/4	0.252	0.276	0.630	7.165	4.961	3307
N673-051010	5/32	5/16	0.311	0.354	0.709	8.583	6.063	5009
N673-061212	3/16	3/8	0.374	0.433	0.787	11.220	7.559	8217
N673-071212	7/32	3/8	0.374	0.433	0.787	11.220	7.559	5009
N673-071414	7/32	7/16	0.437	0.551	1.024	12.756	8.740	8217
N673-081414	1/4	7/16	0.437	0.551	1.024	12.756	8.740	8217
N673-081616	1/4	1/2	0.500	0.709	1.496	13.976	9.961	10923
N673-091616	9/32	1/2	0.500	0.709	1.496	13.976	9.961	8217
N673-101616	5/16	1/2	0.500	0.709	1.378	15.039	10.669	10923
N673-102020	5/16	5/8	0.622	0.748	1.732	17.992	12.795	10923
N673-122020	3/8	5/8	0.622	0.748	1.732	17.992	12.795	14716
N673-142424	7/16	3/4	0.748	0.906	2.047	20.866	15.118	10923
N673-162424	1/2	3/4	0.748	0.906	2.047	20.866	15.118	14716
N673-182828	9/16	7/8	0.875	0.984	2.362	25.591	18.110	14716
N673-203232	5/8	1	1.000	1.102	2.480	29.646	20.669	23551
N673-243636	3/4	1 1/8	1.122	1.240	2.598	33.150	24.134	23551
N673-284040	7/8	1 1/4	1.248	1.358	3.110	37.677	27.126	23551
N673-324444	1	1 3/8	1.378	1.496	3.937	42.126	30.157	23551
NOTE	*	Measured pin centre to bottom of toggle						
	**	Measured from wire cut end (bottom of swage hole) to pin centre						

TOGGLE - BLANK 674

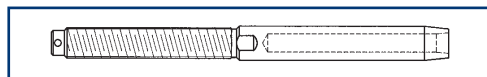
Blank and Toggle (open body) - chrome bronze body with 316 stainless toggle ends. Available in 1/4 to 1 3/8 UNF thread sizes*. Order by catalogue number and thread size, together with any EXTRA OPTIONS required.

**CHROME BRONZE
BODY**

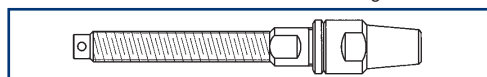


EXTRA OPTIONS

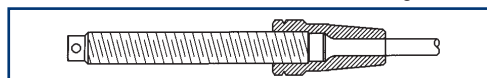
SWAGE STUD Page 12



NORSEMAN STUD Page 6



NORSEMAN ROD STUD Page 10



FORK - BLANK 676

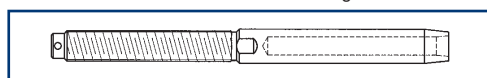
Blank and Fork (open body) - chrome bronze body. 316 stainless fork end. Available in 1/4 to 1 3/8 UNF thread sizes*. Order by catalogue number and thread size, together with any EXTRA OPTIONS required.

**CHROME BRONZE
BODY**

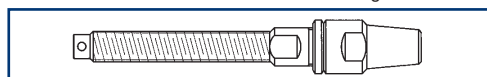


EXTRA OPTIONS

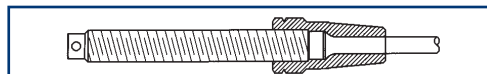
SWAGE STUD Page 12



NORSEMAN STUD Page 6



NORSEMAN ROD STUD Page 10



STEMBALL - BLANK 677

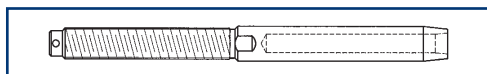
Stemball and Blank (open body) - chrome bronze body and stainless steel ends. Available in 1/4 to 7/8 UNF thread sizes*. Order by catalogue number and thread size, together with any EXTRA OPTIONS required.

**CHROME BRONZE
BODY**

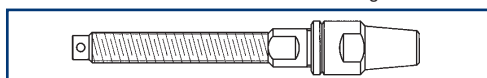


EXTRA OPTIONS

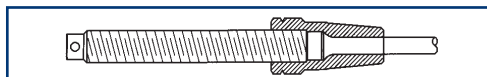
SWAGE STUD Page 12



NORSEMAN STUD Page 6



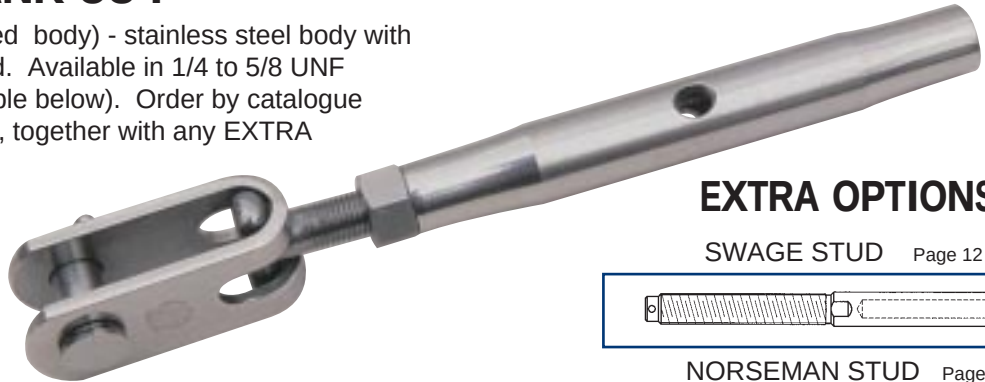
NORSEMAN ROD STUD Page 10



TOGGLE - BLANK 534

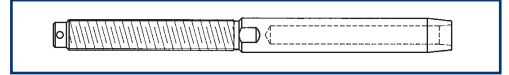
Blank and Toggle (closed body) - stainless steel body with 316 stainless toggle end. Available in 1/4 to 5/8 UNF thread sizes (refer to table below). Order by catalogue number and thread size, together with any EXTRA OPTIONS required.

STAINLESS STEEL
BODY

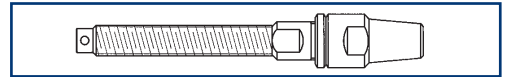


EXTRA OPTIONS

SWAGE STUD Page 12



NORSEMAN STUD Page 6



TOGGLE - FORK 535

Fork and Toggle (closed body) - 316 stainless steel rigging screw.

STAINLESS STEEL
BODY

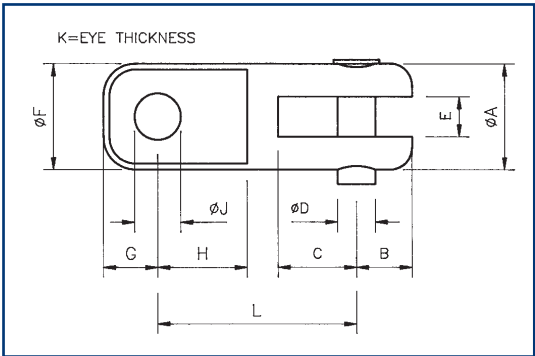


535 CLOSED BODY FORK - TOGGLE TURNBUCKLE

PART NO	THREAD Ø	PIN Ø	OPEN LENGTH	CLOSED LENGTH	FORK GAP	FORK DEPTH	BREAKING STRENGTH
METRIC DIMENSIONS							
	UNF	(mm)	(mm)	(mm)	(mm)	(mm)	(kg)
535-1/4	1/4	6.3	193	141	6.4	13.0	1016
535-5/16	5/16	7.9	219	162	7.9	16.0	2030
535-3/8	3/8	9.5	280	202	9.5	19.0	3090
535-1/2	1/2	12.7	365	265	12.7	25.5	6675
535-5/8	5/8	15.9	473	352	15.8	32.0	10160
USA - IMPERIAL DIMENSIONS							
	UNF	(in)	(in)	(in)	(in)	(in)	(lb)
N535-080808	1/4	0.248	7.598	5.551	0.248	0.512	2239
N535-101010	5/16	0.311	8.622	6.378	0.315	0.630	4476
N535-121212	3/8	0.374	11.024	7.953	0.386	1.004	4476
N535-161616	1/2	0.500	14.370	10.433	0.500	1.004	6812
N535-202020	5/8	0.626	18.622	13.858	0.622	1.260	14716

TOGGLES

Toggles are used particularly with fork ended rigging screws to permit full articulation at the end of a stay. This reduces the chance of fatigue failure or damage due to sideways impact. Toggle action is desirable at all stay ends, but is essential at both ends of sail carrying forestays. Toggles are also used at both ends of jib furling gears, and can be useful in lengthening a too short stay at the least expense.

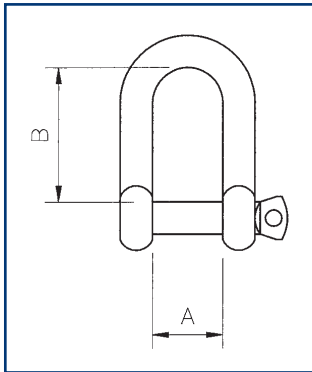


EYE - JAW TOGGLE											
METRIC DIMENSIONS (mm)											
SIZE REF	ØA	B	C	ØD	E	ØF	G	H	ØJ	K	L
EJ - 1/4	14.00	8.00	13.00	6.50	6.30	13.00	7.00	11.00	6.50	5.50	26.00
EJ - 5/16	19.00	10.00	16.00	7.90	7.90	16.00	8.30	13.00	8.10	6.70	34.00
EJ - 3/8	22.00	12.00	19.00	9.50	9.50	19.00	11.00	17.00	9.70	9.00	39.00
EJ - 7/16	28.50	14.00	22.00	11.11	11.10	23.00	12.50	19.50	11.30	9.50	47.00
EJ - 1/2	31.50	16.00	25.50	12.70	12.70	27.00	15.00	24.00	13.00	12.50	54.00
EJ - 5/8	37.80	20.00	32.00	15.80	15.80	33.00	18.00	28.00	16.20	13.50	64.00
EJ - 3/4	47.30	24.00	38.00	19.00	19.00	42.00	21.00	39.00	19.20	18.00	83.00
EJ - 7/8	54.00	28.00	44.50	22.20	22.20	47.50	25.00	41.00	22.50	21.00	96.00
EJ - 1	63.00	32.00	51.00	25.40	25.40	54.00	27.50	44.50	25.70	24.00	101.00
EJ - 1 1/8	69.60	36.00	57.00	28.50	28.50	57.00	30.00	50.00	29.00	25.70	123.00
EJ - 1 1/4	76.00	40.00	63.50	31.70	31.70	63.00	38.00	55.00	32.00	28.60	131.00
EJ - 1 3/8	82.50	44.00	70.00	35.00	35.00	69.00	42.00	61.50	35.00	31.30	145.00
USA - IMPERIAL DIMENSIONS (in)											
NEJ-0808	0.551	0.315	0.512	0.256	0.248	0.512	0.276	0.433	0.256	0.217	1.024
NEJ-1010	0.748	0.394	0.630	0.311	0.311	0.630	0.325	0.512	0.319	0.264	1.339
NEJ-1212	0.866	0.472	0.748	0.374	0.374	0.748	0.433	0.669	0.382	0.354	1.535
NEJ-1414	1.122	0.551	0.866	0.437	0.437	0.906	0.492	0.768	0.445	0.374	1.85
NEJ-1616	1.240	0.630	1.004	0.500	0.500	1.063	0.591	0.945	0.512	0.492	2.126
NEJ-2020	1.486	0.787	1.260	0.622	0.622	1.299	0.709	1.102	0.638	0.531	2.52
NEJ-2424	1.862	0.945	1.496	0.748	0.748	1.654	0.827	1.535	0.756	0.709	3.268
NEJ-2828	2.126	1.102	1.752	0.875	0.875	1.870	0.984	1.614	0.886	0.827	3.78
NEJ-3232	2.480	1.260	2.008	1.000	1.000	2.126	1.083	1.752	1.012	0.945	3.976
NEJ-3636	2.740	1.417	2.244	1.122	1.122	2.244	1.181	1.969	1.142	1.012	4.843
NEJ-4040	2.992	1.575	2.500	1.248	1.248	2.480	1.496	2.165	1.260	1.126	5.157
NEJ-4444	3.164	1.632	2.589	1.292	1.294	2.664	1.456	2.316	1.309	1.232	5.709

SHACKLES

STRIP SHACKLES

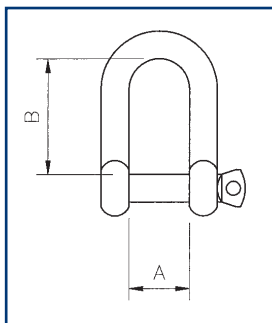
Stainless steel and electro polished.



D SHACKLE				BOW SHACKLE				BLOCK STRIP SHACKLE			
PIN DIA.	Part No.	A	B	Part No.	A	B		Part No.	A	B	
				METRIC DIMENSIONS							
(mm)		(mm)	(mm)		(mm)	(mm)			(mm)	(mm)	
5	862	10	18					SS-4	8	21	
5	863	16	24					SS-5	10	20	
5								SS-6	12	19	
6				SS-14B	14	18		SS-8	14	24	
8				SS-15B	18	24					
				USA - IMPERIAL DIMENSIONS							
(in)		(in)	(in)		(in)	(in)			(in)	(in)	
3/16	NSH-06-862	0.39	0.71					NSH-06-SS4	0.31	0.83	
3/16	NSH-06-863	0.63	0.94					NSH-06-SS5	0.39	0.79	
3/16								NSH-06-SS6	0.47	0.75	
1/4				NSH-08-SS14B	0.55	0.71		NSH-08-SS8	0.55	0.94	
5/16				NSH-10-SS15B	0.71	0.94					

FORGED 'D' SHACKLES

316 stainless steel.

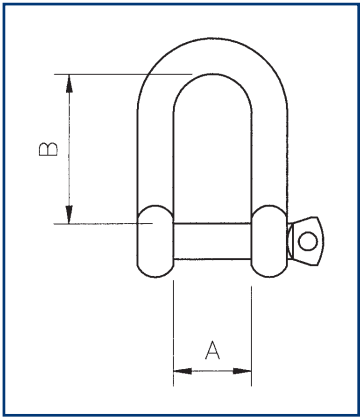


'D' SHACKLE			'D' SHACKLE			WIDE 'D' SHACKLE			LONG 'D' SHACKLE		
PIN DIA.	BREAKING		PART NO.	A	B	PART NO.	A	B	PART NO.	A	B
(mm)	LOADS (kg)			(mm)	(mm)		(mm)	(mm)		(mm)	(mm)
4	800		528AL	8	17						
5	1500		528L	16	23				528H	10	29
6	1950		529L	13	25				529H	13	43
8	3000		530L	16	32				530H	16	49
9.5	4800		531L	19	38	531W	25	40	531H	19	55
11	6000		846L	22	44						
12.7	7500		746L	26	52	746W	29	57			
16	10000		747L	29	58						
19	14000		748L	32	64						
*22	18000		749L	38	76						
				USA - IMPERIAL DIMENSIONS							
(in)	(lb)			(in)	(in)		(in)	(in)		(in)	(in)
5/32	1760		NSH-05D	0.31	0.67				NSH-06L	0.39	1.14
3/16	3300		NSH-06D	0.63	0.91				NSH-08L	0.51	1.69
1/4	4300		NSH-08D	0.51	0.98				NSH-10L	0.63	1.93
5/16	6600		NSH-10D	0.63	1.26				NSH-12L	0.75	2.16
3/8	10560		NSH-12D	0.75	1.50	NSH-12W	0.98	1.57			
7/16	13200		NSH-14D	0.87	1.73						
1/2	16500		NSH-16D	1.02	2.05	NSH-16W	1.14	2.24			
5/8	22000		NSH-20D	1.14	2.28						
3/4	30800		NSH-24D	1.26	2.52						

* = 17/4 Stainless Steel

FORGED SHACKLES

316 stainless steel.



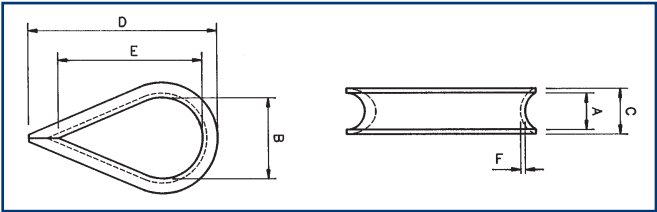
PIN DIA. (mm)	BREAKING LOADS (kg)	BOW SHACKLE			TWIST SHACKLE		
		PART NO.	A (mm)	B (mm)	PART NO.	A (mm)	B (mm)
4	640	528AB	8	18			
5	1200	528B	10	22	528T	10	16
6	1560	529B	13	28	529T	13	20
8	2400	530B	16	35	520T	16	26
9.5	3840	531B	19	38	531T	19	31
11	4800	846B	22	46	846T	22	35
12.7	6000	746B	26	52	746T	26	41
16	8000	747B	29	60	747T	29	45
19	11200	748B	32	68	748T	32	51
USA - IMPERIAL DIMENSIONS							
(in)	(lb)		(in)	(in)		(in)	(in)
5/32	1400	NSH-05B	0.31	0.71			
3/16	2640	NSH-06B	0.39	0.87	NSH-06T	0.39	0.63
1/4	3440	NSH-08B	0.51	1.10	NSH-08T	0.51	0.79
5/16	5280	NSH-10B	0.63	1.38	NSH-10T	0.63	1.02
3/8	8450	NSH-12B	0.75	1.50	NSH-12T	0.75	1.22
7/16	10560	NSH-14B	0.87	1.81	NSH-14T	0.87	1.38
1/2	13200	NSH-16B	1.02	2.05	NSH-16T	1.02	1.61
5/8	17600	NSH-20B	1.14	2.36	NSH-20T	1.14	1.77
3/4	24640	NSH-24B	1.26	2.68	NSH-24T	1.26	2.00

THIMBLES

Manufactured in heavy gauge stainless steel and electro polished.



PART NO.	WIRE DIA.		A		B		C		D		E		F		WEIGHT		USA PART NO.
	(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(kg/100)	(lb/100)	
851A	2	5/64	3	0.12	10	0.39	5.0	0.20	22	0.87	15	0.59	1.0	0.04	0.2	0.44	NTH-02
851	3	1/8	4	0.16	10	0.39	6.5	0.25	25	0.98	16	0.63	1.0	0.04	0.3	0.66	NTH-04
852	4	5/32	5	0.20	12	0.47	7.5	0.29	27	1.06	18	0.71	1.2	0.05	0.5	1.10	NTH-05
853	5	3/16	6	0.24	13	0.51	8.5	0.33	32	1.26	21	0.83	1.5	0.06	1.0	2.20	NTH-06
854	6	1/4	7	0.27	15	0.59	10.0	0.39	38	1.50	26	1.02	1.5	0.06	1.2	2.65	NTH-08
855	7	9/32	8	0.31	19	0.75	11.0	0.43	45	1.77	31	1.22	1.5	0.06	1.5	3.31	NTH-09
856	8	5/16	9	0.35	22	0.87	13.0	0.51	50	1.97	37	1.45	2.0	0.08	2.7	5.95	NTH-10
857	10	3/8	11	0.43	27	1.06	15.0	0.59	65	2.56	48	1.90	2.5	0.10	5.2	11.47	NTH-12
859	12	1/2	14	0.55	29	1.14	17.0	0.67	70	2.75	52	2.05	2.5	0.10	5.5	12.13	NTH-16
860	14	9/16	16	0.63	32	1.26	19.0	0.75	79	3.11	57	2.24	3.0	0.12	11.0	24.25	NTH-18
861	16	5/8	18	0.71	40	1.57	20.0	0.79	90	3.54	65	2.56	3.0	0.12	12.0	26.46	NTH-20
864	18	-	20	0.79	44	1.73	23.0	0.91	102	4.01	74	2.91	4.0	0.16	21.5	47.41	-----
865	20	3/4	22	0.87	52	2.05	27.0	1.06	115	4.53	84	3.31	4.0	0.16	27.0	59.53	NTH-24
866	22	7/8	24	0.94	56	2.20	28.0	1.10	125	4.92	96	3.78	5.0	0.20	37.5	82.69	NTH-28
867	26	1	28	1.10	65	2.56	32.0	1.26	150	5.90	115	4.53	6.0	0.24	62.0	136.71	NTH-32



SNAPSHACKLES

17 / 4 HIGH STRENGTH

High strength snapshackles investment cast in 17/4PH stainless steel, specially heat treated and electropolished to give the best possible combination of strength and corrosion resistance.



SIDE OPENING

The regular pattern for halyards, or where smaller sail grommets may prevent free movement of the snap shackle.

TOP OPENING

Recommended for spinnaker sheet or guys to provide “no hang-up” release. These are available with either a standard or large eye

SIDE OPENING												
Part No.	Size	Throat Width		Throat Length		Length Overall		Weight		Breaking Load		USA Part No.
		(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(gm)	(oz)	(kg)	(lb)	
2571	1	17	0.687	22	0.875	68	2.687	60	2.00	2270	5000	NSS-2571
2572	2	22	0.875	28	1.125	89	3.500	132	4.75	4126	9100	NSS-2572
2573	3	26	1.000	34	1.375	109	4.250	255	9.00	6122	13500	NSS-2573
TOP OPENING												
2511	1	18	0.687	24	0.937	70	2.750	70	2.50	2270	5000	NSS-2511
2512	2	22	0.875	29	1.125	98	3.875	142	5.00	4126	9100	NSS-2512
2513	3	26	1.000	34	1.375	118	4.625	270	9.50	6122	13500	NSS-2513
TOP OPENING WITH LARGE SWIVEL EYE												
2522	2	22	0.875	29	1.123	107	4.250	150	5.25	4126	9100	NSS-2522
2523	3	26	1.000	34	1.375	129	5.062	280	10.00	6122	13500	NSS-2523



316 STAINLESS STEEL NON-MAGNETIC



SIDE OPENING												
Part No.	Size	Throat Width		Throat Length		Length Overall		Weight		Breaking Load		USA Part No.
		(mm)	(ins)	(mm)	(ins)	(mm)	(ins)	(gm)	(oz)	(kg)	(lb)	
1000	1	16	0.625	22	0.875	69	2.750	60	2.0	1016	2240	NSS-1000
996	2	19	0.750	28	1.125	88	3.500	113	4.0	1768	3900	NSS-996
998	3	34	1.000	34	1.375	107	4.250	198	7.0	2993	6600	NSS-998
SWIVEL SHACKLE												
1001	1	16	0.625	22	0.875	68	2.687	59	2.0	1016	2240	NSS-1001
997	2	19	0.750	28	1.125	92	3.625	128	4.5	1768	3900	NSS-997
999	3	34	1.000	34	1.375	109	4.250	198	8.0	2993	6000	NSS-999

SUPERSNAPS

These popular and strong performance snapshackles are investment cast in 17/4 stainless steel and fitted with swivel eyes. They are now standard equipment on the world's competition yachts, proven over many seasons winning in America's Cup, the Admiral's Cup and other events.

All Supersnaps feature the "no-snag" side trigger opening mechanism which makes deck work easier, faster and safer. Supersnaps are electropolished for a quality finish.

**NEW - AN 7000 LB BREAK LOAD
SUPERSNAP WILL BE AVAILABLE
DURING 1999.**



	METRIC PART NO.	WEIGHT (gm) (oz)	BREAKING LOAD (kg) (lb)	USA PART NO.
17/4 SS with Swivel Eye	720	155 5 1/2	4136 9100	NSS-720
	721	290 10 1/4	7258 16000	NSS-721
	726	380 13 1/4	11364 25000	NSS-726
17/4 SS with Large Swivel Eye	723	170 6	4136 9100	NSS-723
	724	295 10 1/2	6122 13500	NSS-724

RACING FID 730

For opening Supersnaps easily and safely under load this strong yet lightweight fid is the professionals choice. The fid is shaped to open a SUPERSNAP shackle either through the eye or via the side wall trigger, for a safe cast off under the heaviest loads. The Racing Fid is now available in a variety of anodised colours.



GIBB DOUBLE ACTION SAFETY HOOKS

The Norseman Gibb Safety Hook is already established as a marine industry standard for safety, with its' DOUBLE ACTION locking system, which ensures that the hook latches securely, even in the most extreme alignment or applications. It offers single handed operation and the enclosed eye is designed to accept either webbing or rope

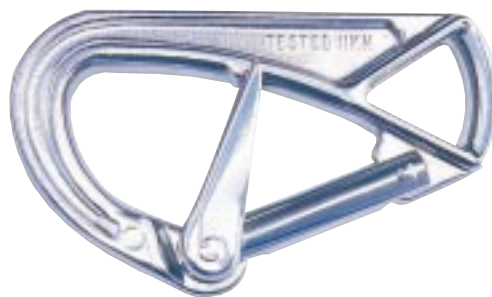
Following comprehensive evaluation and testing, the Gibb 1077 Safety Hook now complies with the more stringent requirements of BS EN 362:1993, which is the European Standard for connectors for use on Personal Protective Equipment (P.P.E.), against falls from heights. This standard, sometimes referred to as the Industrial Standard, is more demanding in it's requirement for the connector to withstand a load of 15KN (1.5 tonnes) with the latch open.



Under the European Directive on P.P.E. complex items or life preserving items must undergo type approval and certification by a Notified Body. **The Gibb 1077 Safety Hook now has a CE mark to signify that it has been approved.**

ORIGINAL 1079

The original version of the Gibb Safety Hook is investment cast in high tensile stainless steel.



CE APPROVED 1077

The strength member is a pressing in high tensile stainless steel. The moulded hand grip, providing a comfortable, snag-free grip, is offered in a choice of eye-catching colours, which can improve safety and enables colour coding for yachts or crew.

The 1077 is already selected by high volume users for use on safety harnesses, including XM Yachting. It is also specified by the RNLI, in addition to specialist suppliers for industrial applications, such as linesmen's harnesses and safety straps.

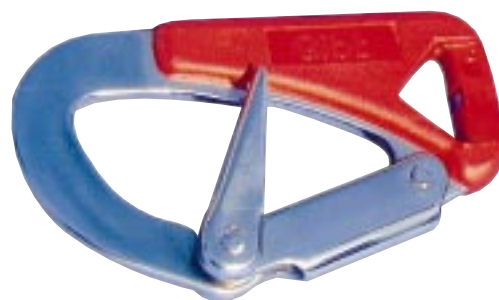
SPECIFICATION:

Pressed in high tensile Stainless Steel
Trigger & latch in heavy gauge 316 Stainless Steel
Proof loaded to 11KN (1.1 tonnes)
Break strain in excess of 2.2 tonnes
Closed eye for webbing or rope
Snag free plastic hand grip
Will withstand 1.5 tonnes with the latch open

CERTIFICATION:

CE European Quality Standard
BS EN 362:1993 Quality Standard

PRODUCTION: Retford to ISO 9002 Certification



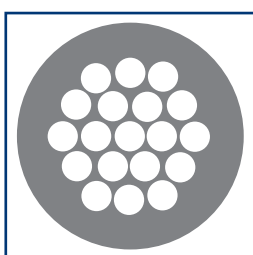
LIFELINE, GUARDRAIL & SAFETY FITTINGS

The Norseman Gibb range of Lifeline fittings for yachts and powerboats is one of the most comprehensive in the world. The range has been proven over many years of use and is selected by boat builders who recognise that Lifeline safety is not an area where costs should be cut.

NOTE: Lifeline fittings with an M8 metric thread are available as a stock item. To order an M8 thread, omit the letter 'U' from the end of the stock code.

STAINLESS STEEL GUARDRAIL WIRE

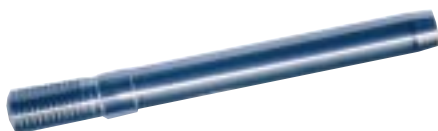
Guard rail wire is selected extensively for its high strength and resistance to wear. Constructed from 1 x 19 Stainless Steel, a hard coating of white PVC is applied to protect crew from abrasion.



DIAMETER	PART NO.	NOMINAL
1 x 19 stainless steel strand covered with hard white PVC	P19-040-6mm	4mm Covered 6mm
	P19-050-7mm	5mm Covered 7mm
	P19-050-9mm	5mm Covered 9mm

7 x 19 Guardrail Wire also available by special order.

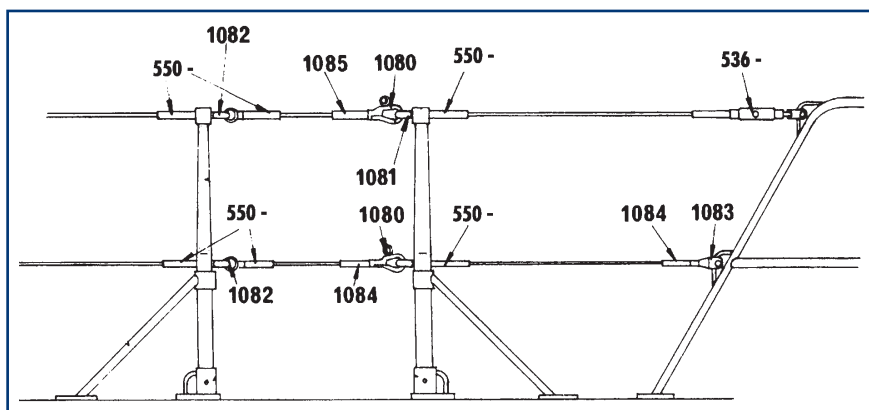
SHORT SWAGE STUD 550



LONG SWAGE STUD WITH LOCKNUT 1084



SELECTION GUIDE FOR GUARDRAIL FITTINGS



NORSEMAN STUD TERMINAL

May be used with 1080U, 1082U, 1083U and lifeline rigging screws to allow on-the-boat fitting without special tools.



For details see page 6

METRIC PART NO.	WIRE Ø		THREAD DIA.	USA PART NO.
	(mm)	(in)	(UNF)	
550-03U	3	1/8	5/16	NLL-550-0410
550-04U	4	5/32	5/16	NLL-550-0510
550-05U	5	3/16	5/16	NLL-550-0610
550-06U	6	1/4	5/16	NLL-550-0810

METRIC PART NO.	WIRE Ø		THREAD DIA.	USA PART NO.
	(mm)	(in)	(UNF)	
1084-03U	3	1/8	5/16	NLL-1084-0410
1084-04U	4	5/32	5/16	NLL-1084-0510
1084-05U	5	3/16	5/16	NLL-1084-0610
1084-06U	6	1/4	5/16	NLL-1084-0810

ADJUSTABLE FORK END 1083U

(USA Part No. NLL-1083-1008)

This streamlined fork end has 29mm (1 1/8") safe adjustment with the long swage stud. It has a 6.3mm (1/4") pin, and 5/16" UNF thread.

SINGLE EYE 1081U

(USA Part No. NLL-1081-10)

Threaded eye to be used with short swage stud for attachment of pelican hook. 5/16" UNF thread.



INTERLINKED EYES 1082U

(USA Part No. NLL-1082-10)

A universal linkage for hinged end of gangway opening. Used with short swage studs. 5/16" UNF thread.



LIFELINE TURNBUCKLE 536



METRIC PART NO. (mm)	WIRE Ø (in)	THREAD DIA. (UNF)	USA PART NO.
536-5/15-3	3 1/8	5/16	N536-041010
536-5/16-4	4 5/32	5/16	N536-051010
536-5/16-5	5 3/16	5/16	N536-061010
536-5/16-6	6 1/4	5/16	N536-081010

QUICKFIT LIFELINE TURNBUCKLE 533



METRIC PART NO.	WIRE Ø	PIN SIZE	EXTENDED LENGTH	CLOSED LENGTH	USA PART NO.
533-3	3mm 1/8"	1/4"	250mm	170mm	NLL-533-040808
533-4	4mm 3/16"	1/4"	250mm	170mm	NLL-533-050808 NLL-533-060808

PELICAN HOOK

These unique quick release Pelican hooks work on the same principle as the Gibb snap shackle.

The long arm provides a powerful lever for tensioning and the spring loaded plunger system is absolutely fool proof. It has 29mm (1 1/8") safe adjustment with the long swage stud.

METRIC PART NO.	THREAD	USA PART NO.
1080	M8 Right Hand Thread	NLL-1080-M08R
1080U	5/16" UNF Right Hand Thread	NLL-1080-10R
1080UL	5/16" UNF Left Hand Thread	NLL-1080-10L



PELICAN HOOK 812

(USA Part No. NLL-812)

For Talurit or Nicopress thimble eyes on lifelines.



BACKSTAY ADJUSTERS

This fitting is manufactured from stainless steel with brass sheaves, one of which is removable for ease of attachment to the backstay bridle.



BSA-3 Yachts up to 26ft **USA Part No. NBSA-3**
BSA-4 Yachts over 26ft **USA Part No. NBSA-6**

DECK EYE PLATES

In stainless steel with heavy duty staple.
 Can be supplied with backing plates if required.



METRIC DEP-6	USA NDEP-6	METRIC DEP-4	USA NDEP-4
Base 3 1/2" x 1 1/4" x 3/16"	Staple 5/16" dia.	Base 3" x 1" x 1/8"	Staple 1/4" dia.
Backing Plate Part No. BP-6		Backing Plate Part No. BP-4	

TRIANGULAR RIGGING PLATES

Manufactured from heavy duty stainless steel supplied complete with 3 clevis pins.



TRP-5 5mm diameter rigging **USA Part No. NTRP-5**
TRP-6 6mm diameter rigging **USA Part No. NTRP-6**

PAD EYES

Extended range of pad eyes, now cast in 17/4 or 316 stainless steel. Accommodates up to 1/2" shackles and up to size 3 Gibb Snapshackles.



1073



1075

Metric Part No.	1073	1075	1075S
USA Part No.	N1073	N1075	N1075S
Base Length (mm)	60	70	70
Base Width (mm)	38	70	70
Eye Thickness	6	9	9
Height inside Eye (mm)	14	17	17
Fastenings (x4)	5	8	8
PCD	-	55	55
Weight (gm)	45	225	225
Finish	Heat Treated & Electropolished	Heat Treated & Electropolished	Electro-polished
Material	17/4PH	17/4PH	316 Stainless
Distortion Load (kg)	1361	5080	1524
Breaking Load (kg)	2270	6363	5454
Backing Plate No.	-	1076	1076

'U' BOLTS

Electro-polished stainless steel, complete with a heavy duty backing plate, nuts and washers.
 The offset type are set at 10° to the vertical above the top plate.



Metric Part No.	Fixing Centres	Diameter of Rod		Length Under Plate		USA Part No.
	(in)	(mm)	(in)	(mm)	(in)	
UB-2	1.5	6	1/4	25	1	NUB-2
UB-2S	1.5					NUB-2S
UB-3	1.5	6	1/4	38	1 1/2	NUB-3
UB-3S	1.5					NUB-3S
UB-5	1.5	6	1/4	70	2 3/4	NUB-5
UB-5S	1.5					NUB-5S
UB-6	2	8	5/16	25	1	NUB-6
UB-6S	2					NUB-6S
UB-7	2	8	5/16	51	2	NUB-7
UB-7S	2					NUB-7S
UB-9	2	8	5/16	76	3	NUB-9
UB-9S	2					NUB-9S
With Welded Top Plate						
UB-10	2.25	10	3/8	38	1 1/2	NUB-10
UB-10S	2.25					NUB-10S
UB-11	2.25	10	3/8	64	2 1/2	NUB-11
UB-11S	2.25					NUB-11S
UB-13	2.25	10	3/8	88	3 1/2	NUB-13
UB-13S	2.25					NUB-13S
Part Nos. with Suffix S = Offset Type						

SWAGING MACHINES - WIRETEKNIK

The principle behind these incredibly robust machines is wonderfully simple. A pair of freely rotating roller dies are driven by the terminal itself as it is drawn between the dies by a hydraulic cylinder. These machines feature a minimum of moving parts, making them exceptionally reliable both in the field and in the production workshop. The biggest advantage of the WireTeknik Swaging Machines is their portability. One man can do the job, whether he uses a manual pump, electric motor or compressed air motor. Due to this portability, a permanent on-site termination can be achieved in all circumstances. The WireTeknik Swaging technique produces straight swages with one pass and is fully approved by Lloyd's Register of Shipping.



WIRETEKNIK SWAGING MACHINES

Metric Part No.	Min. Wire Dia.		Max. Wire Dia.		Machine Weight		Approx. Length		Approx. Width		Approx. Height		USA Part No.
	(mm)	(in)	(mm)	(in)	(kg)	(lb)	(mm)	(in)	(mm)	(in)	(mm)	(in)	
A100	1.5	1/16	5	3/16	12	26	500	20	300	12.00	100	4.00	
A200	1.5	1/16	8	5/16	18	40	430	17	280	11.00	120	4.75	WT-A200
A250	2.5	3/32	12	1/2	37	82	940	37	390	15.38	180	6.28	WT-A250
A300	2.5	3/32	16	5/8	61	135	957	38	390	15.38	240	9.50	WT-A300
A400	16	5/8	38	1 1/2	90	200	1270	50	560	22.00	230	9.00	WT-A400

SAILSAVERS

SAVES SAIL CHAFE AT SPREADER ENDS. Low friction plastic mouldings reduce sail snagging. Split construction allows easy fitting even when the mast is stepped. Smooth nylon easy-fit clips for secure fixing.

SUPER SAILSAVERS

METRIC PART NO.	WIRE DIA.		CROSSTREE DIA.		USA PART NO.
	(mm)	(in)	(mm)	(in)	
SA-5S	6.3	1/4	25	1	NSA-5S
SA-6S	8.0	5/16	32	1 1/4	NSA-6S
SA-7S	9.5	3/8	38	1 1/2	NSA-7S
SA-8S	11.0	7/16	44	1 3/4	NSA-8S

METRIC PART NO.	WIRE DIA.		CROSSTREE DIA.		USA PART NO.
	(mm)	(in)	(mm)	(in)	
SA-3	4.5	3/16	22	7/8	NSA-3
SA-5	6.3	1/4	32	1 1/4	NSA-5
SA-7	9.5	3/8	35	1 3/8	NSA-7
SA-9	13.0	1/2	38	1 1/2	NSA-9

AEROFOIL SAILSAVERS

UK PART NO.	SIZE	USA PART NO.
SA-A-SML	Aerofoil Sailsaver Small	NSA-A-SML
SA-A-MED	Aerofoil Sailsaver Medium	NSA-A-MED
SA-A-LRG	Aerofoil Sailsaver Large	NSA-A-LRG



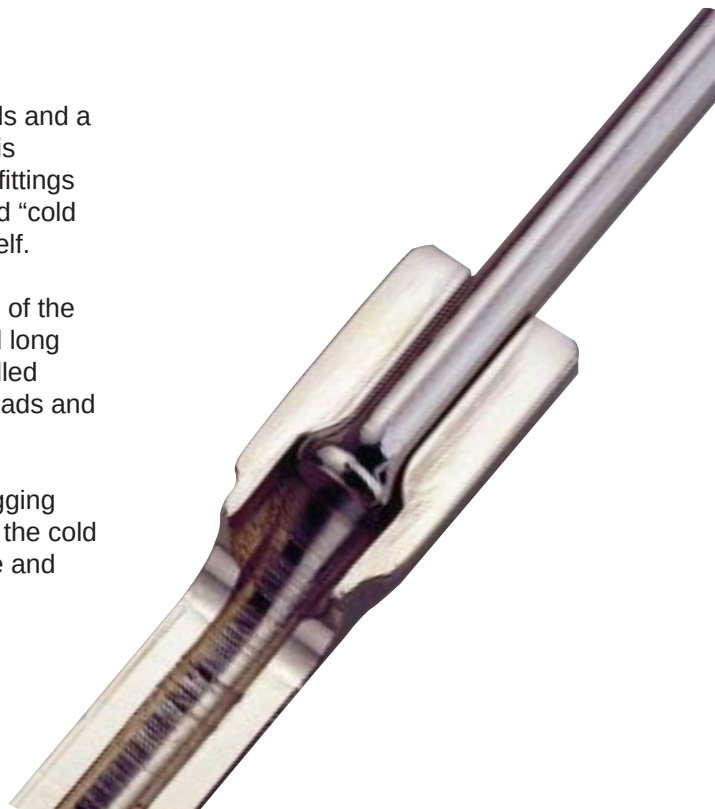
ROD RIGGING SYSTEMS

COLD HEADING PROCESS

The fundamentals of Navtec's rod rigging system are cold heads and a speciality stainless steel alloy called Nitronic-50. The N-50 rod is terminated by hydraulically forming a head which will not allow fittings to slide past. This process of forming a head on the rod is called "cold heading" and results in a head which is as strong as the rod itself.

Navtec fittings have "seats" designed to complement the shape of the rod head. The fit of the head to the seat is critical for safety and long life. For this reason Navtec uses Computer Numerically Controlled (CNC) equipment to make both the dies which form the cold heads and the fitting seats which the heads rest in.

This tightly monitored process is what makes the Navtec rod rigging system second to none. Navtec Agents around the World have the cold heading equipment and training necessary to both manufacture and service your rod rigging system.



STEMBALLS

WHY USE STEMBALLS?

Navtec has conducted a series of tests to evaluate various stemball configurations. The control series of tests was run on a rod rigidly mounted (cantilevered) in the test fixture. This case represents a rod not permitted to realign, or "toggle" in service. Test results indicate that stemballs improve rod life compared with a bare ball on the end of the rod. This result is particularly significant as in-service experience indicates that a bare ball fitting on the upper end of a lower diagonal shroud results in early rod failure on bendy masts. Thus, in such an application, it is important to have a fitting system which will show improved life over the fixed rod and bare ball fitting. Various stemball designs were tested. Best results were obtained with micro stemballs. All tests were performed with same tension load, rocking angle and same size fittings.

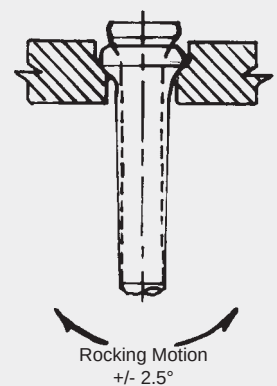
STEMBALL CONFIGURATION TEST

TEST RESULTS OF NAVTEC MICRO STEMBALL ROD SIZE -12

TEST NUMBER	APPLIED LOAD POUNDS	% OF ROD BREAK STRENGTH	DEGREES OF ROTATION (+/-)	CYCLES TO FAILURE
425	5000	40%	2.5	115,092
426	5000	40%	2.5	71,982
427	5000	40%	2.5	80,064
428	5000	40%	2.5	60,426
AVERAGE				81,891

DISCUSSION:-

Fatigue life comparable to that with fatigue indicating stemball, but with higher level of consistency with approximately 50% weight savings.





MICRO STEMBALL

The F235 Micro Stemball is the latest development in Navtec's range of Stemballs. By using higher strength material, computer stress analysis and fatigue testing, Navtec has developed a smaller and lighter Stemball with better fatigue resistance.

The Micro Stemball is used with Navtec's L500 Tip Cups, to help reduce overall size and fatigue. The F235 is also used in Navtec's K150 and K550 Tangs.

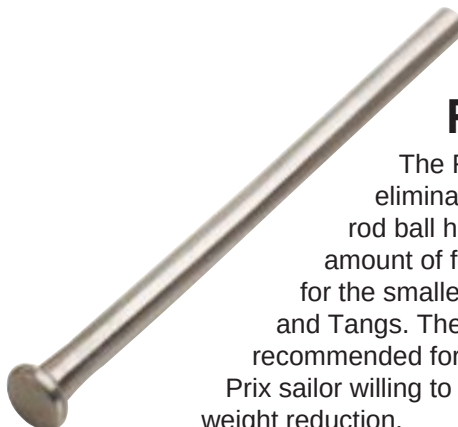
TAPERED STEMBALL

The F220 Tapered Stemball with its larger head geometry is used primarily in spreader root tangs to help distribute the load. They are also used in the Navtec K200 range of Tangs.



ROD BALL HEADS

The Rod Ball head is designed to eliminate the use of stemballs. The rod ball head provides the least amount of fatigue resistance, but allows for the smallest, lightest weight Tip Cups and Tangs. The Rod Ball system is only recommended for the serious inshore Grand Prix sailor willing to sacrifice fatigue life for weight reduction.

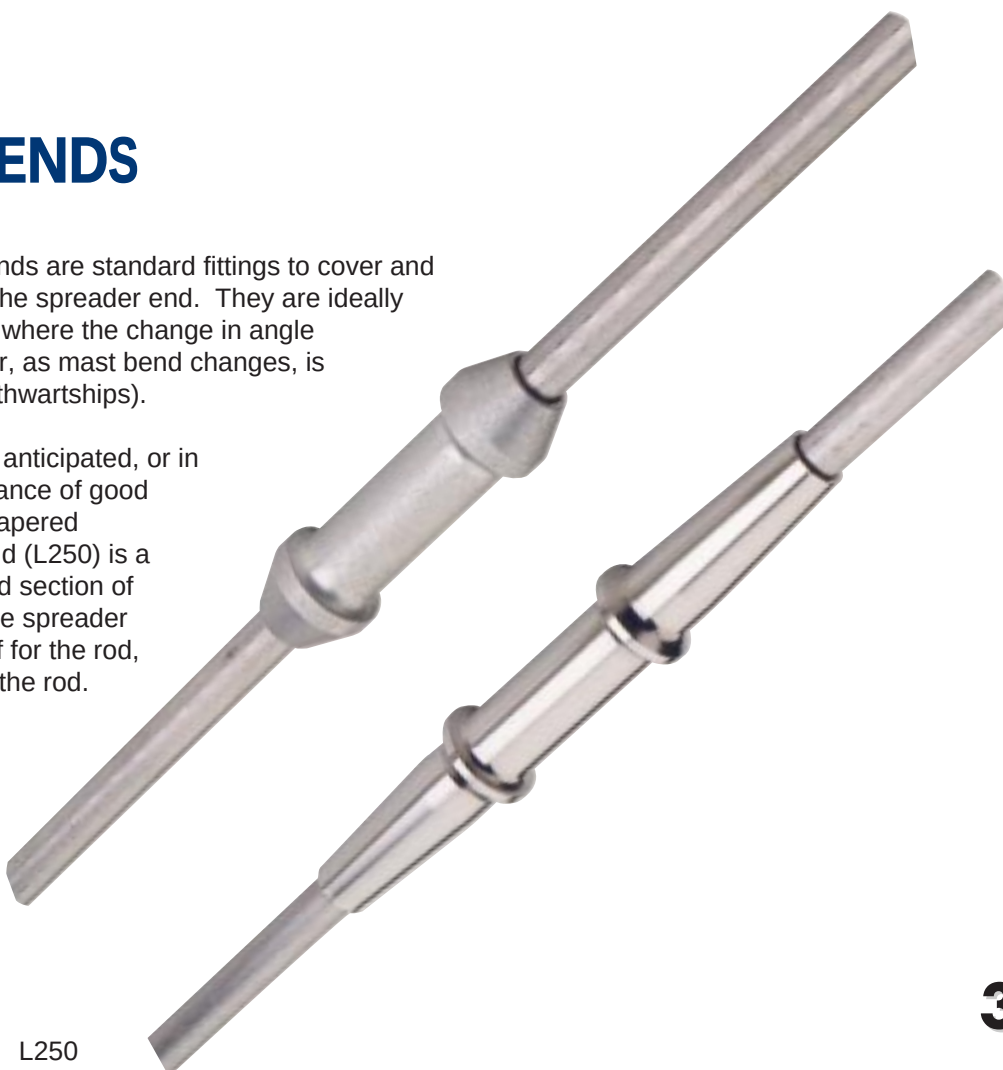


SPREADER BENDS

L200 Aluminum Spreader Bends are standard fittings to cover and protect rod that passes over the spreader end. They are ideally suited to relatively stiff masts where the change in angle between shroud and spreader, as mast bend changes, is less than 1 degree (looking athwartships).

When greater deflections are anticipated, or in any case where higher assurance of good fatigue life is important, the Tapered Stainless Steel Spreader Bend (L250) is a superior product. The tapered section of the fitting above and below the spreader tip provides better strain relief for the rod, thus increasing fatigue life of the rod.

L200



L250

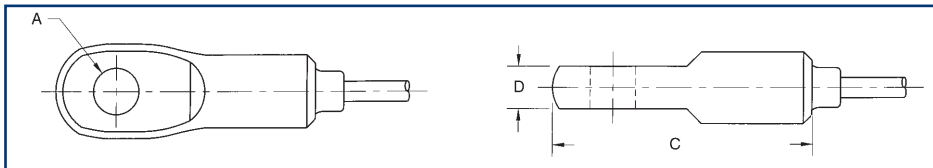
ROD TERMINATION FITTINGS

EYES

Navtec produces a full range of Marine Eyes (G100), an industry standard. They are used most commonly as upper and lower terminals on rod backstays. Titanium Marine Eyes (G800) are also available.

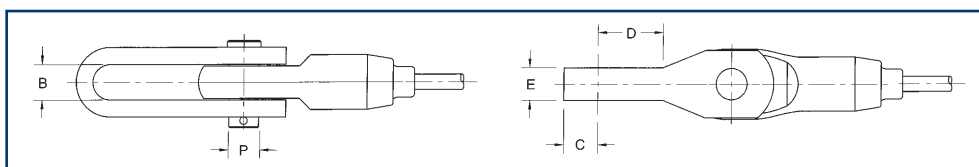


Marine Eye
G100



MARINE EYE

ROD SIZE	PART # STD. NOSE	A		C		D		WEIGHT W/STD NOSE	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(grams)
-4	G100-004	0.39	9.9	2.28	57.9	0.37	9.4	0.11	50
-6	G100-006	0.45	11.5	2.52	64.0	0.43	10.9	0.21	95
-8	G100-008	0.52	13.1	3.15	80.0	0.49	12.4	0.32	145
-10	G100-010	0.52	13.1	3.15	80.0	0.49	12.4	0.66	300
-12	G100-012	0.64	16.3	3.65	92.7	0.62	15.7	0.67	304
-17	G100-017	0.64	16.3	3.65	92.7	0.62	15.7	0.68	309
-22	G100-022	0.77	19.4	4.30	109.2	0.74	18.8	1.10	500
-30	G100-030	0.89	22.6	4.80	121.9	0.86	21.8	1.40	636
-40	G100-040	1.02	25.8	5.20	132.1	0.99	25.1	1.74	791
-48	G100-048	1.14	29.0	5.50	139.7	1.11	28.2	2.03	922
-60	G100-060	1.26	32.0	6.20	157.5	1.24	31.5	3.72	1690
-76	G100-076	1.27	32.3	7.06	179.3	1.24	31.5	6.04	2745
-91	G100-091	1.39	35.2	7.80	198.1	1.36	34.5	6.85	3113
-115	G100-115	1.58	40.1	8.97	227.8	1.50	38.1	10.93	4967
-150	G100-150	1.76	44.7	10.48	266.2	1.74	44.2	17.00	7725
-170	G100-170	1.89	47.9	11.00	279.4	1.86	47.2	20.81	9445
-195	G100-195	2.14	54.2	12.27	311.7	2.11	53.6	23.00	10451
-220	G100-220	2.26	57.4	13.00	330.2	2.24	56.9	N/A	N/A
-260	G100-260	2.45	62.2	14.00	355.6	2.43	61.7	31.83	14464



High Fatigue
Eye G200

HIGH FATIGUE EYE ASSEMBLY

ROD SIZE	PART #	B		C		D		E		WEIGHT	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(grams)
-4	G200-004	0.39	6.0	0.38	9.5	0.84	21.3	0.37	6.0	0.26	118
-6	G200-006	0.45	11.4	0.41	10.3	0.90	22.9	0.43	10.8	0.42	191
-8	G200-008	0.52	13.2	0.50	12.7	1.18	30.0	0.48	12.2	0.66	300
-10	G200-010	0.52	13.2	0.50	12.7	1.18	30.0	0.48	12.2	0.67	304
-12	G200-012	0.65	16.5	0.63	15.9	1.20	30.5	0.61	15.4	1.39	632
-17	G200-017	0.65	16.5	0.63	15.9	1.20	30.5	0.61	15.5	1.36	618
-22	G200-022	0.77	19.6	0.75	19.1	1.46	37.1	0.73	18.5	2.20	1,000
-30	G200-030	0.92	23.4	0.81	20.6	1.68	42.7	0.84	21.3	3.03	1,377
-40	G200-040	1.04	26.4	1.00	25.4	2.10	53.3	0.96	24.4	4.42	2,008
-48	G200-048	1.17	29.7	1.06	26.9	2.26	57.4	1.09	27.7	5.64	2,563
-60	G200-060	1.29	32.8	1.25	31.8	2.65	67.3	1.21	30.7	8.32	3,781
-76	G200-076	1.25	31.8	1.38	34.9	2.50	63.5	1.25	31.8	11.70	5,316
-91	G200-091	1.42	36.1	1.44	36.5	3.40	86.4	1.34	34.0	14.75	6,702
-115	G200-115	1.60	40.6	1.80	45.7	2.97	75.5	1.52	38.7	18.05	8,202

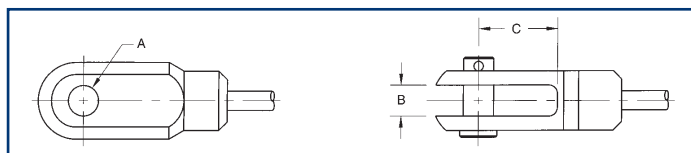
Larger sizes available on special order. Consult Navtec for details.

ROD JAWS

Rod Jaws (H100) are commonly used as upper and lower terminals on rod backstays, as well as on other low fatigue assemblies such as bobstays.



Rod Jaw
H100



ROD JAW

ROD SIZE	PART # STANDARD JAW	AØ		B		C		WEIGHT STD. JAW	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(grams)
-4	H100-004	0.32	8.1	0.27	6.9	0.79	20.0	0.10	45
-6	H100-006	0.32	8.1	0.33	8.3	0.82	20.8	0.07	32
-8	H100-008	0.39	9.8	0.33	8.3	0.87	22.1	0.20	91
-10	H100-010	0.44	11.1	0.40	10.0	0.90	22.9	0.26	118
-12	H100-012	0.44	11.2	0.46	11.6	1.18	29.8	0.40	182
-17	H100-017	0.52	13.1	0.53	13.5	1.29	32.7	0.55	250
-22	H100-022	0.63	16.0	0.59	15.0	1.48	37.7	1.06	482
-30	H100-030	0.75	19.1	0.65	16.5	1.50	38.0	1.50	682
-40	H100-040	0.88	22.3	0.79	20.1	1.65	41.9	2.34	1063
-48	H100-048	1.01	25.5	0.91	23.1	1.70	43.2	3.31	1504
-60	H100-060	1.145	36.8	1.145	36.8	1.62	41.1	5.00	2272

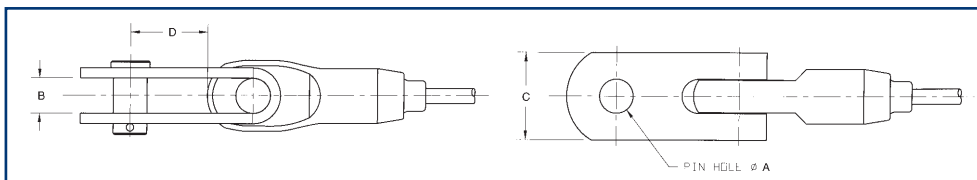
1. Small Pin Eyes (G150) must be used with H100 and H121 Jaws. G100 Eyes will not fit these jaws.

HIGH FATIGUE JAWS

It is important in forestays to have fittings at each end which permit "toggling" under high load. Forestays are generally highly loaded and the lead angle changes each time the boat tacks. These are severe conditions in terms of fitting and rod fatigue. Fittings designed to minimize bending stresses induced in the rod are essential in this application.



High Fatigue
Jaw H200



HIGH FATIGUE JAW

ROD SIZE	PART NUMBER	AØ		B		C		D		WEIGHT W/STD NOSE	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(grams)
-4	H200-004	0.375	9.5	0.39	9.8	1.00	25.4	0.94	23.9	0.25	0.11
-6	H200-006	0.438	11.1	0.45	11.4	1.00	25.4	1.04	26.4	0.49	0.22
-8	H200-008	0.500	12.7	0.52	13.2	1.25	31.8	1.02	25.9	0.75	0.34
-10	H200-010	0.500	12.7	0.52	13.2	1.25	31.8	1.39	35.3	0.77	0.35
-12	H200-012	0.625	15.9	0.65	16.4	1.60	40.6	1.43	36.3	1.81	0.82
-17	H200-017	0.625	15.9	0.65	16.5	1.60	40.6	1.43	36.3	1.53	0.69
-22	H200-022	0.750	19.1	0.77	19.6	2.00	50.8	1.74	44.2	2.62	1.19
-30	H200-030	0.875	22.2	0.90	22.7	2.00	50.8	2.16	54.9	3.76	1.71
-40	H200-040	1.000	25.4	1.04	26.4	2.50	63.5	2.53	64.3	5.51	2.50
-48	H200-048	1.125	28.6	1.17	29.6	2.50	63.5	2.82	71.6	7.44	3.37
-60	H200-060	1.250	31.8	1.29	32.8	3.00	76.2	3.41	86.6	11.72	5.32
-76	H200-076	1.250	31.8	1.29	32.8	3.00	76.2	3.41	86.6	13.55	6.15
-91	H200-091	1.375	34.9	1.40	35.4	3.00	76.2	3.90	99.1	17.43	8.25
-115	H200-115	1.560	39.6	1.63	41.4	3.75	95.3	4.23	107.4	26.49	12.01
-150	H200-150	1.750	44.5	1.81	46.1	4.00	101.6	4.75	120.7	37.80	17.14
-170	H200-170	1.875	47.6	1.95	49.4	5.00	127.0	4.75	120.7	38.10	17.28
-195	H200-195	2.125	54.0	2.17	55.0	5.50	139.7	4.75	120.7	N/A	N/A
-220	H200-220	2.250	57.2	2.38	60.5	6.00	152.4	5.00	127.0	N/A	N/A
-260	H200-260	2.438	61.9	2.45	62.3	6.00	152.4	4.10	104.1	94.00	42.63
-320	H200-320	2.500	63.5	2.50	63.5	6.60	167.6	6.00	152.4	N/A	N/A
-400	H200-400	2.500	63.5	2.50	63.5	7.00	177.8	6.75	171.5	N/A	N/A

TANGS

Navtec designs and manufactures standard and custom rigging fittings for all types of yachts from globe circling mega yachts to cruisers and performance racers throughout the world. Navtec answers the need with unsurpassed engineering and in house manufacturing capabilities.

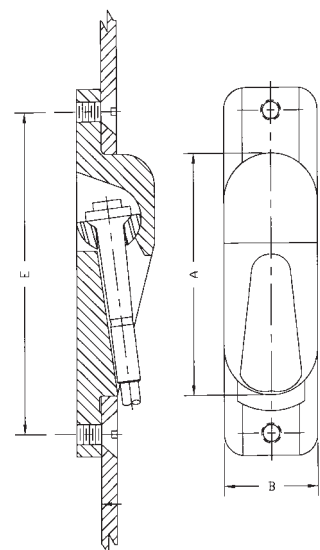
K200 EXTERNAL STEMBALL TANG

The economical K200 Tang has minimal projection inside the mast, a reasonable cut-out size, some projection outside of the mast and can be used with rod or 1 x 19 wire.



GIBB STEMBALL N641 & NAVTEC K200 TANG

SWAGE STEMBALL	ADAPTER WASHER	NAVTEC TANG
N641-04	F400-04-06	K200-006
N641-05	F400-06-06	K200-006
N641-06	N640-06	K200-012
N641-07	N640-07	K200-012
N641-08	N640-08	K200-012
N641-09	N640-08	K200-012
N641-10	F400-17-30	K200-030
N641-12	N640-10	K200-030



**K 200 External
Stemball Tang**

EXTERNAL STEMBALL TANG - ROD, STEMBALL AND SEAT COMBINATIONS

ROD SIZE	TANG PART NUMBER	TAPERED STEMBALL		CUT OUT DIMENSIONS				FASTENER		WEIGHT (TANG & SEAT)		
		STEMBALL PART NUMBER	SEAT PART NUMBER	LENGTH (A)		WIDTH (B)		LENGTH (E)		SIZE	(lbs)	(grams)
				(in)	(mm)	(in)	(mm)	(in)	(mm)			
-4	K200-006	F220-004	F400-04-06	2.72	69.2	1.13	28.6	3.60	91.4	1/4-20	0.20	91
-6	K200-006	F220-006	F400-06-06	2.72	69.2	1.13	28.6	3.60	91.4	1/4-20	0.20	91
-8	K200-012	F220-008	F400-08-12	3.75	95.3	1.50	38.1	5.05	128.3	5/16-18	0.20	91
-10	K200-012	F220-010	F400-08-12	3.75	95.3	1.50	38.1	5.05	128.3	5/16-18	0.41	186
-12	K200-012	F220-012	F400-12-12	3.75	95.3	1.50	38.1	5.05	128.3	5/16-18	0.41	186
-17	K200-030	F220-017	F400-17-30	5.00	127.0	2.00	50.8	6.70	170.2	3/8-16	1.21	550
-22	K200-030	F220-022	F400-22-30	5.00	127.0	2.00	50.8	6.70	170.2	3/8-16	1.21	550
-30	K200-030	F220-030	F400-30-30	5.00	127.0	2.00	50.8	6.70	170.2	3/8-16	1.21	550
-40	K200-060	F220-040	F400-40-60	6.88	174.6	2.80	71.1	9.40	238.8	5/8-11	2.45	1,113
-48	K200-060	F220-048	F400-48-60	6.88	174.6	2.80	71.1	9.40	238.8	5/8-11	2.45	1,113
-60	K200-060	F220-060	F400-60-60	6.88	174.6	2.80	71.1	9.40	238.8	5/8-11	2.45	1,113
-76	K200-076	F220-076	F400-76-76	9.25	235.0	3.75	95.3	12.50	317.5	3/4-16	7.20	3,272
-91	K200-115	F220-091	F400-91-A2	11.52	292.7	4.50	114.3	15.38	390.7	1-12	N/A	N/A
-115	K200-115	F220-115	F400-A2-A2	11.52	292.7	4.50	114.3	15.38	390.7	1-12	N/A	N/A

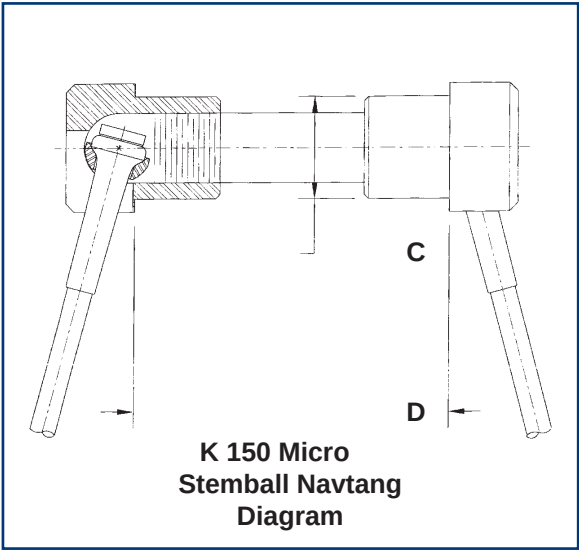
STEMBALLS REQUIRE SEPARATE SEATS (F400) FOR USE WITH THESE TANGS.
EXTERNAL STEMBALL TANGS ARE NOT SUITABLE FOR USE WITH MICRO STEMBALLS
K200-060 and up are supplied without fastener holes.
See detailed installation instructions before installing these tangs.

K150 MICRO STEMBALL NAVTANGS

The popularity of the Navtang, due to small mast cut-out, has resulted in the development of the Micro Stemball Navtang with a modification of the original Navtang (now obsolete), allowing the use of Micro Stemballs and K151-02 washers. The Micro Stemball Navtang also uses a stainless steel tie bar instead of an aluminum tie bar.

MICRO STEMBALL NAVTANG					
SIZE	TANG PART NUMBER	SHANK DIAMETER (C) (in) (mm)		WEIGHT (tang, washer & stemball) (lbs) (grams)	
-4	K150-004	0.75	18.9	0.25	114
-6	K150-006	0.81	20.6	0.33	150
-8	K150-008	0.93	23.6	0.35	159
-10	K150-010	1.00	25.3	0.51	232
-12	K150-012	1.18	30.1	0.71	323
-17	K150-017	1.31	33.1	1.26	573
-22	K150-022	1.49	37.8	1.73	786
-30	K150-030	1.87	47.5	3.12	1,418
-40	K150-040	2.07	52.5	4.37	1,986
-48	K150-048A	2.25	57.1	4.75	2,158
-60	K150-060A	2.63	66.7	5.50	2,499
-76	K150-076	3.00	76.2	7.47	3,394
-91	K150-091	3.25	82.6	9.78*	4,440
-115	K150-115	3.75	95.3	13.74	6,240
-150	K150-150	1.12	28.4	19.32	8,780

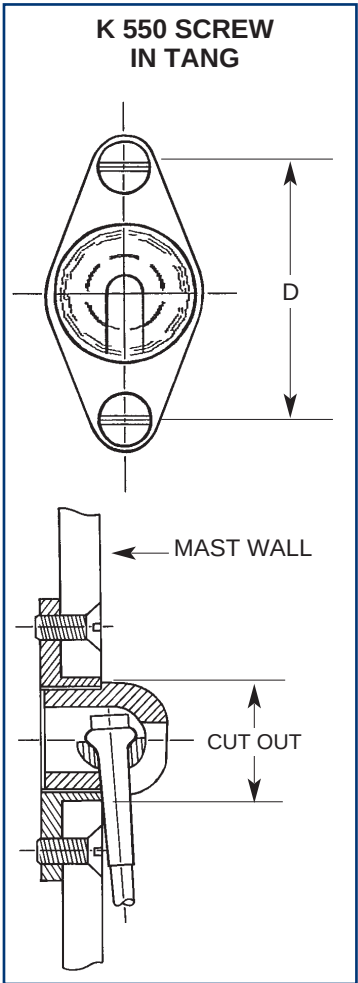
Mast o.d. (dimension D in sketch) must be specified when ordering.
When Navtangs are installed, as shown, without a compression tube, a stainless steel protective sleeve should be used to protect the tie bar from halyard chafe.
Micro Navtang part numbers are for a complete assembly including cap, micro stemball, washer and tie bar.
The Micro Navtang is made from 316 stainless steel.



K550 SCREW IN TANGS

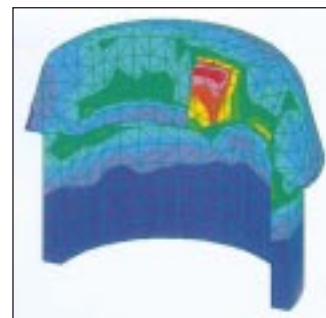
Developed from America’s Cup tangs, these tangs offer a lightweight alternative to the K150 tang where no tie bar is desired. The height of the sleeve on the backing plate is specified to match mast wall thickness, thus creating a custom fit for every mast. This feature makes the K550 an excellent choice for Carbon masts as well as Aluminum.
With the cap made from high strength stainless alloy and the backing plate made from 316 stainless, corrosion life of the K550 is unsurpassed.

K550 SCREW IN TANG									
ROD SIZE	TANG PART NUMBER	SCREW SIZE (in) (mm)		MAST HOLE Ø (in) (mm)		D (in) (mm)		WEIGHT (lb) (kg)	
-6	K550-006-01	1/4	20	1.25	4.7	2.25	57.2	0.34	0.15
-8	K550-008-01	1/4	20	1.25	4.7	2.25	57.2	0.34	0.15
-10	K550-010-01	1/4	20	1.38	3.9	2.75	69.9	0.4	0.19
-12	K550-012-01	1/4	20	1.38	3.9	2.75	69.9	0.4	0.19
-17	K550-017-01	5/16	18	1.88	5.5	3.75	95.3	1.1	0.48
-22	K550-022-01	5/16	18	1.88	5.5	3.75	95.3	1.1	0.48
-30	K550-030-01	3/8	16	2.19	6.1	4.25	108.0	1.7	0.77
-40	K550-040-01	7/16	20	2.50	8.4	4.75	120.7	2.6	1.16
-48	K550-048-01	7/16	20	3.00	10.4	5.25	133.5	2.6	1.16
-60	K550-060-01	1/2	13	3.13	9.9	6.00	152.4	5.2	2.34
-76	K550-076-01	5/8	11	3.63	8.5	6.95	175.5	6.6	3.00
-91	K550-091-01	5/8	11	4.13	14.2	7.50	190.5	7.8	3.54
-115	K550-115-01	3/4	10	4.75	17.8	8.50	215.9	11.0	5.00
-150	K550-150-01	7/8	9	5.13	20.1	10.00	254.0	15.0	6.82



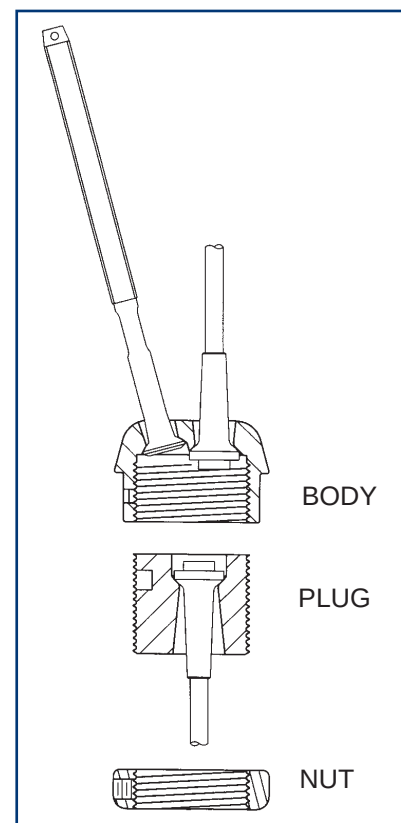
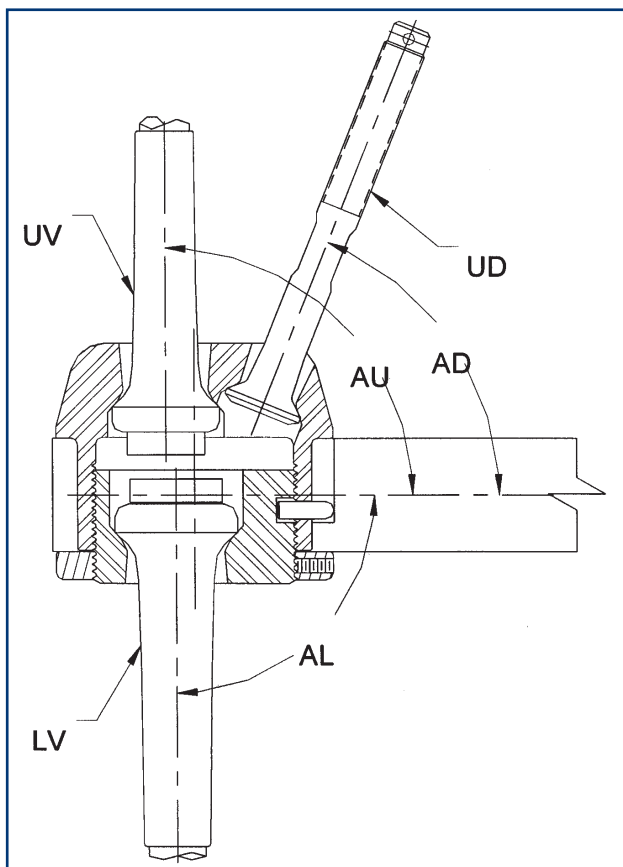
SPREADER TIP CUPS

Navtec has developed a comprehensive range of performance spreader tips designed to suit a wide range of sailing applications. Developed over many seasons, each has been optimized to offer a particular performance advantage. Finite Element Analysis (F.E.A.) modeling is used to help optimise the tip cups for weight reduction and long fatigue life.



L500 TIP CUPS

The L500 is the latest in Navtec's line of spreader end tip cups. The L500 incorporates Navtec's F235 Micro stemballs to provide superior fatigue resistance. They feature the same anti-rotational lock pin developed for the L528 range of tip cups and fit completely inside the spreader, significantly reducing sail chafe. The L500 is made from three parts, a body, a plug, and a locking nut to make installation easier. The part numbers for the L500 include all the information on rod sizes, diagonal ports and angles to allow the mast maker and riggers to choose the correct tip cup. See table below for more information on part numbers. The hole cutouts have been standardized throughout the line to allow the mast maker to build the spreader ends accurately once the rod sizes are determined.



L500 TIP CUP ANGLES AND PART NUMBERING

Part numbers for the L500 tip cup are as follows:-

L500-LV/UV/UD/SN

Where:

- LV = Lower Vertical Dash Size
- UV = Upper Vertical Dash Size
- UD = Upper Diagonal Screw Size in 32nds of an inch
- SN = Serial Number corresponding to the angle combinations shown below

If you are unsure about what to order, or if angles are still in question please forward rod sizes and angles to NAVTEC sales for the correct part numbering.

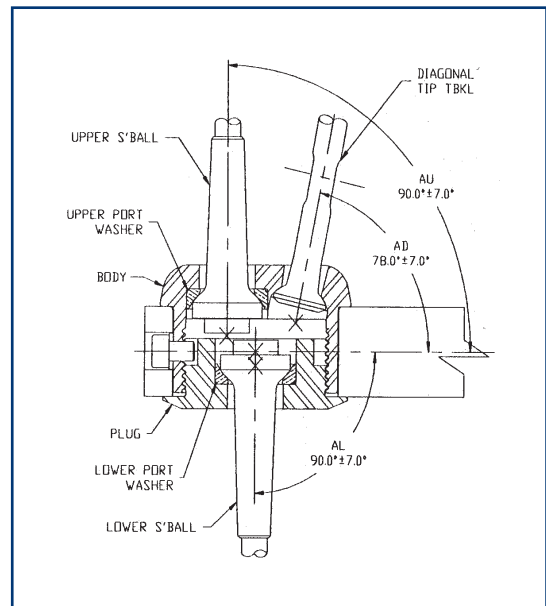
SN	AL	AU	AD
01	87° ±5°	90° ±5°	75° ±5°
02	89° ±5°	90° ±5°	80° ±5°
03	87° ±5°	90° ±5°	70° ±5°
04	90° ±5°	90° ±5°	75° ±5°
05	90° ±5°	90° ±5°	80° ±5°
06	90° ±5°	90° ±5°	70° ±5°
07	84° ±5°	90° ±5°	75° ±5°
08	84° ±5°	90° ±5°	80° ±5°
09	84° ±5°	90° ±5°	70° ±5°
10	ANY	ANY	ANY

L400 TIP CUP

Designed for “smaller” boats, the L400 spreader tip is a two-piece modular design for economy and flexibility. The body and plug are designed to accept 75 different rod combinations! Combinations available for:-

Lowers: -4, -6, -8, -10, -12
Uppers: -4, -6, -8, -10, -12
Diagonal: -4, -6, -8

Standardized for manufacturing economy, interchangeable seats are used for each rod size. Currently being used on many 30' designs, these tip cups make modern discontinuous rigging affordable for boats from 24-36 feet.



GRAND PRIX TIP CUPS

L834 MICRO TIP CUP

The L834 Micro Tip is made from ultra high strength stainless steel to reduce overall size and weight. The L834 Tip Cup is the choice of top IMS Grand Prix racers from the Maxi level down. Each Micro Tip Cup is engineered to minimize weight and size for each boats specific application.



L900 ALLOY TIP CUP

The L900 is the latest in Navtec's line of performance tip cups. The L900 Tip cup is made from high strength aluminum alloys to optimize weight. The L900 offers up to 50% weight savings over its comparable stainless steel counterparts. Developed for the 1998 Admiral's Cup winner Flash Gordon, they have become the standard on the IMS Grand Prix circuit. The L900 requires a little more care in handling and assembly, and requires routine inspection.



CUSTOM TIP CUPS

Navtec has many years of experience designing Tip Cups. Through the years Navtec has designed many custom Tip Cups from ILC 30's to our present line of titanium no stemball America's Cup range. Navtec engineers are constantly testing new designs incorporating new materials to stay on the leading edge of racing and Superyacht mast requirements. Please contact Navtec for more details.

TIP TURNBUCKLES

Tip Turnbuckles are the lightest method of adjusting small rod lengths, such as diagonal shrouds. Our range has been developed to offer accurate calibration, and are manufactured in a range of metals to suit your performance requirement.

C651 CHROME BRONZE

The C651 Tip Turnbuckle has a chrome-plated bronze body and high strength stainless ballhead screw. Adaptor washers (D342-T) may be required if a smaller diagonal rod size is used other than that specified in standard Tip Cups.



C880 NITRONIC 50

The C880 Tip Turnbuckle is part of Navtec's Series 800 IMS range. It offers weight savings comparable to the C780, but without the use of titanium.



C882 IN-LINE TURNBUCKLE

The C882 In-Line Turnbuckle is used on jumpers in place of a long screw tip turnbuckle. The center screw design allows for greater loads to be generated as is required in ILC yachts. This design also allows a smaller tang to be used than the tip turnbuckle system requires.



C651 BRONZE BODY TIP TURNBUCKLE

ROD SIZE	PART#	PORT SIZE (No adapter required ¹)	THREAD DIAM.		STROKE		BREAKING STRENGTH		WEIGHT	
			(in)	(mm)	(in)	(mm)	(lbs)	(kgs)	(lbs)	(grams)
-4	C651-004-08	D341-08	1/4	6.40	2.0	51	6200	2818	0.18	82
	C651-004-10	D341-10	5/16	8.00	2.2	56	10000	4545	0.38	172
-6	C651-006-10	D341-10	5/16	7.9	2.2	56	1000	4545	0.38	172
-8	C651-008-10	D341-10	5/16	7.9	2.2	56	13500	6136	0.38	172
-10	C651-010-12	D341-12	3/8	9.5	2.5	64	13500	6136	0.52	236
-12	C651-012-15	D341-14	7/16	11	2.8	71	20500	9318	0.84	381
-15	C651-014-16	D341-16	1/2	13	3.0	76	28000	12727	1.23	558
-17	C651-017-16	D341-16	1/2	13	3.0	76	28,000	12727	1.23	558
-22	C651-022-20	D341-20	5/8	16	3.6	91	41000	18636	2.08	943
-30	C651-030-20	D341-20	5/8	16	3.6	91	41000	18636	2.68	1215
-40	C651-402428A	D341-24	3/4	19.1	3.9	99	70000	31818	4.69	2127
-48	C651-482428B	D341-24	3/4	19.1	3.9	99	70000	31818	4.66	2113
-60	C651-602832B	D341-28	7/8	22.2	4.2	107	96000	43636	6.11	2771

1. Adaptor washers are required when a tip turnbuckle is used in a port larger than the indicated standard port.

C880 TIP TURNBUCKLE

ROD SIZE	PART#	PORT SIZE (No adapter required ¹)	THREAD DIAM.		STROKE		BREAKING STRENGTH		WEIGHT	
			(in)	(mm)	(in)	(mm)	(lbs)	(kgs)	(lbs)	(grams)
-6	C880-006-10	D341-10	5/16	7.9	1.9	48	10000	4545	0.27	122
-8	C880-008-10	D341-10	5/16	7.9	1.9	48	10000	4545	0.27	122
-10	C880-010-12	D341-12	3/8	9.5	2.0	51	13500	6136	0.39	177
-12	C880-012-14	D341-14	7/16	11.0	2.0	51	13500	6136	0.54	245
-15	C880-015-16	D341-16	1/2	13.0	2.1	53	28000	12727	0.72	327
-17	C880-017-16	D341-16	1/2	13.0	2.1	53	28000	12727	0.72	327
-22	C880-022-20	D341-20	5/8	16.0	2.9	74	41000	18636	1.40	635
-30	C880-030-20	D341-20	5/8	16.0	3.2	80	41000	18636	1.49	676
-40	C880-402428	D341-24	3/4	19.0	3.7	94	70000	31818	2.47	1120
-48	C880-482428	D341-24	3/4	19.0	3.7	94	70000	31818	2.88	1306
-60	C880-602832	D341-28	7/8	22.0	4.0	102	96000	43636	4.81	2182

1. Adaptor washers are required when a tip turnbuckle is used in a port larger than the indicated standard port.

C882 IN-LINE TURNBUCKLE

ROD SIZE	PART #	LENGTH				THREAD DIAM.	WEIGHT	
		OPEN (in)	OPEN (mm)	CLOSED (in)	CLOSED (mm)		(lbs)	(kg)
-4	C882-004L08	12.46	316.5	9.00	228.6	1/4 - 28	0.26	0.12
-6	C882-006L10	13.11	333.0	9.33	237.0	5/16 - 24	0.54	0.25
-8	C882-008L10	13.11	333.0	9.33	237.0	5/16 - 24	0.54	0.25
-10	C882-010L12	14.36	364.7	10.24	260.1	3/8 - 24	0.66	0.30
-12	C882-012L14	14.64	371.9	10.84	275.3	7/16 - 20	0.93	0.42
-15	C882-015L16	14.80	375.9	10.30	261.6	1/2 - 20	1.14	0.52
-17	C882-017L16	14.80	375.9	10.30	261.6	12/2 - 20	1.14	0.52
-22	C882-022L20	19.05	483.9	13.16	334.3	5/8 - 18	1.96	0.89
-30	C882-030L20	19.71	500.6	13.39	340.1	5/8 - 18	2.33	1.06
-40	C882-040L24	23.25	590.6	15.75	400.1	3/4 - 16	3.96	1.80
-48	C882-048L24	23.91	607.3	16.41	416.8	3/4 - 16	4.59	2.08
-60	C882-060L23	25.77	654.6	17.77	451.4	7/8 - 14	8.20	3.72

TURNBUCKLES - ROD & WIRE RIGGING

NAVTEC SERIES 500

Designed for strength and reliability, the 500 series is available for both rod and wire rigging. The 500 Series is made from 316 stainless steel and has the following features:-

C560

C550

C550
(-60 & larger)

C500

C500
Large Wire

C550 TURNBUCKLES FOR ROD

- Center screw design allows for easy adjustment under high load.
- The bronze center screw is nickel plated, which not only looks good but also provides lubricity to prevent galling.
- Available for -4 to -400. For turnbuckles -76 and larger, Navtec uses highly polished stainless steel bodies with bronze thread inserts to resist galling and high strength stainless screws to decrease the overall size and weight.
- The C560 prefix represents the marine eye version.
- Long Screw option available.

C500 TURNBUCKLES FOR WIRE

- The swage end, made from 316 stainless, is drilled through to allow the rigger to fully insert the wire before swaging and to allow water to drain from the fitting.
- The Series 500 Turnbuckles can be fitted with an extra long screw in the event the swage end has to be replaced or if the rigging is otherwise too short.
- C500 prefix designates the toggle end version, and the C510 represents the marine eye version.

ALSO SEE NORSEMAN ROD
TURNBUCKLES ON PAGE 10

RIGGING SPARES & ACCESSORIES

Navtec offers a full range of spare rigging parts. They include Standard Screws (D-320-S), Long Screws (D-320-L), Series 500 Rod Bodies, Series 500 Swage Ends, Jaw/Jaw Toggles, Eye/Jaw Toggles, Series 500 Eye Ends with Toggle and Clevis Pins.



SERIES 500 TURNBUCKLE

ROD SIZE	PART NUMBER	THREAD DIAM. (in) (mm)	PIN DIAM. (in) (mm)	LENGTH OPEN (1) (in) (mm)	LENGTH CLOSED (1) (in) (mm)	WEIGHT (lbs) (kg)
STANDARD TURNBUCKLES						
-4	C550-041012	5/16 7.9	3/8 9.5	12.35 314	8.53 217	0.47 0.21
-6	C550-061214	3/8 9.5	7/16 11.1	13.82 351	9.66 245	0.70 0.32
-8	C550-081416	7/16 11.1	1/2 12.7	15.13 384	10.43 265	1.25 0.57
-10	C550-101616	1/2 12.7	1/2 12.7	17.33 440	12.25 311	1.66 0.75
-12	C550-121620	1/2 12.7	5/8 15.9	18.62 473	13.00 344	1.72 0.78
-17	C550-172020	5/8 15.9	5/8 15.9	20.15 512	14.09 358	3.19 1.45
-22	C550-222424	3/4 19.1	3/4 19.1	23.85 606	17.37 441	5.51 2.50
-30	C550-302828	7/8 22.2	7/8 22.2	26.98 685	19.77 502	8.50 3.85
-40	C550-403232	1 25.4	1 25.4	29.26 743	21.65 550	11.50 5.22
-48	C550-483636	1 1/8 28.6	1 1/8 28.6	30.47 774	22.85 580	14.69 6.66
-60	C550-604040	1 1/4 31.8	1 1/4 31.8	32.80 883	24.98 634	22.90 10.39
-76	C550-763640A	1 1/8 28.6	1 1/4 31.8	34.12 867	25.13 638	24.33 11.03
-91	C550-914044A	1 3/8 34.9	1 1/4 31.8	40.10 1019	27.72 704	34.25 15.53
-115	C550-A24450	1 3/8 34.9	1 9/16 39.7	44.32 1126	30.74 781	44.90 20.36
-150	C550-A55256A	1 1/2 38.1	1 3/4 44.5	47.87 1216	31.29 795	73.00 33.11
-170	C550-A75260A	1 5/8 41.3	1 7/8 47.6	52.14 1324	37.14 943	82.00 37.19
-195	C550-A96068A	1 7/8 47.6	2 1/8 54.0	54.98 1396	37.20 945	106.00 48.07
-220	C550-B26072	1 7/8 47.6	2 1/4 57.2	65.23 1657	47.43 1205	139.00 63.05
-260	C550-B67678	2 3/8 60.3	2 7/16 61.9	57.80 1468	41.70 1059	178.00 80.73
-320	C550-C28084	2 1/2 63.5	2 5/8 66.7	58.00 1473	41.50 1054	220.00 99.80
-400	C550-D08480	2 5/8 66.7	2 1/2 63.5	58.72 1491	41.22 1047	265.00 120.18

1. Length based on pin center line to rod head.

COMMON REPLACEMENT PARTS

D510 SWAGE BODIES

PART NUMBER	WIRE DIAMETER (in)	THREAD DIAMETER (in)
D510-0510	5/32	5/16
D510-0610	3/16	5/16
D510-0612	3/16	3/8
D510-0710	7/32	5/16
D510-0712	7/32	3/8
D510-0714	7/32	7/16
D510-0812	1/4	3/8
D510-0814	1/4	7/16
D510-0816	1/4	1/2
D510-0914	9/32	7/16
D510-0916	9/32	1/2
D510-1016	5/16	1/2
D510-1020	5/16	5/8
D510-1220	3/8	5/8
D510-1424	7/16	3/4
D510-1628	1/2	7/8
D510-1828	9/16	7/8
D510-2032	5/8	1
D510-2440	3/4	1 1/4
D510-2844	7/8	1 3/8

D531 LH TURNBUCKLE EYE WITH TOGGLE

PART NUMBER	THREAD DIAMETER (in)	PIN DIAMETER (in)
D531-0808	1/4	1/4
D531-0810	1/4	5/16
D531-1010	5/16	5/16
D531-1012	5/16	3/8
D531-1212	3/8	3/8
D531-1214	3/8	7/16
D531-1414	7/16	7/16
D531-1416	7/16	1/2
D531-1616	1/2	1/2
D531-1620	1/2	6/8
D531-2020	5/8	5/8
D531-2424	3/4	3/4
D531-2828	7/8	7/8
D531-3232	1	1
D531-3632	1 1/8	1
D531-3636	1 1/8	1 1/8
D531-4040	1 1/4	1 1/4

RIG-RAP

Navtec's Rig-Rap rigging tape stretches to twice its length and sticks only to itself. It conforms easily to any turnbuckle or spreader tip fitting. Rig-Rap does not deteriorate in sunlight or salt water and will protect expensive sails from sharp edges.

Roll is 36' x 1". Part number: V100-01 (1 Roll), V100-02 (1 Case of 24 rolls).



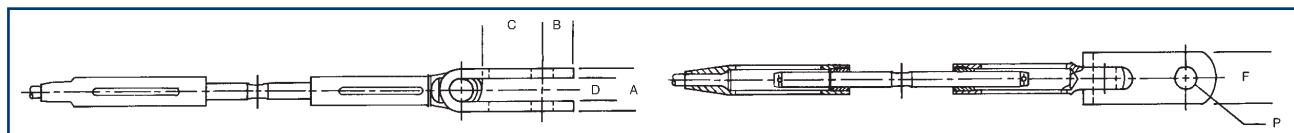
SERIES 890 TURNBUCKLES ADJUSTABLE BARREL PIN TERMINALS

These are the ultimate lightweight turnbuckle. These were born from the America's Cup and are now on the top ILC's, One Design classes and all of the new generation Maxi's. GP Terminals are calibrated for accurate tuning and are made from highly polished Nitronic 50.



C890 ADJUSTABLE BARREL PIN TERMINAL													
ROD SIZE	PART NUMBER	PIN SIZE		ROD STRENGTH		TERMINAL STRENGTH		LENGTH OPEN		LENGTH CLOSED		WEIGHT	
		(in)	(mm)	(lbs)	(kg)	(lbs)	(kg)	(in)	(mm)	(in)	(mm)	(lbs)	(kgs)
-10	C890-BP10001	1/2	12.7	10300	261620	14900	378460	8.11	205.994	6.11	155.194	0.73	18.542
-12	C890-BP12001	5/8	15.9	12500	317500	17880	454152	8.11	205.994	6.11	155.194	0.73	18.542
-15	C890-BP-15001	5/8	15.9	14250	361950	26520	673608	8.11	205.994	6.11	155.194	0.76	19.304
-17	C890-BP-17001	5/8	15.9	17500	444500	26520	673608	8.11	205.994	6.11	155.194	0.76	19.304
-22	C890-BP-22001	3/4	19.1	22500	571500	41290	1048766	9.007	228.7778	7.007	177.9778	1.49	37.846
-30	C890-BP-30001	7/8	22.2	30000	762000	44960	1141984	9.32	236.728	7.32	185.928	2.038	51.7652
-40	C890-BP-40001	1	25.4	36000	914400	72410	1839214	10.75	273.05	8.75	222.25	2.89	73.406
-48	C890-BP-48001	1 1/8	28.6	46000	1168400	72410	1839214	12.09	307.086	9.59	243.586	3.932	99.8728
-60	C890-BP-60001	1 1/4	31.8	59000	1498600	99350	2523490	20.31	515.874	16.81	526.974	10.43	264.922
-76	C890-BP-76001	1 1/4	31.8	76000	1930400	129290	3283966						
-91	C890-BP-91001	1 3/8	34.9	90000	2286000	166000	4216400						

SERIES 800 TURNBUCKLE - CALIBRATED



SERIES 800 TURNBUCKLE DIMENSIONS													
ROD SIZE	PART NUMBER	P		A		B		C		D		F	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
-8	C800-081014	0.5	12.7	0.82	20.828	0.7	17.78	1.12	28.448	0.45	11.43	1.13	28.702
-10	C800-101216	1/2	12.7	0.90	22.86	0.78	19.812	1.46	37.084	0.52	13.208	1.25	31.75
-12	C800-121420	5/8	15.875	1.02	25.908	0.84	21.336	1.46	37.084	0.52	13.208	1.38	35.052
-15	C800-151620	5/8	15.875	1.02	25.908	0.93	23.622	1.54	39.116	0.65	16.51	1.6	40.64
-17	C800-171620	5/8	15.875	1.02	25.908	0.93	23.622	1.54	39.116	0.65	16.51	1.6	40.64
-22	C800-222024	3/4	19.05	1.27	32.258	1.19	30.226	1.69	42.926	0.77	19.558	2	50.8
-30	C800-302028	7/8	22.225	1.68	42.672	1.19	30.226	2.14	54.356	0.88	22.352	2	50.8
-40	C800-402432	1	25.4	1.79	45.466	1.45	36.83	2.54	64.516	1.04	26.416	2.5	63.5
-48	C800-482436	1 1/8	28.575	2.17	55.118	1.45	36.83	2.78	70.612	1.17	29.718	2.5	63.5
-60	C800-602840	1 1/4	31.785	2.29	58.166	1.82	46.228	3.62	91.948	1.29	32.766	3	76.2
-76	C800-763240L	1 1/4	31.75	2.29	58.166	1.82	46.228	3.50	88.9	1.29	32.766	3	76.2
-91	C800-913644L	1 3/8	34.925	2.65	76.31	1.82	46.228	3.80	96.51	1.4	35.56	3	76.2
-115	C800-A24450L	1 9/16	39.6875	2.88	73.152	2.25	57.15	4.16	105.664	1.63	41.402	3.75	95.25
-150	C800-A55256L	1 3/4	44.45	3.31	84.074	2.43	61.722	4.52	114.808	1.81	45.974	4	101.6
-170	C800-A75660L	1 7/8	47.625	3.42	86.868	3.13	79.502	4.63	117.602	1.92	48.768	5	127
-195	C800-A96068L	2 1/8	53.975	3.67	93.218	3.35	85.09	4.80	121.92	2.17	55.118	5.5	139.7
-220	C800-B26472L	2 1/4	57.15	3.86	98.044	3.70	93.98	5.12	130.048	2.38	60.452	6	152.4
-260	C800-B67678L	2 7/16	61.9125	4.45	113.03	3.50	88.9	4.27	108.458	2.45	62.23	6	152.4

DOUBLE TOGGLE C600

Double Toggle Turnbuckles offer the ultimate in reliability and flexibility. With toggles at both ends, these turnbuckles are most often used with wire fitted with Norseman-type eyes. They will accommodate wire from $\frac{5}{32}$ " (4 mm) to $1\frac{1}{4}$ " (32 mm) and rod from -4 to -400.



C600 DOUBLE TOGGLE TURNBUCKLES

PART NUMBER	SCREW SIZE		PIN SIZE		ROD SIZE	WIRE SIZE		LENGTH OPEN		LENGTH CLOSED	
	(in)	(mm)	(in)	(mm)		(in)	(mm)	(in)	(mm)	(in)	(mm)
C600-001010	5/16	7.9	5/16	7.9	-3	5/32	4.0	14.5	368.3	11.0	279.4
C600-001012	5/16	7.9	3/8	9.5	-4	3/16	4.8	14.5	368.3	11.0	279.4
C600-001212	3/8	9.5	3/8	9.5	-4	7/32	5.6	16.0	406.4	12.5	317.5
C600-001214	3/8	9.5	7/16	11.1	-6	1/4	6.4	16.0	406.4	12.5	317.5
C600-001414	7/16	11.1	7/16	11.1	-6	1/4	6.4	17.5	444.5	13.3	336.6
C600-001416	7/16	11.1	1/2	12.7	-8	9/32	7.1	17.5	444.5	13.3	336.6
C600-001616	1/2	12.7	1/2	12.7	-8, -10	9/32	7.1	20.5	520.7	16.0	406.4
C600-001620	1/2	12.7	5/8	15.9	-12	5/16	7.9	20.5	520.7	16.0	406.4
C600-002020	5/8	15.9	5/8	15.9	-12, -17	3/8	9.5	23.6	600.2	18.4	466.9
C600-002424	3/4	19.1	3/4	19.1	-22	7/16	11.1	27.1	689.1	21.8	552.5
C600-002828	7/8	22.2	7/8	22.2	-30	9/16	14.3	30.3	768.4	24.0	609.6
C600-003232	1	25.4	1	25.4	-40	9/16	14.3	33.3	844.6	26.8	679.5
C600-003636	1 1/8	28.6	1 1/8	28.6	-48	5/8	15.9	34.8	882.7	28.3	717.6
C600-004040	1 1/4	31.8	1 1/4	31.8	-60	3/4	19.1	37.5	952.5	30.5	774.7
C600-003640	1 1/8	28.6	1 1/4	31.8	-76	7/8	22.2	40.5	1028.7	31.5	800.1
C600-004044	1 1/4	31.8	1 3/8	34.9	-91	1	25.4	46.9	1190.8	35.9	911.4
C600-004448	1 3/8	34.9	1 1/2	38.1	-115	1 1/8	28.6	51.3	1301.8	39.3	997.0
C600-004856	1 1/2	38.1	1 3/4	44.5	-150	1 1/4	31.8	59.5	1511.3	45.5	1155.7
C600-005260	1 5/8	41.3	1 7/8	47.6	-170	N/A	N/A	63.3	1606.6	48.3	1225.6
C600-006068	1 7/8	47.6	2 1/8	54.0	-195	N/A	N/A	66.9	1698.8	50.9	1292.4

STAINLESS STEEL TURNBUCKLE COVERS

Stainless steel turnbuckle covers add the finishing touch to your boat. Covers for all turnbuckles come with a black Delrin® tip to grip the rod or wire and a supporting gasket which threads onto the turnbuckle screw.

Series 500 Covers are:

Part number D550-CA-xxx (specify wire or rod size).

Series 800 Covers are:

Part number D800-CA-xxx (specify rod size).



INSULATORS

The P100 Insulator offers superior electrical and strength characteristics and when compared to other insulators, Navtec Insulators are designed to have low capacitance and low internal dissipation even at fairly high transmitter powers. This makes it easier to tune the antenna and also improves radio performance.

Navtec's insulators are designed to be an integral part of your backstay rigging, with a greater breaking strength than the rod or wire itself. They are designed to be used at high sustained loads even in tropical sun.

These Insulators are available with various end configurations. Direct connection to the rod is possible with a rod cap or an eye or jaw can be fitted instead. Swages to adapt to 1 x 19 wire are also available. When ordering insulators, one must order the body plus appropriate end fittings.



INSULATOR & TERMINATION

ROD SIZE	1 X 19 WIRE	INSULATOR BODY	ROD CAP	SWAGE	EYE	JAW	THREAD SIZE		BODY O.D.		LENGTH "L"		BODY WEIGHT	
							(in)	(mm)	(in)	(mm)	(in)	(mm)	(lbs)	(grams)
-6	7/32	P100-10A	P101-08-006A	P110-0716A	G701-010	H123-161414	1/2	12.7	1.25	31.8	11.26	286.0	1.13	512
-8	1/4	P100-10A	P101-08-008A	P110-0816A	G701-010	H123-161616	1/2	12.7	1.25	31.8	11.26	286.0	1.13	512
-10	9/32	P100-10A	P101-08-010A	P110-0916A	G701-010	H123-161616	1/2	12.7	1.25	31.8	11.26	286.0	1.13	512
-12	5/16	P100-17A	P101-08-012A	P110-1020A	G701-017	H123-202020	5/8	15.9	1.88	47.8	13.04	331.2	2.88	1306
-17	3/8	P100-17A	P101-08-017A	P1101220A	G701-017	H123-202020	5/8	15.9	1.88	47.8	13.04	331.2	2.88	1306
-22	7/16	P100-22A	P101-08-022A	P110-1424A	G701-022	H123-242424	3/4	19.1	2.00	50.8	14.44	366.8	3.81	1728
-30	1/2	P100-30A	P101-08-030A	P110-1628A	G701-030	H123-282828	7/8	22.2	2.25	57.2	15.77	400.6	5.50	2494
-40	9/16	P100-40A	P101-08-040A	P110-1832A	G701-040	H123-323232	1	25.4	2.50	63.5	17.02	432.3	7.38	3347
-48	5/8	P100-48A	P101-08-048A	P110-2032A	G701-048	H123-323636	1	25.4	3.00	76.2	19.31	490.5	10.81	4902
-60	3/4	P100-60A	P101-08-060A	P110-2440A	G701-060	H123-404040	1 1/4	31.8	3.00	76.2	22.25	565.2	16.00	7256
-76	7/8	P100-76A	P101-08-076A	P110-2844A	G701-075	N/A	1 3/8	34.9	3.50	88.9	24.11	612.4	N/A	N/A
-91	1	P100-91A	P101-08-091A	P110-3248A	G701-091	N/A	1 1/2	38.1	3.50	88.9	26.83	681.5	N/A	N/A
-115	1 1/8	P100-115A	P101-08-115A	P110-3648A	G701-115	N/A	1 1/2	38.1	4.50	114.3	29.35	745.5	N/A	N/A
-150	1 1/4	P100-150A	P101-08-150A	P110-4052A	G701-150	N/A	1 5/8	41.3	5.13	130.3	34.47	875.5	N/A	N/A

1. Other Specifications -
Resistance: >10 ^8 ohns
Capacitance: Approx. 60 pf
Electrical Breakdown: >8000 volts wet or dry. (Sprayed with salt water and drained for approx. 1 second)
2. Design changes have been made to allow swage ends and rod caps to be roll pinned to the insulator body. Eyes and Jaws should be dinged to the insulator.

LOAD METER SYSTEM

GRAND PRIX LOAD PIN

Racing yachts use the Grand prix Load Pin in the forestay to measure loads. This information enables the racing sailor to reproduce fast settings for given conditions and to keep the same runner tension from tack to tack.

With the increased use of technology in the design and tuning of the sail plan, it becomes increasingly important to measure rig loads throughout the whole rig. Some superyachts use Custom Grand Prix Load Pins to measure the load in forestay, running backstay, deck level vertical and diagonal shrouds. The gathered data can be used for tuning the rig and trimming sails to achieve optimum performance. Designers can access the information to help them better understand the loads that superyacht rigs experience.

The Grand Prix Load Pin is installed in place of a standard clevis pin and is connected to a Signal Processor (P240) and Display Unit (P250). The system is compact, low weight and can be utilized anywhere within the rig where knowledge of load will give a performance or safety advantage. The unit interfaces with the Navtec Signal Processor (P240) and Display Unit (P250). The display unit(s) can be positioned at any convenient location and are backlit.

Alternatively the readout information can be displayed through the yacht's instruments.



APPLICATIONS

FORESTAY

For repeatable accuracy of backstay tension and control of forestay sag.

SHROUDS

Knowledge of main rig loads from tack to tack.

RUNNER

Actual load through runner winch.

LOWER DIAGONALS

Reads side force on mast.

PART #	PRODUCT CODE	DESCRIPTION
P230-010	1200	Grand Prix Load Pin Trans, 1/2" Pin
P230-017	1200	Grand Prix Load Pin Trans, 5/8" Pin
P230-022	1200	Grand Prix Load Pin Trans, 3/4" Pin
P230-030	1200	Grand Prix Load Pin Trans, 7/8" Pin
P230-040	1200	Grand Prix Load Pin Trans, 1" Pin

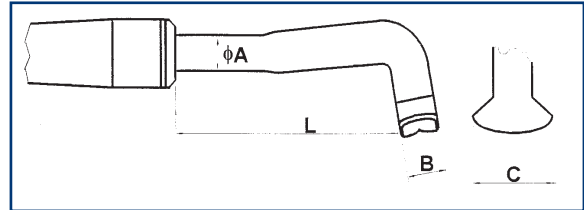
NAVTEC FIBER CABLE TERMINATIONS

ARAMID FIBERS - HIGH MODULUS POLYETHYLENE COVERED (HMPE) FITTINGS

A range of low weight, high strength 17-4 stainless steel fittings are available for use with high modulus Fiber Cable. Titanium options are available. These have been developed to offer the highest strength and lowest weight to gain maximum advantage for terminal bodies and reducers. Standard end fittings are made from 316 Stainless steel.

Note: Only Navtec Fiber cable using Navtec terminal bodies, cones, and reducers will be covered by the standard Navtec warranty policy.

T BALL FOR FIBER CABLE



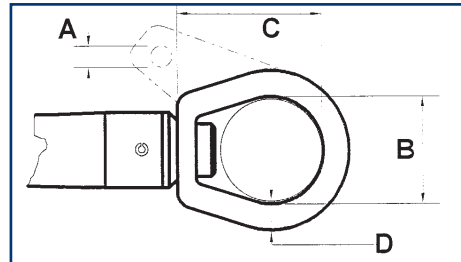
T BALL FOR ARAMID FIBER CABLE

PART NO.	CABLE SIZE	METRIC DIMENSIONS				WEIGHT *
		L (mm)	ØA (mm)	B (mm)	C (mm)	
R572-09-03T01	3T	97	12.5	14.3	26.8	265
R572-09-03T81	3.8T	102	14.3	14.3	27.5	287
R572-09-05T01	5T	102	14.3	14.3	27.5	474
R572-09-07T01	7T	128	16.0	18.0	32.5	548
R572-09-09T01	9T	146	18.0	18.0	33.5	768

PART NUMBER	TON [T]	USA - IMPERIAL DIMENSIONS				WEIGHT *
		L (in)	A (in)	B (in)	C (in)	
R572-09-03T01	3.0T	3.82	0.49	0.56	1.06	0.58
R572-09-03T81	3.8T	4.02	0.56	0.56	1.08	0.63
R572-09-05T01	5T	4.02	0.56	0.56	1.08	1.04
R572-09-07T01	7T	5.04	0.63	0.71	1.28	1.21
R572-09-09T01	9T	5.75	0.71	0.71	1.32	1.69

* Total weight of stainless steel fitting with T Ball.

SWIVEL EYE FOR FIBER CABLE



SWIVEL EYE FOR ARAMID FIBER CABLE

PART NO.	CABLE SIZE	METRIC DIMENSIONS			WEIGHT *
		ØB (mm)	C (mm)	ØD (mm)	
R572-10-03T01	3T	23	33.5	6.5	154
R572-10-03T81	3.8T	28	39.0	7.8	180
R572-10-05T01	5T	32	47.0	9.3	274
R572-10-07T01	7T	37	54.0	11.0	401
R572-10-09T01	9T	42	60.0	12.2	629

PART NUMBER	TON [T]	USA - IMPERIAL DIMENSIONS			WEIGHT *
		B (in)	C (in)	D (in)	
R572-10-03T01	3T	0.91	1.32	0.26	0.34
R572-10-03T81	3.8T	1.10	1.54	0.31	0.40
R572-10-05T01	5T	1.26	1.85	0.37	0.60
R572-10-07T01	7T	1.46	2.13	0.43	0.88
R572-10-09T01	9T	1.65	2.36	0.48	1.39

* Total weight of stainless steel fitting with Swivel Eye

KEVLAR is a registered trade mark of Du Pont.

TOGGLE FORK FOR FIBER CABLE



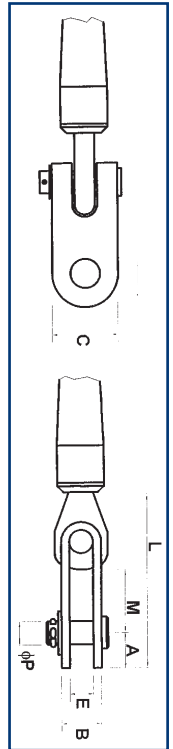
TOGGLE FORK FOR ARAMID FIBER CABLE

PART NO.	CABLE SIZE	METRIC DIMENSIONS							WEIGHT *
		L (mm)	A (mm)	B (mm)	C (mm)	E (mm)	M (other)	ØP (mm)	
R572-08-03T01	3T	75	11.0	18.0	25.0	11.5	21	9.5	132
R572-08-03T81	3.8T	78	16.0	21.0	30.0	14.0	28	10.9	266
R572-08-05T01	5T	79	16.0	21.0	30.0	14.0	27	10.9	331
R572-08-07T01	7T	103	20.0	28.5	30.0	18.3	39	12.5	515
R572-08-09T01	9T	118	21.0	30.5	40.0	20.0	46	15.8	890
R572-08-12T01	12T	148	28.0	37.0	50.0	24.0	53	18.9	1569
R572-08-15T01	15T	161	27.0	45.0	51.0	25.3	59	22.2	2200
R572-08-20T01	20T	162	27.0	45.0	51.0	25.3	59	22.2	2455
R572-08-25T01	25T	171	31.0	48.0	64.0	27.0	63	25.2	3442
R572-08-31T01	31T	192	36.0	57.0	64.0	31.0	66	25.4	4600†
R572-08-43T01	43T	215	41.0	60.0	76.5	34.0	78	31.7	6400†
R572-08-54T01	54T	250	44.0	70.0	76.5	38.0	99	34.9	9300†

PART #	TON [T]	USA - IMPERIAL DIMENSIONS							WEIGHT*
		L (in)	A (in)	B (in)	C (in)	E (in)	M (in)	PØ (in)	
R572-08-03T01	3.0T	2.95	0.43	0.71	0.98	0.45	0.83	0.37	0.599
R572-08-03T81	3.8T	3.07	0.63	0.83	1.18	0.55	1.10	0.43	1.207
R572-08-05T01	5T	3.11	0.63	0.83	1.18	0.55	1.06	0.43	1.501
R572-08-07T01	7T	4.06	0.79	1.12	1.18	0.72	1.54	0.49	2.336
R572-08-09T01	9T	4.65	0.83	1.20	1.57	0.79	1.81	0.62	4.037
R572-08-12T01	12T	5.83	1.10	1.46	1.97	0.94	2.09	0.74	7.117
R572-08-15T01	15T	6.34	1.06	1.77	2.01	1.00	2.32	0.87	9.979
R572-08-20T01	20T	6.38	1.06	1.77	2.01	1.00	2.32	0.87	11.136
R572-08-25T01	25T	6.73	1.22	1.89	2.52	1.06	2.48	0.99	15.613
R572-08-31T01	31T	7.56	1.42	2.24	2.52	1.22	2.60	1.00	20.910†
R572-08-43T01	43T	8.46	1.61	2.36	3.01	1.34	3.07	1.25	29.090†
R572-08-54T01	54T	9.84	1.73	2.76	3.01	1.50	3.90	1.37	42.270†

* Total weight of stainless steel fitting with Double Jaw Toggle.

† Estimated figures



MARINE EYE FOR FIBER CABLE



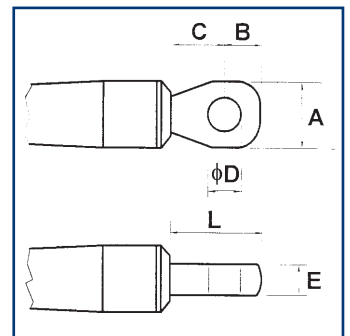
MARINE EYE FOR ARAMID FIBER CABLE

PART #	CABLE SIZE	METRIC DIMENSIONS						WEIGHT *
		L (mm)	A (mm)	B (mm)	C (mm)	ØD (mm)	E (mm)	
R572-07-03T01	3T	29	20	12	17.0	9.7	9.0	138
R572-07-03T81	3.8T	35	24	11	24.0	11.3	10.2	152
R572-07-05T01	5T	38	28	13	25.0	11.3	11.0	215
R572-07-07T01	7T	43	29	15	28.0	13.0	12.5	301
R572-07-09T01	9T	53	34	18	35.0	16.0	13.5	515
R572-07-12T01	12T	67	42	21	46.0	19.2	18.5	891
R572-07-15T01	15T	73	48	25	48.0	22.5	18.5	1088
R572-07-20T01	20T	73	49	24	49.0	22.5	21.0	1337
R572-07-25T01	25T	75	55	27	48.0	25.7	24.0	1802
R572-07-31T01	31T	84	57	29	55.0	29.0	26.0	2325
R572-07-43T01	43T	93	63	38	55.0	32.0	29.0	3200†
R572-07-54T01	54T	103	63	42	61.0	35.0	31.5	4700†

PART #	TON [T]	USA - IMPERIAL DIMENSIONS						WEIGHT *
		L (in)	A (in)	B (in)	C (in)	D (in)	E (in)	
R572-07-03T01	3T	1.14	0.79	0.47	0.67	0.38	0.35	0.30
R572-07-03T81	3.8T	1.38	0.94	0.43	0.94	0.44	0.40	0.34
R572-07-05T01	5T	1.50	1.10	0.51	0.98	0.44	0.43	0.97
R572-07-07T01	7T	1.69	1.14	0.59	1.10	0.51	0.49	0.66
R572-07-09T01	9T	2.09	1.34	0.71	1.38	0.63	0.53	1.14
R572-07-12T01	12T	2.64	1.65	0.83	1.81	0.76	0.73	1.96
R572-07-15T01	15T	2.87	1.89	0.98	1.89	0.89	0.73	2.40
R572-07-20T01	20T	2.87	1.93	0.94	1.93	0.89	0.83	2.95
R572-07-25T01	25T	2.95	2.17	1.06	1.89	1.01	0.94	3.97
R572-07-31T01	31T	3.31	2.24	1.14	2.17	1.14	1.02	5.12
R572-07-43T01	43T	3.66	2.48	1.50	2.17	1.26	1.14	7.05†
R572-07-54T01	54T	4.06	2.48	1.65	2.40	1.38	1.24	10.36†

* Total weight of stainless steel fitting with marine eye.

† Estimated figures



HYDRAULIC SYSTEMS

IF YOU PUSH, PULL, TENSION OR SUPPORT, NAVTEC

HAS AN INNOVATIVE WAY TO HANDLE THE JOB

HEADSTAY LOADCELL

View the changing pressure from a cockpit read out and adjust the backstay for improved windward performance

FLATTENER/OUTHAUL

Flatten the mainsail fast, from the cockpit

CONTROL PANEL

Choice of Systems 50 (4 function) System VII, or Custom System

VANG

Push button quick release

MAIN SHEET TRAVELER

A special dual action cylinder allows you to play the boom athwartships for increased speed to windward

INNER FORESTAY TENSION

BABYSTAY TENSION

Trim tension to induce mast bend, especially when reefed

HALYARD TENSION

Adjust between strong or light wind conditions

CUNNINGHAM

Fine tune the mainsail luff tension

CHECKSTAYS

Fine trim to change the depth of camber in the mainsail

MAST JACK

Tension the rig for sailing, or lower it for unstepping, but with repeatable accuracy

VANG

Trim the boom height for strong or light winds to improve mainsail performance. It pulls and pushes!

CENTERBOARD CYLINDER

Adjust height with a hydraulics system

GENOA CAR PULLERS

Change the headsail shape by adjustment to the clew sheeting position

BACKSTAY

Control mast tip tension and upper leech shape

TRANSOM DOOR CYLINDERS

SYSTEM 50 HYDRAULIC PANELS

The System 50 Panel is the heart of the standard Navtec hydraulic system and has been completely re-designed to suit the changing needs of both racing and cruising yachts from 35' to 70'.

FEATURES INCLUDE:

1. ERGONOMIC DESIGN

The 4-function design is more compact and lighter than ever before, and positions all controls - gauge, function and power - in one line, making the selection quick and easy. Function selection can be 'felt' through the selector, an especially important feature at night.

2. EASY OPERATION

Reliable, controlled flow; needle-type release valve.

3. INCREASED SPEED

Offering faster response. New valves and high pressure piping allow for an increased flow rate, increasing the oil flow speed, and in turn the power response. This is an important factor when large adjustments, such as boom vang or backstay control need to be made.

4. LARGER GAUGE

Now more easily read, the gauge monitors system pressure on the selected function enabling you to accurately repeat settings for best boat speed.

5. AUTO-SHIFT PUMP

A two speed auto-shift pump can be fitted to the system for higher performance. This is the fast, efficient method when power is required quickly, often in a racing environment. From coarse pump (high volume) the auto-shift feature switches to fine pump (high pressure) automatically for quick, seamless operation.

6. POWER INTERFACE

Now easily interfaced with all leading winch powerpacks - Lewmar Commander and Harken Hydro. Hydraulic power is then supplied from the power source which is accurately controlled through the System 50 panel. Further high pressure trimming can be added by hand pumping when required.

7. PROTECTION

Navtec's relief valve provides immediate pressure relief protection for the selected function when the system experiences excessive overloads.

8. SAFETY

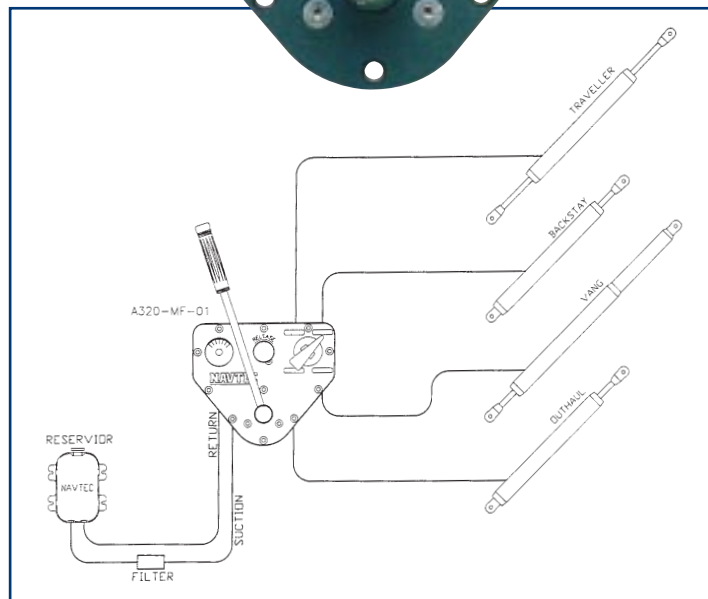
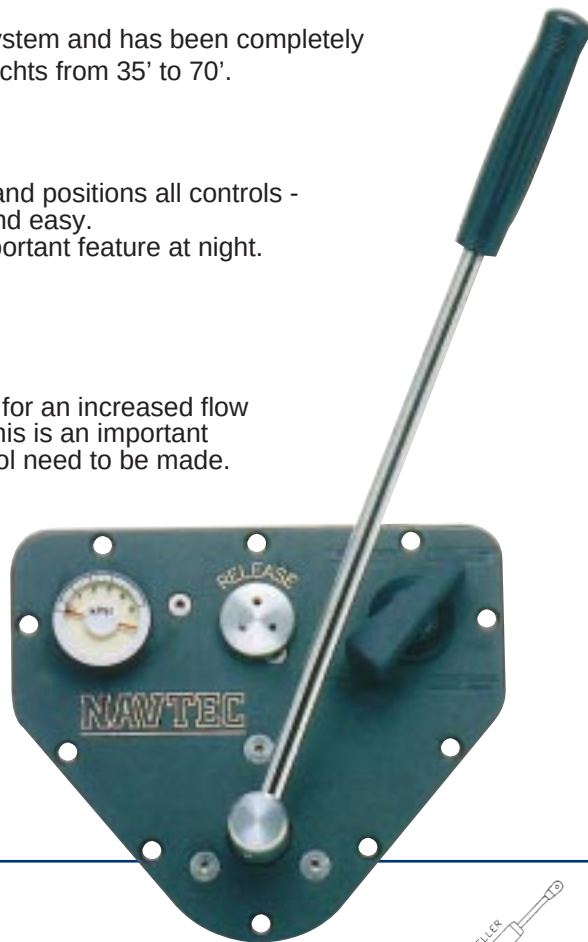
The pump is operated from the safety of the cockpit.

9. FINISH

Panel faces are available in black anodised finish, or stainless steel (custom order).

10. RESERVOIR

System includes standard 2 quart reservoir. (4 quart reservoir available for additional capacity.)



SYSTEM 50 - MAXIMUM 4 FUNCTIONS

DESCRIPTION	PART #	MAXIMUM DIMENSIONS		DEPTH	
		(in)	(mm)	(in)	(mm)
Single Function	A320-SF-01	10 x 8.5	254 x 216	4.25	108
Multi-Function ²	A320-MF-01	10 x 8.5	254 x 216	4.50	115
Single Function with 2 Speed Auto-Shift Pump ³	A320-SF-02	10 x 8.5	254 x 216	6.00	153
Multi-Function with 2 Speed Auto-Shift Pump	A320-MF-02	10 x 8.5	254 x 216	6.00	153
Single-Function with 4-Way Valve ⁴	A320-SF4-01	10 x 8.5	254 x 216	4.50	115
Single to Multi Conversion Kit	A320-SMC-01			4.50	115

1. System includes pump, valves, reservoir, filter, hose and handle.
2. Can be used as a 1, 2, 3 or 4 function panel.
3. Two-speed Auto-Shift pump has 300% greater low pressure flow rate of oil.
4. The 4-Way Valve is to control push-pull cylinders.

- Stainless steel face plates can be ordered by adding an 'S' to the end of the part number i.e. A320-MF-01S

SYSTEM VII LIGHTWEIGHT HYDRAULIC PANELS

System VII Lightweight Hydraulic Panels (A360) are the heart of the hydraulic systems aboard ULDB, IMS, Whitbread Round The World, Grand Prix and America's Cup yachts. These panels feature the two-speed, automatic shift pump. In addition, System VII Panels use the lightweight FAC valves (Fast Acting Control) for higher flow. FAC valves have three positions: pump, hold tension and release, which are indicated by the knob position.

Navtec achieves lightweight by meticulously sculpting excess material from valve blocks and pumps, a titanium pump shaft, and in some cases by removing the gauges. Non-titanium versions are available where class rules prohibit its use, such as IMS and W-60.



SYSTEM VII HYDRAULIC PANELS

PANEL NUMBER	DESCRIPTION	PANEL DIMENSION (6)		DEPTH		WEIGHT			
		(in)	(mm)	(in)	(mm)	(lbs)	(kgs)		
SYSTEM									
A360-L00-01	Single Function	8.2	x 6.75	208	x 171	6	153	9.1	4.1
A360-L00-02	2 Function	11.5	x 6.75	292	x 171	6	153	11.9	5.4
A360-L00-03	3 Function	14.8	x 6.75	376	x 171	6	153	15.5	7.0
A360-L00-04	4 Function (3)	17.6	x 6.75	447	x 171	6	153	18.3	8.3
COMPONENTS (5)									
A360-PO-02	Autoshift Pump-only panel	4.75	x 6.5	121	x 165	6	153	3.8	1.7
VALVE/GAUGE MANIFOLD (4)									
A360-VGM-01	Single Function	5.75	x 6.75	146	x 171	5.5	140	3.0	1.4
A360-VGM-02	2 Function	9.0	x 6.75	229	x 171	5.5	140	5.8	2.6
A360-VGM-03	3 Function	12.3	x 6.75	311	x 171	5.5	140	8.6	3.9
A360-VGM-04	4 Function (3)	15.5	x 6.75	394	x 171	5.5	140	11.4	5.2

1. Panels of other configurations available.

2. Includes pump, 2 quart reservoir, filter and reservoir hose.

3. Additional function controls available.

4. Does not include pump.

5. These do not include reservoir, filter or hose.

6. For cutout dimension, subtract 1.5" (38 mm) from panel dimension.

NAVTEC CYLINDERS

With over 20 years of experience and an on-going research and development program, Navtec is uniquely qualified to produce the highest quality, most durable cylinders available. Tighter tolerances, the added control of in-house design and manufacture, specification of only the highest grade materials and finishes all combine to give the yacht owner the lightest, smallest, most attractive cylinders, as well as the best long term value. Custom length cylinders can be made to order.

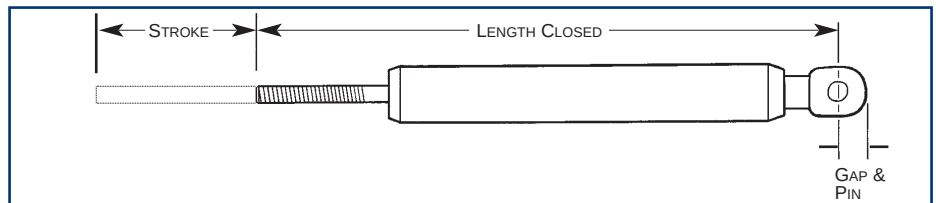
STANDARD & STAINLESS STEEL CYLINDERS

Navtec Cylinders are designed to help minimize weight and windage, without sacrificing reliability. The Standard range is available in sizes -6 through -150 in a standard (SE) and long versions (LE). Longer stroke flattening reef cylinders (FE) are also available in sizes -6 through -40. The flattener comes complete with a black hard-coated alloy rod jaw.

Navtec's standard range of cylinders is made from the highest quality components suitable for the marine environment. The cylinder rods are made from a highly polished 316 stainless steel. The cylinder tube, lower clevis and cap are all black hard-coated aluminum. The cylinder bores are specially polished for longer seal life.

Navtec also offers a range of Stainless steel cylinders. Stainless steel cylinders are available in the standard and long configuration in sizes -6 through -90. Larger sizes are also available, please contact Navtec with your specific needs.

Navtec can also provide custom cylinders for any application. Using titanium parts on special order basis can save weight. Please contact Navtec with your specific needs.



HP CYLINDER SPECIFICATIONS

PART NUMBER ³	CYLINDER SIZE	PISTON ROD SIZE		FORCE AT MAX RELIEF VALVE SETTING ¹		BREAKING STRENGTH		MAX. WIRE SIZE		GAP & PIN		LENGTH CLOSED ²		LENGTH EXTENDED		STROKE	
		(in)	(mm)	(lb)	(kg)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
A250-SE-006	-6	7/16	11.2	3195	1449	9400	4263	7/32	5.6	7/16	11.2	18.7	475.0	27.7	703.6	9.0	228.6
A250-LE-006	-6	7/16	11.2	3195	1449	9400	4263	7/32	5.6	7/16	11.2	23.2	589.3	36.7	932.2	13.5	342.9
A250-FE-006	-6	7/16	11.2	3195	1449	9400	4263	7/32	5.6	7/16	11.2	29.9	759.5	49.9	1247.5	20.0	508.0
A250-SE-010	-10	1/2	12.7	5809	2634.5	12000	5442.2	9/32	7.0	1/2	12.7	19.3	490.2	28.3	818.8	9.0	228.6
A250-LE-010	-10	1/2	12.7	5809	2634.5	12000	5442.2	9/32	7.0	1/2	12.7	23.8	604.5	37.3	947.4	13.5	342.9
A250-FE-010	-10	1/2	12.7	5809	2634.5	12000	5442.2	9/32	7.0	1/2	12.7	31.0	787.4	51.0	1295.4	20.0	508.0
A250-SE-012	-12	5/8	15.9	7635	3462.6	18000	8163	5/16	8.0	5/8	15.9	20.9	530.9	30.9	784.9	10.0	254.0
A250-LE-012	-12	5/8	15.9	7635	3462.6	18000	8163	5/16	8.0	5/8	15.9	25.6	650.2	39.8	1010.9	14.2	360.7
A250-FE-012	-12	5/8	15.9	7635	3462.6	18000	8163	5/16	8.0	5/8	15.9	36.1	916.9	60.1	1526.5	24.0	609.6
A250-SE-017	-17	5/8	15.9	10880	4934.2	21000	9524	3/8	9.6	5/8	15.9	21.0	533.4	30.5	774.7	9.5	241.3
A250-LE-017	-17	5/8	15.9	10880	4934.2	21000	9524	3/8	9.6	5/8	15.9	25.7	652.8	39.9	1013.5	14.2	360.7
A250-FE-017	-17	5/8	15.9	10880	4934.2	21000	9524	3/8	9.6	5/8	15.9	42.9	1089.7	72.9	1851.7	30.0	762.0
A250-SE-022	-22	3/4	19.0	13942	6322.9	30000	13605	7/16	11.2	3/4	19.0	23.0	584.2	33.0	838.2	10.0	254.0
A250-LE-022	-22	3/4	19.0	13942	6322.9	30000	13605	7/16	11.2	3/4	19.0	28.0	711.2	43.0	1092.2	15.0	381.0
A250-FE-022	-22	3/4	19.0	13942	6322.9	30000	13605	7/16	11.2	3/4	19.0	49.4	1254.8	84.4	2143.8	35.0	889.0
A250-SE-030	-30	7/8	22.2	22090	10018	40000	18141	1/2	12.7	7/8	22.2	26.3	668.0	37.3	947.4	11.0	279.4
A250-LE-030	-30	7/8	22.2	22090	10018	40000	18141	1/2	12.7	7/8	22.2	31.8	807.7	48.3	1226.8	16.5	419.1
A250-FE-030	-30	7/8	22.2	22090	10018	40000	18141	1/2	12.7	7/8	22.2	56.4	1432.6	96.4	2448.6	40.0	1016.0
A250-SE-040	-40	1	25.4	32198	14602	52000	23583	5/8	15.9	1	25.4	28.3	718.8	40.3	1023.6	12.0	304.8
A250-LE-040	-40	1	25.4	32198	14602	52000	23583	5/8	15.9	1	25.4	34.3	871.2	52.3	1328.4	18.0	457.2
A250-FE-040	-40	1	25.4	32198	14602	52000	23583	5/8	15.9	1	25.4	63.1	1602.7	108.1	2745.7	45.0	1143.0
A250-SE-048	-48	1	25.4	32198	14602	77000	34921	3/4	19.0	1 1/8	28.4	28.84	732.5	40.84	1027.3	12.0	304.8
A250-LE-048	-48	1	25.4	32198	14602	77000	34921	3/4	19.0	1 1/8	28.4	34.84	884.9	58.84	1494.5	18.0	457.2
A250-SE-060	-60	1 1/4	31.8	42881	19447	85000	38549	3/4	19.0	1 1/4	31.8	32.1	815.3	46.1	1170.9	14.0	355.6
A250-LE-060	-60	1 1/4	31.8	42881	19447	85000	38549	3/4	19.0	1 1/4	31.8	39.1	993.1	60.1	1526.5	21.0	533.4
A250-SE-090	-90	1 1/4	31.8	57737	26185	144000	65306	1	25.4	1 3/8	35.1	35.8	909.3	51.8	1315.7	16.0	406.4
A250-LE-090	-90	1 1/4	31.8	57737	26185	144000	65306	1	25.4	1 3/8	35.1	43.8	1112.5	67.8	1722.1	24.0	609.6
A250-SE-110	-110	1 3/8	35.1	73268	33228	177000	80272	1 1/8	30.8	1 1/2	38.1	39.8	1010.9	57.8	1468.1	18.0	457.2
A250-LE-110	-110	1 3/8	35.1	73268	33228	177000	80272	1 1/8	30.8	1 1/2	38.1	48.8	1239.5	75.8	1925.3	27.0	685.8
A250-SE-150	-150	1 1/2	38.1	90639	41106	210000	95238	1 1/4	31.6	1 3/4	44.5	41.3	1049.0	59.3	1506.2	18.0	457.2
A250-LE-150	-150	1 1/2	38.1	90639	41106	210000	95238	1 1/4	31.6	1 3/4	44.5	50.3	1277.6	77.3	1963.4	27.0	685.8

1. At 5000 PSI
2. Length from the end of the cylinder rod to the center of the cylinder clevis pin.
3. Light cylinder part numbers are denoted SL, LL and FL instead of SE, LE and FE.
SE Standard LE Long FE Flattener

CYLINDER TERMINALS

Navtec offers a variety of cylinder terminals, each suited to specific needs.

THE ADJUSTABLE EYE WITH TOGGLE

The D530 screws onto the cylinder piston rod and provides small length adjustments. Not to be tensioned under load.

THE EYE / JAW TOGGLE

Used at the lower end of the cylinder to help prevent excessive side loads, the J100 is frequently used on backstay and inner forestay cylinders.

THE FIXED CLEVIS

The H120 Screws onto the cylinder piston rod and provides no length adjustment.



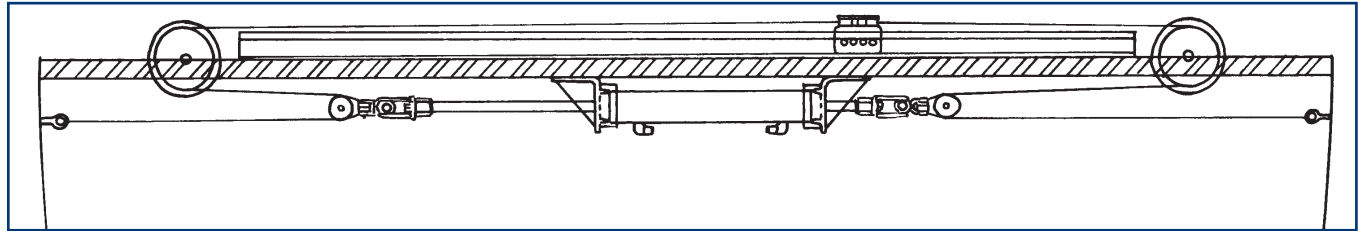
CYLINDER TERMINAL SPECIFICATIONS											
				ADJUSTABLE EYE WITH TOGGLE				FIXED CLEVIS		EYE JAW TOGGLE	
CYL. SIZE	PISTON ROD SIZE	PIN DIA.		PART NUMBER	LENGTH OPEN	LENGTH CLOSED		PART NUMBER	LENGTH	PART NUMBER	LENGTH
	in mm	in mm			in mm	in mm			in mm		in mm
-6	7/16 11	7/16 11		D530-1414	4.88 124	3.13 79		H120-141414	1.00 25	J100-1414	2.00 51
-10	1/2 13	1/2 13		D530-1616	6.00 152	4.00 102		H120-161616	1.25 32	J100-1616	2.19 56
-12	5/8 16	5/8 16		D530-2020	6.50 165	4.25 108		H120-202020	1.31 33	J100-2020	2.50 64
-22	3/4 19	3/4 19		D530-2424	7.63 194	5.00 127		H120-242424	1.38 35	J100-2424	2.88 73
-30	7/8 22	7/8 22		D530-2828	8.75 222	5.63 143		H120-282828	1.50 38	J100-2828	3.31 84
-40	1 25	1 25		D530-3232	9.25 235	6.25 159		H120-323232	1.50 38	J100-3232	3.69 94
-60	1 1/4 32	1 1/4 32		D530-4040	11.50 292	9.50 216		H120-404040	2.50 64	J100-4040	4.50 114
-90	1 1/4 32	1 1/4 32		D530-4444	15.00 381	9.50 241		H120-404444	2.50 64	J100-4444	5.63 143

Note: FE Cylinders are provided with alloy jaws

TRAVELER CYLINDER

Developed for large cruising yachts these cylinders control athwartships mainsheet position with the minimum of effort. Conventional ropes and winches can also be removed from deck layouts if required for a clean deck arrangement.

These traveler cylinders are cockpit controlled.



BOOM VANGS

SERIES 85A VANG

Navtec's Series 85A Vang is more powerful, more cost effective, safer and easier to use than its competitors, including mechanical vang. It features a larger than normal piston rod to resist buckling. Benefits include:

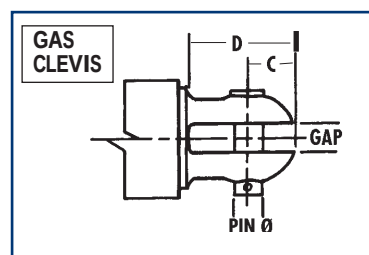
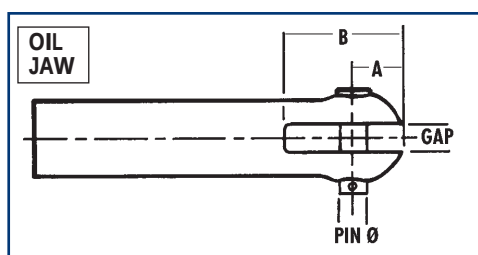
- MORE POWERFUL:** Higher mechanical advantage.
- SAFER:** You can remotely operate the vang from the cockpit. Built-in protection of the relief valve. The gas return pressure enables the vang to serve as a topping lift when furling, flaking or reefing. It also provides boom lift in light air conditions.
- EASIER TO USE:** All the control is within arms reach. There is no clutter or weight from blocks, control lines, fairleads or cams associated with solid mechanical vang.
- FAST:** With the addition of a Navtec Push button Quick Release Valve, the vang can be instantaneously dumped to help prevent an imminent broach from the safety of the cockpit or the convenience of the rail.



VANG SPECIFICATIONS

PART NUMBER	PISTON ROD SIZE		MAXIMUM PULL FORCE (1)		RETURN FORCE (3)		PCLC RANGE AVAILABLE (4)		STROKE		WEIGHT	
	(in)	(mm)	(lb)	(kg)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
A850-VC-006	5/8	16	2400	1088	394	179	46-60	1168-1524	9.0	229	9.3	4.2
A850-VC-010	3/4	19	4550	2063	678	307	55-72	1397-1829	9.0	229	10.3	4.7
A850-VC-012	7/8	22	6150	2789	916	415	55-89	1397-1829	9.5	241	13.0	5.9
A850-VC-017	1	25	8450	3832	1240	562	55-100	1397-2540	9.5	241	21.0	9.5
A850-VC-022	1	25	12200	5533	1613	732	55-104	1397-2642	10.0	254	25.0	11.3
A850-VC-030	1 1/4	32	21200	9615	2508	1137	55-107	1397-2718	11.0	279	35.3	16.0
A850-VC-040A	1 1/4	32	29900	13560	3610	1637	N/A	N/A	12.0	305	46.6	21.1
A850-VC-060B	1 1/2	38	40000	18141	4899	2222	N/A	N/A	14.0	356	116.9	52.6
A850-VC-090B	1 3/4	45	51800	23492	6400	2902	N/A	N/A	16.0	406	147	66.7
A850-VC-110B	2 1/8	51	65000	29478	8000	3628	N/A	N/A	18.0	457	N/A	N/A
A850-VC-150A	2 3/8	60	77300	35057	10000	4535	N/A	N/A	18.0	457	N/A	N/A

- At maximum relief valve setting of 5000 PSI.
- These strengths have been revised since the issue of the 1993 catalog to reflect design updates.
- At 500 PSI gas pressure, return force can vary from zero to twice the standard return force by varying the gas pressure.
- Standard PCLC is 60 in (1524 mm) for -6 vang and 72" (1829 mm) for -10, -12 and -17 vang. Lengths other than this will be subject to additional charge. For larger vang there is no extra charge for lengths within the specified range. Vangs -60 and above are manufactured on a custom basis. There is no charge for specifying PCLC.

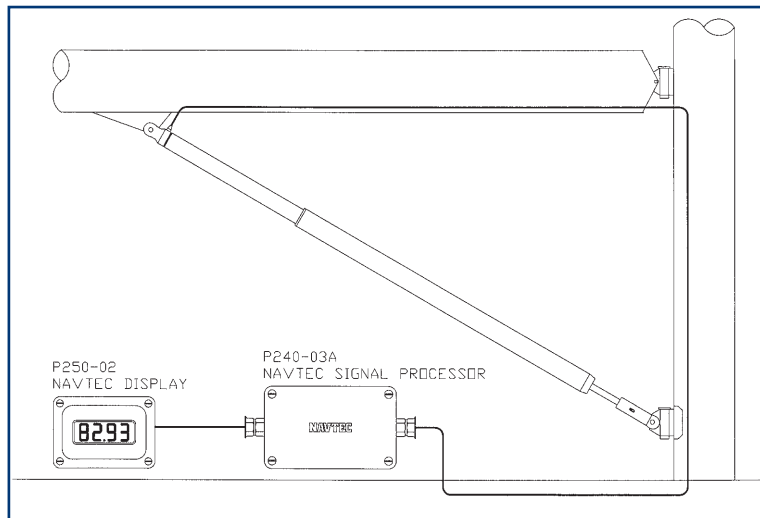


VANG JAW DIMENSIONS

PART NUMBER	PIN GAP		OIL JAW		GAS CLEVIS	
	(in)	(mm)	PIN CTR DEPTH (in) (A) (mm)	SLOT DEPTH (in) (B) (mm)	PIN CTR DEPTH (in) (C) (mm)	SLOT DEPTH (in) (D) (mm)
A850-VC-006	7/16	11	0.73 18.5	1.73 43.9	0.85 21.6	2.15 54.6
A850-VC-010	1/2	13	0.88 22.4	2.20 55.9	0.85 21.6	2.22 56.4
A850-VC-012	5/8	16	1.00 25.4	2.37 60.2	0.95 24.1	2.32 58.9
A850-VC-017	5/8	16	1.00 25.4	2.37 60.2	0.95 24.1	2.32 58.9
A850-VC-022	5/8	16	1.12 28.4	2.62 66.5	1.10 27.9	2.47 62.7
A850-VC-030	3/4	19	1.32 33.5	2.82 71.6	1.25 31.8	3.75 95.3
A850-VC-040A	7/8	22	1.50 38.2	3.44 87.4	1.50 38.2	3.30 83.9
A850-VC-060B	1	25	1.70 43.1	3.70 94.0	1.70 43.1	3.70 94.0
A850-VC-090B	1 1/4	32	2.07 52.6	4.57 116.1	2.07 52.5	4.57 116.1
A850-VC-110B	1 3/8	35	2.33 59.1	5.33 135.3	2.45 62.2	5.45 138.4
A850-VC-150A	1 1/2	38	2.70 68.5	6.08 154.4	2.70 68.5	6.08 154.4

POSITION INDICATING VANGS A850-PI

Developed for modern furling boom systems, this Vang has an electronic read-out indicating the vang's position. Accurate and repeatable boom positioning is required for furling boom systems. Originally for Superyachts, this system is now available for boats 40' and larger. Please contact Navtec for more details.



MECHANICAL LOCK A260

The Mechanical Lock Cylinder (A260-SE or -LE) is most useful for extended passages and allows you to release the hydraulic pressure on the backstay cylinder while still maintaining tension. Because your backstay tension is now mechanical rather than hydraulic, there is no relief valve protection from sudden overloads. The mechanical lock is available for Navtec's cylinders from -10 to -150. Retrofit kits are available (A260-SK or -LK).



MECHANICAL LOCK CYLINDER SPECIFICATIONS

PART NUMBER	CYLINDER SIZE	PISTON ROD SIZE		FORCE AT MAX RELIEF VALVE SETTING ¹		GAP & PIN		LENGTH CLOSED ²		STROKE		WEIGHT	
		(in)	(mm)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
A260-SE-010	-10	1/2	12.7	5609	2634	1/2	12.7	32.9	835.7	9.0	228.6	5.0	2.3
A260-LE-010	-10	1/2	12.7	5809	2634	1/2	12.7	41.9	1064.3	13.5	342.9	6.6	3.0
A260-SE-012	-12	5/8	15.9	7635	3463	5/8	15.9	35.4	899.2	9.5	241.3	9.0	4.1
A260-LE-012	-12	5/8	15.9	7635	3463	5/8	15.9	44.8	1137.9	14.2	350.7	11.0	5.0
A260-SE-017	-17	5/8	15.9	10880	4934	5/8	15.9	35.7	906.8	9.5	241.3	9.6	4.4
A260-LE-017	-17	5/8	15.9	10880	4934	5/8	15.9	45.1	1145.5	14.2	360.7	12.0	5.4
A260-SE-022	-22	3/4	19	13942	6323	3/4	19.0	37.7	957.6	10.0	254.0	12.2	5.5
A260-LE-022	-22	3/4	19	13942	6323	3/4	19.0	47.7	1211.6	15.0	381.0	15.0	6.8
A260-SE-030	-30	7/8	22.2	22030	10018	7/8	22.2	42.9	1068.7	11.0	279.4	19.9	9.0
A260-LE-030	-30	7/8	22.2	22030	10018	7/8	22.2	53.9	1369.1	16.5	419.1	24.2	11.0
A260-SE-040	-40	1	25.4	32198	14602	1	25.4	47.0	1193.8	12.0	304.8	33.0	15.0
A260-L3-040	-40	1	25.4	32198	14602	1	25.4	59.0	1498.6	18.0	457.2	40.2	18.2
A260-SE-060	-60	1 1/4	31.8	42881	19447	1 1/4	31.8	54.4	1381.8	14.0	355.6	52.2	23.7
A260-LE-060	-60	1 1/4	31.8	42881	19447	1 1/4	31.8	58.4	1737.4	21.0	533.4	62.0	28.1

1. At 5000 PSI

2. Length from the end of the cylinder rod to the center of the cylinder clevis pin

SE = Standard

LE = Long

BACKSTAY ADJUSTERS

INTEGRAL BACKSTAY ADJUSTER

Navtec's self-contained hydraulic adjuster is our lowest-cost means for adjusting backstay tension. Benefits include:-

- 1. PERFORMANCE:** Reduces friction in roller furling system, making it work more easily. A tighter forestay means better upwind performance. With a built-in gauge you can repeat the setting that won your last race.
- 2. PROTECTION:** Built-in adjustable relief valve helps prevent crew members from over-tensioning the backstay. Ball-type release valve offers reliable, controlled pressure release.
- 3. EASY INSTALLATION:** Packaging with step-by-step instructions makes Navtec Integral installation easy.



INTEGRAL BACKSTAY ADJUSTER SPECIFICATIONS

CYLINDER SIZE	PART #	PISTON ROD SIZE		FORCE AT STD RELIEF VALVE SETTING		FORCE AT MAX RELIEF VALVE SETTING (3)		MAX 1 x 19 CABLE SIZE		PIN DIAMETER		WEIGHT	
		(in)	(mm)	(lb)	(kg)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(lbs)	(kg)
-6	A370-A-06	1/2	13	3500	1587 (1)	5809	2634	7/32	5.6	7/16	11.2	7.4	3.4
-10	A370-A-10	1/2	13	4600	2086 (2)	5809	2634	9/32	7.0	1/2	12.7	7.6	3.5
-12	A370-A-12	5/8	16	6300	2857 (1)	10880	4934	5/16	8.0	5/8	15.9	15.9	7.2
-17	A370-A-17	5/8	16	8600	3900 (2)	10880	4934	3/8	9.6	5/8	15.9	15.9	7.2
-22	A370-A-22	3/4	19	11100	5034 (2)	13942	6323	7/16	11.2	3/4	19.1	20.5	9.3
CYLINDER SIZE	PART #	LENGTH OPEN		LENGTH CLOSED		STROKE		TOGGLE PART # (If Required)	TOGGLE PIN TO PIN L				
		(in)	(mm)	(in)	(mm)	(in)	(mm)						
-6	A370-A-06	29.0	737	22.0	559	7.0	178	A371-20A06	2.13		54		
-10	A370-A-10	29.0	737	22.0	559	7.0	178	A371-20A10	2.13		54		
-12	A370-A-12	32.0	813	24.8	629	7.3	184	A371-20A17	2.38		60		
-17	A370-A-17	32.0	813	24.8	629	7.3	184	A371-20A17	2.38		60		
-22	A370-A-22	34.5	876	26.5	673	8.0	203	A371-20A22	2.63		67		

1. In pounds or kilograms at 3000psi.
2. In pounds or kilograms at 4000psi.
3. In pounds or kilograms at 5000psi.

HYDRAULIC ACCESSORIES

PUSH BUTTON QUICK RELEASE VALVE

A440-A-01A. For the ultimate in vang control, Navtec's "Panic Button" is fast, lightweight, easy to use and comes complete with a watertight installation mount. Valves can be remotely mounted in multiple locations and provide rapid cylinder release for functions like vang, traveler car, sheet cylinder and genoa car.



REMOTE GAUGE

Remote Gauges (A060-01-01) provide pressure/force display and can be located close to a winch or in an easy to read location. These are identical to panel mounted gauges and can be placed anywhere on the boat. Note also the availability of an electronic gauge.



PUMP HANDLES

Don't be caught short, you'll want a spare.

Titanium Pump Handle: Part Number A021-A-04

Auto-Shift Pump Handle: Part Number A031-A11

Two-speed Pump Handle: Part Number A021-A11

One-Speed Pump Handle: Part Number A031-A11

Integral Pump Handle: Part Number A371-A24



HANDLE HOLDER

Both System 50 and System VII pump handles are removable to prevent accidental pumping, line fouling, or personal injury.

The Handle Holder (A021-24-01) is specially designed to hold the handle close to the mounting surface yet be easily accessible. Every Navtec installation should have one. It will not accept the Titanium Two-Speed Pump Handle.



MAST JACK

The lightweight, compact A270 Mast Jack is the ultimate tool for achieving the high rigging tension preloads in today's yachts. The Jack may be permanently installed or used on a removable basis for additional weight savings. The Jack may be used at 5,000 psi/7,500 psi with a Navtec panel or at 10,000 psi with an industrial pump.



A270 MAST JACK														
SIZE	5000 PSI MAX LOAD		10000 PSI MAX LOAD		STROKE		LENGTH EXTENDED		LENGTH RETRACTED		DIAMETER		WEIGHT	
	(lb)	(kg)	(lb)	(kg)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(lb)	(kg)
-40	20000	9070	40000	18141	3.0	76	11.5	292	8.5	216	4.0	178	10.0	5
-70	35000	15873	70000	31746	3.5	89	13.0	330	9.5	241	5.3	0	17.0	8
-125	62500	28345	125000	56689	4.0	102	14.9	378	10.9	277	7.0	102	29.0	13

DIGITAL PRESSURE GAUGE

The Digital Pressure Gauge system consists of a Hydraulic Pressure Transducer (P261), a Signal Processor (P240) and a Digital Display (P250). Each is purchased separately. Several hydraulic functions can be monitored by using a selector valve (A400). The pressure gauge system can be set to read out directly in pressure (KPSi or KPa) or can be set to read in force (KLb or KNt or Kgf) corresponding to a specific cylinder size.

HYDRAULIC RESERVOIRS

MOLDED RESERVOIRS

Navtec has dramatically improved the hydraulic reservoirs for System 50 and System VII Panels. The new reservoirs primary advantage is translucent polyethylene construction which allows visual checking of the hydraulic oil level. The reservoir is available in 2-quart size (Part Number A290-A-MR02). A 4-quart reservoir (Part Number A290-A-MR04) is also available. For additional capacity, reservoirs can be linked together.



MOLDED RESERVOIR CAPACITIES & DIMENSIONS							
SIZE	USABLE VOLUME	WIDTH		HEIGHT*		DEPTH	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
2 QUART	60 in³ (983 cm³)	6.9	174.8	8*	200*	4.9	124
4 QUART	120 in³ (1967 cm³)	7.8	196.9	11*	280*	5.8	146
* Height does not include cap, which adds 1.2" (31mm) to the overall height.							

PUMPS

MAXI PUMP A020-04-01

Developed for the America's Cup fleet, this high output pump is now available to the public. With a flow rate of 1.65 times the standard autoshift pump in high speed, this pump represents a major advantage in speed. Available with or without titanium components, this pump is the choice for the most serious competitors, both in the IMS fleet and elsewhere.

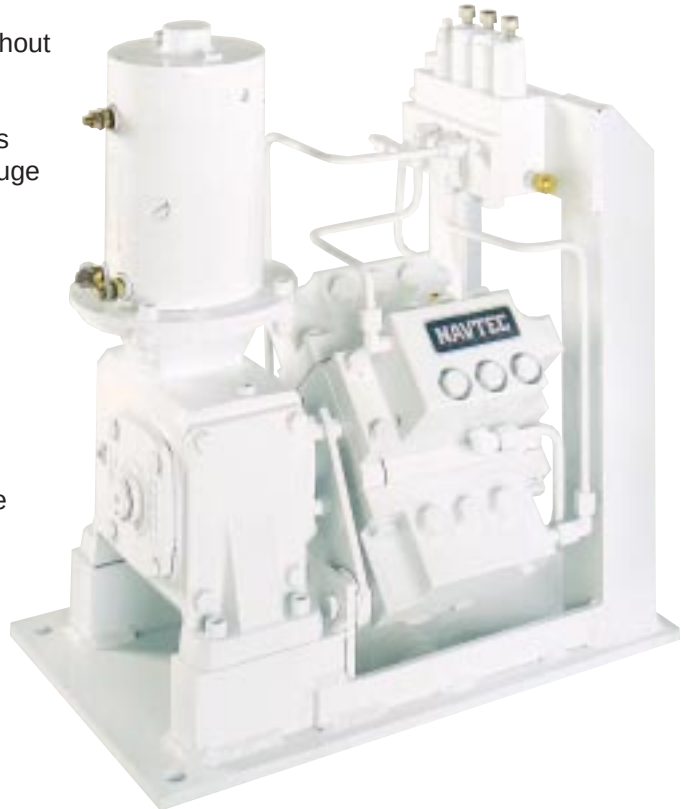


POWERED 502 ROTARY PUMP

Navtec's Powered 502 Rotary Pump system can be fitted with either 12 or 24 volt power and offers an uncompromising 5,000 psi pump which takes full advantage of Navtec hydraulic cylinders. Navtec cylinders are smaller, lighter and less expensive than their burdensome 2,000 psi competitors. Furthermore, Navtec's cylinders are compatible with the standard wire and rod sizes without modification.

The fluid output of the Powered 502 Rotary Pump is normally directed to a Navtec System VII Valve/Gauge Manifold panel purchased separately. This panel provides for:

1. High pressure, high flow of the Powered 502 Rotary Pump
2. Zero internal leakage
3. Constant relief valve protection from sudden overloads
4. Constant pressure display
5. Optional manual two-speed pump backup in the event of electric power loss.



HYDRAULICS SPARES

A complete selection of spare parts from seals to total rebuild kits is available from your nearest Navtec hydraulics servicing facility.

Seal kits include all seals and piston bearings (if used), while repair kits for cylinders and vangs also include replacement rods and pistons.

Servicing of Navtec hydraulics requires numerous special tools and training. Repairs should be performed only by authorized Navtec hydraulics technicians.



HYDRAULIC PLUMBING

Though stainless steel tube is quite common on large yachts, flexible hose capable of 5,000 psi working pressure is perfect for most installations. Navtec's flexible hose is easier to install below deck and with proper installation it will perform flawlessly year after year. Care should be taken to avoid sharp objects and fastenings and to ensure that there are no kinks in the hose.

All fittings used above deck must be stainless steel to prevent corrosion. Cadmium-plated fittings are acceptable below deck as long as they will not be immersed in bilge water.

Navtec's Delrin® Through Deck Gland provides a secure, watertight passage most commonly used on the backstay hose when passing through the transom. The Through Deck Gland is also perfect for electrical applications.

Most boom vang installations have a continuous hose that runs from the vang through the mast to the mast step. Here the hose exits and is terminated. A hose union connects the vang hose to the hose that runs back to the panel. This two-piece installation allows for easier decommissioning when unstepping the mast.



NAVTEC & NORSEMAN GIBB

TERMS & CONDITIONS

1. GENERAL

The following conditions issued by Navtec & Norseman Gibb (the Seller) apply to any contract of which these conditions form part to the exclusion of any conditions of order or purchase of the Buyer or any other standards, specifications, conditions or particulars of or adopted by the Buyer, unless expressly accepted in writing by the Seller as part of the contract.

"Goods" means the subject matter of the contract including (but not limited to) raw materials, finished or semi-finished materials, and whether one or a number of items, whether or not identical or smaller.

2. DELIVERY & COMPLETION DATES

- i) The delivery or performance dates specified in the contract are approximate only and, unless otherwise expressly stated, time is not of the essence for delivery.
- ii) The Seller will not be liable in any circumstances for the consequences of any delay in delivery or failure to deliver if the duration of the delay is not substantial or if the delay or failure is due to an act of God, fire, inclement or exceptional weather conditions, industrial action (whether at the Seller's premises or elsewhere), hostilities, breakdowns, shortage of labour, materials, power or other supplies, late delivery or performance or non-delivery or non-performance by suppliers or sub-contractors, governmental order or intervention (whether or not having the force of law), export restrictions (whether or not existing at the date of the contract), or any other cause whatever beyond the Seller's control or of an unexpected or exceptional nature.
- iii) All prices quoted and all contract prices are (unless otherwise expressly agreed by the Seller in writing) ex the Seller's premises. If the Buyer so requests when the order is placed the Company will arrange all packing, transportation and delivery, but all carriage, packing and transportation costs and charges (including insurance in transit) will be payable by the Buyer in addition to the contract price. The Company shall be entitled to use any means of transport and carrier it may select.

3. PASSING OF TITLE AND RISK

- i) The risk in the Goods shall pass to the Buyer:
 - a) when the Goods are delivered at the destination specified in an order
 - b) if the goods are appropriated to the Buyer but kept at the Supplier's premises upon collection of the Goods by the Buyer or upon the expiry of 7 days from the Seller's written notice to the Buyer that such Goods are ready for delivery whichever is the earlier.
- ii) Notwithstanding sub-clause (i) above absolute property in and title to the Goods shall remain vested in the Seller and Buyer shall keep the goods as bailee and trustee for the Seller (returning the same to the Seller upon request) until the price thereof has been paid in full together with any interest and all other sums due in respect thereof from the Buyer in accordance with the order:

- iii) If pending payment for Goods as aforesaid the Buyer shall sell or otherwise dispose of the Goods or Products or make any insurance claim in respect thereof, the Buyer shall not give any warranties or incur any liabilities on behalf of the Seller and the proceeds of any such sale or other disposition (or claim thereto) or any such insurance proceeds (or claim thereto) shall belong to the Seller and be held by the Buyer as trust funds to the extent of all sums due to the Seller in respect of such, and the Buyer shall pay such proceeds into a separate account.
- iv) Nothing in this condition shall give the Buyer any right to return Goods sold by the Seller and the Seller may sue the Buyer for the price when due (without prejudice to its other rights) notwithstanding that property therein may not have passed to the Buyer.
- v) The Buyer's rights to use the goods or to sell them prior to full payment may be terminated forthwith by written notice given by the Seller to the Buyer shall automatically terminate with or without such notice if a receiver is appointed over any of the assets or the undertaking of the Buyer or a winding up order is made against the Buyer or the Buyer goes into voluntary liquidation (otherwise that for the purpose of solvent reconstruction or amalgamation) or calls a meeting of or makes any arrangement or composition with its creditors generally commits any act of bankruptcy or allows execution or distress to be levied against its goods and in the event of a receiver or liquidator of the Seller being appointed, such receiver or liquidator shall pay into a separate bank account any sums received from third parties in respect of sales to them of Goods or Products by the Buyer up to the amount of any indebtedness of the Buyer to the Seller for the sole benefit of the Seller.

4. WARRANTY

The Seller warrants its products, in normal usage, to be free of defects in materials and workmanship for a period of one year from date of original purchase by the user, subject to the conditions and limitations below. Any part that proves to be defective in normal usage during that one year period will be repaired or replaced by the Seller. This warranty is subject to the following conditions and limitations:

- i) The Seller's liability shall be limited to repair or replacement (choice of remedy at the Seller's option) of goods or parts defective in materials or workmanship. This shall be the Buyer's exclusive remedy in contract, tort or otherwise.
- ii) Except as otherwise provided, quality shall be in accordance with the Seller's specifications.
- iii) Determination of the suitability of the material for the use contemplated by the Buyer is the sole responsibility of the Buyer, and the Seller shall have no responsibility in connection with such

suitability.

- iv) The Seller shall not be liable for any harm resulting from:
 - a) failures due to use of products in applications for which they are not intended.
 - b) failures due to corrosion, wear and tear, or improper installation. In the case of rod rigging products, improper installation includes, but is not limited to, the use of rod rigging end fittings other than those manufactured by the Seller or meeting the Seller's specifications. Improper installation also includes, but is not limited to, the use of dies other than those leased by the Seller to Authorized Navtec Representatives, to form the head which is part of the patented Navtec Headed Rod Rigging System.
- v) The Seller shall not be responsible for shipping charges or installation labor associated with any warranty claims.
- vi) Service by anyone other than Authorized Navtec, Norseman Gibb Representatives shall void this warranty unless in accordance with the Seller's guidelines and standards of workmanship.

5. DISCLAIMER OF IMPLIED WARRANTIES.

There are no warranties of merchantability, fitness for purpose, or any other kind, express or implied, and none shall be implied by law. The duration of any such warranties that are nonetheless implied by law for the benefit of a consumer shall be limited to a period of one year from original purchase by the user. Some States/Countries do not allow limitations on how long an implied warranty lasts so the above limitation may not apply to you.

6. LIMITATIONS OF CONSEQUENTIAL DAMAGES.

The Seller shall not be liable for consequential damages to yachts, equipment or other property, or persons due to any failure of the Seller's equipment.

7. This warranty gives you specific legal rights and you may also have other rights which vary from State to State and Country to Country.

8. CONFIDENTIALITY, PATENTS ETC

- i) Any drawings specifications or other technical information supplied to the Buyer by the Seller in connection with the Contract are provided on the express understanding that the Buyer will not give, loan, exhibit or sell such drawings, specifications or technical information to any third party and that the Buyer will not use them in any way except in connection with the goods or services provided hereunder. The copyright in all documents provided by the Seller will remain vested in the Seller.
- ii) The Buyer shall indemnify the Seller against all actions, costs (including the cost of defending any legal proceedings), claims, proceeding, accounts and damages in respect of any infringement or alleged infringement of any patent, registered design, copyright, trademark or other industrial or intellectual property rights resulting from compliance by the Seller with the Buyers specific requirements, designs or specifications.

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