



Marine Design Appraisal Document

Lloyd's Register EMEA
Engineering Systems
London Design Support Services
71 Fenchurch Street
London, EC3M 4BS

Date
11 January 2008

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JP3 Rudder Bearings Type IV: Type 40 to 45 and Type 48 / 49 Machinery General Design Appraisal

Valid until 12 January 2013

- Drawings and calculations, as listed in Appendix A, have been examined for compliance with the Rules and Regulations for Special Service Craft 2002 Part 14, Chapter 1 and the arrangement will be approved with the following conditions;

1.1. Machinery

Manufacturer	JP3
Equipment	Rudder Stock Bearings
Service	Steering Gear
Bearing Material	"Ertalyte" or "Peek HPV"
Rudder Stock Material	Composite or Aluminium

1.2 Type IV Bearings; Type 40 to 45.

Type IV – 1 Row of Barrel Rollers

For x = 0 to 7 inclusive, y = 1 to 3 inclusive.

Ref.	Working Load (kg)		Ref.	Working Load (kg)	
	"Ertalyte"	"Peek"		"Ertalyte"	"Peek"
4x.1y.07	2470	4186	4x.1y.12	4651	7883
4x.1y.08	2882	4884	4x.1y.13	5132	8699
4x.1y.09	3258	5522	4x.1y.14	6135	10398
4x.1y.10	3742	6343	4x.1y.15	6928	11743
4x.1y.11	4491	7611	4x.1y.16	7313	12396

FINAL ACCEPTANCE OF ACTUAL ITEM(S) DEPEND(S) ON SATISFACTORY SURVEY AND TESTING

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Type IV – 2 Rows of Barrel Rollers

For x = 0 to 7 inclusive, y = 1 to 3 inclusive.

Ref.	Working Load (kg)		Ref.	Working Load (kg)	
	"Ertalyte"	"Peek"		"Ertalyte"	"Peek"
4x.2y.07	3625	6144	4x.2y.16	10410	17645
4x.2y.08	4518	7658	4x.2y.17	12877	21826
4x.2y.09	4699	7965	4x.2y.18	15011	25443
4x.2y.10	5538	9387	4x.2y.19	15428	26150
4x.2y.11	6177	10470	4x.2y.20	15698	26607
4x.2y.12	7204	12209	4x.2y.21	17557	29758
4x.2y.13	8307	14080	4x.2y.22	20506	34755
4x.2y.14	9543	16174	4x.2y.25	23008	38997
4x.2y.15	10410	17645	4x.2y.26	25100	42543

Type IV – 3 Rows of Barrel Rollers

For x = 0 to 7 inclusive, y = 1 to 3 inclusive.

Ref.	Working Load (kg)		Ref.	Working Load (kg)	
	"Ertalyte"	"Peek"		"Ertalyte"	"Peek"
4x.3y.08	5958	10098	4x.3y.23	26058	44165
4x.3y.09	6082	10308	4x.3y.24	26058	44165
4x.3y.10	7470	12662	4x.3y.25	29184	49465
4x.3y.11	9309	15778	4x.3y.26	33441	56679
4x.3y.12	10467	17741	4x.3y.27	35452	60088
4x.3y.13	11657	19757	4x.3y.28	38087	64555
4x.3y.14	12370	20967	4x.3y.30	41878	70980
4x.3y.15	13281	22510	4x.3y.32	48769	82659
4x.3y.16	16287	27604	4x.3y.34	55132	93445
4x.3y.17	19087	32351	4x.3y.36	61389	104049
4x.3y.18	19431	32934	4x.3y.37	65537	111080
4x.3y.19	18338	31082	4x.3y.38	74397	126097
4x.3y.20	21194	35921	4x.3y.40	77258	130947
4x.3y.21	23626	40043	4x.3y.42	83157	140944
4x.3y.22	24941	42273			

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1.3 Type IV bearings: Type 48 / 49.

For x = 8 or 9

Ref.	Working Load (kg)		Ref.	Working Load (kg)	
	"Ertalyte"	"Peek"		"Ertalyte"	"Peek"
4x.22.07	3903	6616	4x.22.33	39271	66562
4x.22.08	4793	8124	4x.22.34	42009	71202
4x.22.09	4759	8065	4x.22.35	41906	71028
4x.22.10	5637	9554	4x.22.36	47865	81127
4x.22.11	6040	10237	4x.22.37	47680	80814
4x.22.12	7501	12713	4x.22.38	50563	85700
4x.22.13	9041	15324	4x.22.39	52063	88242
4x.22.14	10577	17928	4x.22.40	53739	91083
4x.22.15	12801	21697	4x.22.41	56551	95849
4x.22.16	13157	22299	4x.22.42	59184	100313
4x.22.17	15248	25845	4x.22.43	61382	104038
4x.22.18	15531	26323	4x.22.44	64493	109310
4x.22.19	16558	28064	4x.22.45	65897	111690
4x.22.20	17078	28946	4x.22.46	69263	117395
4x.22.21	19226	32586	4x.22.47	71045	120415
4x.22.22	21983	37259	4x.22.48	72487	122859
4x.22.23	27813	47140	4x.22.49	76299	129320
4x.22.24	30557	51791	4x.22.50	80114	135786
4x.22.25	30999	52540	4x.22.51	74967	127063
4x.22.26	31814	53923	4x.22.52	75985	128788
4x.22.27	34097	57791	4x.22.53	76067	134012
4x.22.28	36604	62041	4x.22.54	81158	137556
4x.22.29	36897	62538	4x.22.55	83808	142048
4x.22.30	37752	63987	4x.22.56	87312	147986
4x.22.31	41201	69833	4x.22.57	89236	151247
4x.22.32	38440	65152	4x.22.58	91665	155365

Ref.	Working Load (kg)
	"Ertalyte"
48.22.80	136200

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Issue number **2**
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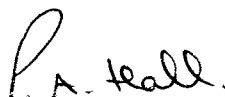
2. Conditions of Approval

- 2.1 The system is to be constructed, tested, installed and maintained on board in accordance with manufacturer requirements and tried and tested under working conditions to the satisfaction of the Surveyor.
- 2.2 All bolting arrangements are to be locked and secured to the satisfaction of the Surveyor.
- 2.3 The Bearings are to be used with Composite of Aluminium rudder stocks only.
- 2.4 Bearings of 'Peek' material are to be replaced every 2 to 3 years.
- 2.5 Type IV Bearings will accept +/- 3.5 degree maximum rudder stock deflection.



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1. The documents listed below have been examined

Drawing No.	Rev.	Title	Status	Date
48.22.80-1	-	48.22.80 – Noix	SI	11 January 2008
48.22.80-2	-	48.22.80 - Cage	SI	11 January 2008
48.22.80-3	-	48.22.80 - Flasque	SI	11 January 2008
48.22.80-4	-	48.22.80 - Cage	SI	11 January 2008
48.22.80-5	-	48.22.80 - Colerette	SI	11 January 2008
48.22.80	-	48.22.80 – Galet ØLg76mm	SI	11 January 2008
.				
-	-	Palier Type IV 4X.10.XX, Palier Haut	RI	7 October 2002
-	-	Palier Type IV 4X.12.XX, Palier Haut	SI	7 October 2002
-	-	Palier Type IV 4X.20.XX, Palier Haut	SI	7 October 2002
-	-	Palier Type IV 4X.22.XX, Palier Haut	SI	7 October 2002
-	-	Palier Type IV 4X.30.XX, Palier Haut	SI	7 October 2002
-	-	Palier Type IV 4X.32.XX, Palier Haut	SI	7 October 2002
-	-	Implantation of Type IV Bearing for Composite Boat.	SI	7 October 2002
-	-	Implantation of Type IV Bearing for Aluminium Boat.	SI	7 October 2002
-	-	Type IV Bearing 48.22.xx	SI	9 October 2006
-	-	Inner Races and Barrel Rollers	SI	9 October 2006
-	-	Outer Races	SI	9 October 2006
-	-	Seal Carriers	SI	9 October 2006
Calculations Ref.		Details	Status	Date
Letter dated 11 Juin 2002 to Mr P Moysey	-	Method of Calculation for theoretical bearing load. Description of Type IV Rudder Bearings. Description of General Code. Theoretical Calculated Loads (1 Row). Theoretical Calculated Loads (2 Rows). Theoretical Calculated Loads (3 Rows). Test Load Process	SI	7 October 2002
Letter 10/7/02 to Mr P Moysey	-	Material Specification	SI	7 October 2002
Fax JP3 to LR Nantes	-	Peak Barrel Rollers Directions for use. TYPE 48 series bearings calculation notice	SI	9 October 2006

Appraisal Status Key

SI Retained as supporting documentation for information only

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