

Service manual



Service Manual

The latest version of service manual is available at: <u>www.macpara.com/en/service-manual</u>

Technical inspections

Full inspection is recommended every 24 months, if not advised otherwise by the inspecting person due to current paraglider condition.

Paragliders in commercial use (training and tandem flights) should be undergoing Full Inspection every 12 months (excluding first 24-month period after purchase).

Technical inspection is carried out by the manufacturer or authorised person.

TECHNICAL DATA

High Performance EN-C		Elan 2	Elan 2	Elan 2	Elan 2	Elan 2	Elan 2
Size		22 (XS)	24 (S)	26 (M)	28 (L)	30 (XL)	33 (XXL)
Zoom flat	[%]	89	92	96	100	104	109
Area flat	[m ²]	22,18	23,7	25,80	28	30,28	33,27
Area projected	[m ²]	18,82	20,11	21,90	23,76	25,70	28,23
Span flat	[m]	11,79	12,19	12,72	13,25	13,78	14,44
Span projected	[m]	9,43	9,75	10,17	10,59	11,02	11,55
Aspect ratio flat	-	6,27	6,27	6,27	6,27	6,27	6,27
Root cord	[m]	2,34	2,42	2,52	2,63	2,74	2,87
Cells	-	63	63	63	63	63	63
Weight	[kg]	4,45	4,60	4,80	5,20	5,50	5,90
Weight range*	[kg]	55-70	70-90	82-102	92-112	105-130	115-145
Weight range*	[lbs]	121-154	154-198	181-225	203-247	231-287	254-320
Min.speed	[km/h]	23-25	23-25	23-25	23-25	23-25	23-25
Max.speed	[km/h]	38-40	38-40	38-40	38-40	38-40	38-40
Top speed (accelerator)	[km/h]	55-56	55-56	55-56	55-56	55-56	55-56
Glide ratio	-	10,5	10,5	10,5	10,5	10,5	10,5
Min. Sink rate	[m/s]	1,05	1,05	1,05	1,05	1,05	1,05

*pilot equipped = weight naked + cca. 15-20 Kg (33-44 lbs)

Check-intervals

All paragliders used in flight must be checked at least every 24 months. For paragliders used by paragliding schools the period is 12 months.

Personnel authorised to carry out checks

Training course by manufacturer is the basis for permission to carry out paraglider checks.

Identification of glider

An identity sticker with details of certification and serial number is attached to the glider.

Components of the check

Porosity

The porosity should be checked with a porosity meter (JDC). Compare the resultant data with the producer's manual.

Porosity measures should be taken on at least three points of both the top and bottom surface. The first point should be placed 20-30 cm from leading edge in the middle of canopy. Second and third points are placed left and right from first measure point at 25% of the span. One additional measurement should be made on the top surface of the wing tip.

The identified time should be higher than 30 second (JDC). In the event of the result being less than 30 seconds, the result of the check is a fail.

Overall strength check

The check of canopy strength should be made with a Bettsometer (B.M.A.A approved Patent No. GB 2270768 Clive Betts Sales). On the top and bottom surfaces make small holes with a needle at the Aline attachment points. The exact verification should be made in accordance with the Bettsometer user manual.

Line strength check

Line strengths should be as specified in accordance with the certification requirements. One main line should be taken from each array and have its strength checked with a tension-meter.

Required strengths should be higher than:

• A + B main lines x measured value > 8 x maximum take-off weight and higher then 800 kg for the A + B arrays.

• C + D mean lines x measured value > 6 x maximum take-off weight and higher then 600 kg for the A + B arrays.

Replacements for damaged lines must be with new original lines. Line lengths are taken from the lines data page.

Full line length measurement

Lines should be separated and each line measured under a tension of 5 kg. Measurement is made from the line karabiner to the canopy's surface in according to the method of certification. Measurement of brake lines is made from the knot on swivel to upper loop of galery line. The lenght of bunching line is not included. Rib numbering begins in the middle of canopy and leads to the wing tip. Measured full lengths should be documented in the inspection record and are compared with certified full line lengths protocol. Lengths should not differ by more than 10 mm. The opposite sides should be checked for symmetry.

Canopy line-attachment points check

Attachment points should be checked for damage and stretching. Defects, loops and flares should be repaired.

Canopy fabric check

Ribs, diagonal ribs, top and bottom surface should be checked. Any damage to sewing or tears to the fabric, which could influence flying characteristics must be repaired.

Lines

All lines should be checked for tears, breaks any damage to the sheath or signs of wear. Special attention should be paid to the sewing of the line loops. Damaged lines must be replaced.

The results should be documented in the inspection record.

Connector check

All line carabineers, trimmers (if used), speed systems and pulleys should be inspected for visible damage. Open or improperly secured connectors should be secured in accordance with the producers recommendations.

Risers

Both risers should be checked for tears, signs of wear or any damage and measured with a pull of 5 daN strength. Measured data should be documented in the inspection record. The difference must not be higher then 5 mm when compared to specified lengths.

Final check

The glider sticker and check sticker must be inspected for readability and correctness. The check must be documented with date, signature and stamp on the canopy and in the user manual.

CONSTRUCTION OF THE CANOPY



LINE PLAN – ELAN 2















FULL LINE LENGTHS

Elan 2 - 22 (XS)

			<u> </u>	
Center	Α	В	С	Brakes
1	6892	6816	6925	7215
2	6850	6774	6877	6930
3	6850	6778	6932	6850
4	6757	6687	6861	6725
5	6801	6734	6776	6700
6	6669	6609	6794	6580
7	6510	6457	6839	6485
8	6433	6393	6671	6435
9	6430	6400	6505	6470
10	6086	6054	6413	6390
11	5998	6032	6406	6265
12	5968	5977	6120	6280
13			6027	6185
14				6150
15				6230

Elan 2 - 24 (S)

Center	Α	В	С	Brakes
1	7107	7029	7141	7490
2	7064	6985	7092	7195
3	7064	6989	7150	7115
4	6967	6896	7076	6980
5	7013	6943	6988	6955
6	6877	6815	7007	6835
7	6712	6657	7053	6730
8	6633	6592	6879	6680
9	6631	6599	6707	6720
10	6274	6241	6612	6640
11	6183	6218	6606	6510
12	6152	6161	6309	6525
13			6214	6425
14				6385
15				6470

Elan 2 - 26 (M)

Center	Α	В	С	Brakes
1	7394	7312	7430	7785
2	7349	7266	7378	7480
3	7349	7271	7439	7390
4	7248	7173	7362	7250
5	7296	7223	7269	7230
6	7154	7089	7290	7100
7	6982	6925	7338	6995
8	6901	6858	7156	6940
9	6898	6865	6976	6980
10	6525	6491	6879	6895
11	6430	6467	6872	6760
12	6397	6407	6562	6775
13			6462	6675
14				6630
15				6725

Elan 2 - 28 (L)

Center	Α	В	С	Brakes
1	7681	7596	7718	8110
2	7634	7548	7664	7790
3	7634	7553	7729	7700
4	7529	7451	7649	7555
5	7579	7503	7551	7530
6	7431	7363	7574	7395
7	7252	7192	7624	7285
8	7168	7123	7433	7230
9	7165	7131	7246	7270
10	6776	6740	7145	7185
11	6677	6715	7138	7045
12	6643	6653	6814	7060
13			6710	6955
14				6910
15				7005

Elan 2 - 30 (XL)

Center	Α	В	С	Brakes
1	7932	7844	7970	8400
2	7883	7794	7914	8070
3	7883	7800	7983	7975
4	7775	7694	7900	7825
5	7826	7748	7798	7800
6	7673	7603	7822	7660
7	7488	7426	7874	7545
8	7402	7355	7675	7490
9	7399	7364	7482	7530
10	6995	6958	7378	7445
11	6893	6932	7371	7300
12	6858	6868	7035	7315
13			6927	7205
14				7160
15				7255

Elan 2 - 33 (XXL)

Center	Α	В	С	Brakes
1	8255	8163	8295	8840
2	8204	8111	8236	8465
3	8204	8117	8308	8360
4	8091	8006	8222	8210
5	8145	8063	8114	8180
6	7985	7911	8141	8050
7	7792	7727	8195	7920
8	7703	7654	7987	7865
9	7699	7663	7785	7915
10	7278	7239	7678	7830
11	7171	7212	7670	7665
12	7134	7145	7319	7680
13			7179	7555
14				7505
15				7615

MEASURING FULL LINE LENGTHS

Main lines





Brakes line

Standard system



Raff system







RISER



Riser lengths Elan 2

	Α	A1	В	С
Trim-position	525	525	525	525
Accelerated	370	370	425	525

The lengths are measured from the main attachment point to the lower edge of rapid links.

Riser





MATERIALS

Fabric

(PORCHER SPORT, Rue du Ruisseau B.P. 710,38290 ST. QUENTIN FALLAVIER, FRANCE) Top Sail / Bottom Sail - Leading Edge - SKYTEX 38 E25A - 100% nylon 6.6, 33 Dtex, 38 g/m² Top Sail - Trailing Edge - SKYTEX 32 E3W - 100% nylon 6.6, 33/22 Dtex, 32 g/m² Bottom Sail - SKYTEX 27 E71A - 100% nylon 6.6, 22 Dtex, 27 g/m² Main ribs, Diagonals - SKYTEX 32 E29A - 100% nylon 6.6, 33/22 Dtex, 32 g/m² Ribs - SKYTEX 32 E29A - 100% nylon 6.6, 33/22 Dtex, 32 g/m² Reinforcement main ribs - W382 Polyester 180 g/m²

Lines

(EDELMAN+RIDDER+CO. Achener Weg 66, D-88316 ISNY IM ALLGEAU, GERMANY)

Upper lines, Stabilo, Brake lines , -C - Aramid 8000/U-070, Breaking Load 70 kg Upper lines-A,-B,-C, Middle cascade-A,-B,-C - Aramid 8000/U-090, Breaking Load 90 kg Brake lines -Aramid 8000/U-090, Breaking Load 90 kg Upper lines -A,-B,-C, Middle cascade-C - Aramid 8000/U-130, Breaking Load 130 kg Wing tip line - Aramid/Polyester A-7343-090, Breaking Load 090 kg Main brake line - Dynema/Polyester A-7850-200, Breaking Load 200 kg

(ROSENBERGER TAUWERK, GERMANY)

Main lines A1,A2,A3,B1,B2,B3,C1,C2,C3 - Dynema/Polyester PPSL 191,Breaking Load 191 kg (For Elan 2-30 and 33) Main lines A2,A3,B2,B3 - Dynema /Polyester PPSL 200, Breaking Load 200 kg

Attachment straps

(STUHA a.s., DOBRUSKA, Opočenská 442, 518 01 Dobruška CZECH REPUBLIC) STAP-POLYESTERBRIDLE 13 mm, Breaking Load 70 kg

Risers

(Cousin Trestec, 8 rue Abbé Bonpain 59 117 Wervicq-sud France, FRANCE) Aramid-Polyester 3455 12 mm Breaking Load 1100 kg

Thread

(AMANN SPONIT Itd, Dobronická 635, 148 25 PRAHA 4, CZECH REPUBLIC) Lines-SYNTON 60, Main lines-SERABOND 60, Canopy-SYNTON 40, Riser-SYNTON 20

Rapid links

(ELAIR SERVIS, Axmanova 3913/9,767 01 KROMERIZ, CZECH REPUBLIC) NIRO TRIANGLE 200 - Max. Load 200 kg

Rigifoils

(MERKUR SLOVAKIA s.r.o., Kamenné pole 4554/6,031 01 Liptovský Mikuláš, SLOVAKIA) Rigifoils - Nylon 1,6 mm, 2,3 mm