

# DUET **PRO**

## MANUAL

REV. 1



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## **Congratulations!**

Thank you for choosing the DUET PRO.

The DUET PRO has been designed for professional tandem pilots who want to share their most fantastic moments.

This manual will help you to get all information about your glider. We strongly recommend that you read this manual carefully in order to be aware of any general limitations, performance characteristics, take-off and flight characteristics, landing procedures, dealing with emergency situations, and general maintenance.

This is information about the design of the DUET PRO, advice on how to use it best and how to care for it to ensure it has a long life, We hope that the DUET PRO will give you a lot of satisfactory flying times.

**-DAVINCI GLIDERS TEAM-**

### **WARNING!**

**THIS IS NOT TRAINING MANUAL. ATTEMPTING TO FLY THIS OR ANY OTHER PARAGLIDER WITHOUT PROPER INSTRUCTION FROM A CERTIFIED PROFESSIONAL INSTRUCTOR IS EXTREMELY DANGEROUS TO YOURSELF AND BYSTANDERS.**

DAVINCI GLIDERS are carefully manufactured and inspected at the factory. Please use the glider only as described in this manual.

Do not make any modifications to the glider.

As with any sport - without taking the necessary safety precautions, paragliding can be dangerous.

## 1. Technical DATA

DUET PRO			40	42
CELLS	NUMBER		50	50
	CLOSED		8	8
FLAT	AREA	m <sup>2</sup>	39.8	41.5
	SPAN	m	14.8	15.1
	ASPECT RATIO		5.5	5.5
PROJECTED	AREA	m <sup>2</sup>	34.2	35.6
	SPAN	m	11.9	12.1
	ASPECT RATIO		4.1	4.1
FLATTENING		%	14.1	14.1
CORD	MAX	m	3.27	3.33
	MIN	m	0.90	0.92
	AVER	m	2.69	2.75
LINES	HEIGHT	m	8.69	8.87
	MAIN		2+1/3/3/2	
RISERS	NUMBER	4	A+A'/B/C/D	
	TRIMS	mm	110	110
WEIGHT RANGE (Free flight)	MIN-MAX	KG	100-210	120-230
CERTIFICATION	EN-926-1/2, LTF/ DGAC	KG	EN-B	EN-B
GLIDER WEIGHT		KG	7.2	7.4

## 2. MATERIALS DATA

CANOPY		FABRIC CODE	SUPPLIER
UPPER SURFACE	Leading Edge	MJ40 MF	MYUNGJIN TEX
	Middle/Tailing	MJ32 MF	MYUNGJIN TEX
BOTTOM SURFACE		MJ32 MF	MYUNGJIN TEX
PROFILES	Smart Nose+	MJ38 HF	MYUNGJIN TEX
	Loading	MJ38 HF	MYUNGJIN TEX
	Unloading	MJ38 HF	MYUNGJIN TEX
DIAGONALS		MJ32 HF	MYUNGJIN TEX
Leading Edge Reinforcement		410D Nylon PU	NAVI TEX

SUSPENSION LINES	FABRIC CODE	SUPPLIER
UPPER CASCADES	TNL 145/125/80	Daegu Braiding Co
MIDDLE CASCADES	TNL 200/180/145	Daegu Braiding Co
MAIN	TNL 400/280	Daegu Braiding Co
UPPER STABLE	TNL 125	Daegu Braiding Co
MIDDLE STABLE	TNL 125	Daegu Braiding Co
MAIN STABLE	TNL 145	Daegu Braiding Co
UPPER BRAKE	TNL 80	Daegu Braiding Co
MIDDLE H/L BRAKE	TNL 180/125	Daegu Braiding Co
MAIN BREAK	TNL 400	Daegu Braiding Co

RISERS	FABRIC CODE	SUPPLIER
MATERIAL	WEBBING 20MM	GUTH&WOLF GMBH
Al Sub riser	6mm Dyneema	Liros
PULLEYS	RIELY	Ronstan

### 3. Introduction and Pilot Target

The DUET PRO is a tandem paraglider suitable for the professional commercial flying.

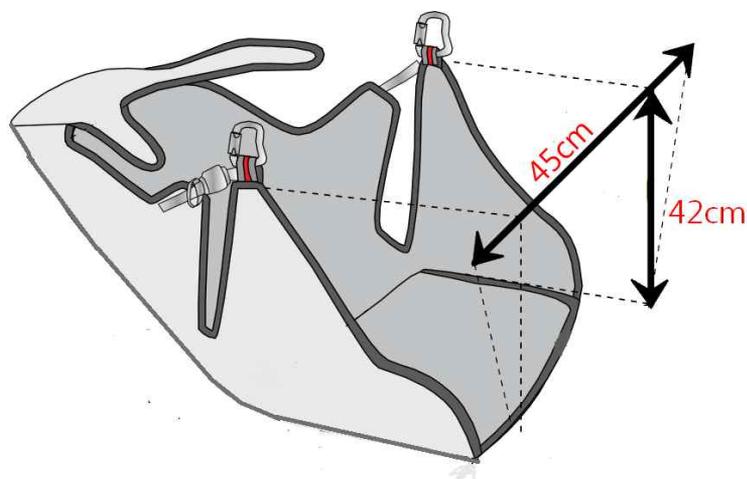
You must be in possession of the appropriate license and insurances to fly with passengers.

You must do not

- Be flown with more than the maximum certified total weight
- Be towed with a tow line tension in excess of 250kg

The DUET PRO has been classified as EN-B and LTF-B. The glider has been type-tested for “one-and two-seated” use.

During type-testing the DUET PRO was tested with a ‘GH’ type harness. The setup is shown in the below picture.

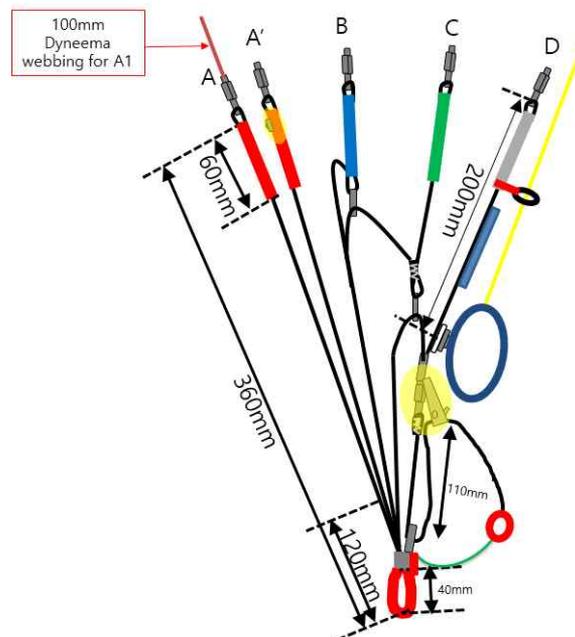


#### 4. Risers

DUET PRO has 4 risers. The A riser has a red cover for easy identification. There is another line with red mailon. There is A' and is for the big ears.

There is a 100mm A1 sub riser. It will be helpful for your soft take-off in the windy condition.

The tolerance should not be more than  $\pm 5\text{mm}$  from the standard riser length.



	Standard [mm]	Trim opened [mm]	Travel length [mm]
A	360	360	0
B	360	387	27
C	360	415	55
D	360	470	110

## 5. Lines

They come in different diameters of Kevlar and Dyneema with sheathed cover. They must be inspected every 150 hours maximum.

In the case of Brake lines, it was cut a little longer, so every pilot can adjust it according to his personal taste.

But you must always leave 10cm before the brake line starts acting in order to avoid trailing edge deformation when the wing is fully trim opened. In case the brake handle comes loose during flight or any brake line is cut you can use the D riser softly for directional control instead of the brake line.

If you feel it is necessary to adjust the brake-line length to suit physical build, we recommend you ground handling the glider before you test-fly it and carry out this process after every 20mm of adjustment.

## 6. Trimmers (Accelerator)

The DUET PRO is supplied with a trim riser set. The 'neutral' or standard position is when the trimmers are pulled all the way down and A/B/C/D riser lengths are equal. We recommend performing landing and take-off with the trimmers closed. With the trimmers closed, the DUET PRO will reliably inflate without any overshooting.

As a result, the take-off characteristics are very smooth, straightforward, easy, forgiving, and require

no special skills.

You can be accelerated in flight using the trimmers which make a low angle of attack and increase the flying speed. DUET PRO trimmers provide you with a more satisfying flight on windy days.

We advise you to use these trimmers carefully and do not use them in turbulent and strong thermal conditions. During full trim, conditions should be meet the dynamic reaction flight of the wing in case of collapse.

The DUET PRO doesn't have an accelerator system.

## **7. Pre-flight check**

To know yourself with the glider it is a good idea to perform practice inflations and ground handling in advance.

You should have no difficulties flying the DUET PRO for the first time in suitable conditions, but as with all new equipment.

When you have the new glider, the below points should be inspected.

- Check the lines are clear and not twisted.
- Connection points between the glider and harness.
- All harness buckles are closed.
- The Karabiners are fully closed and not damaged.
- The sewing, condition of the lines, and connection of the lines are right

- Internal damage to ribs and diagonal ribs.
- Damage to the top and bottom panels and seams between panels.

## **8. Take-Off**

DUET PRO has easy inflation behavior at the forward/reverse launch because of its super light glider weight. To get the right-wing shape for the take-off, pull the brake until the canopy shows the perfect banana shape on the flat ground. While inflating the DUET PRO, you should hold both of the A risers in your hands. Smoothly and gradually inflate the wing. It does not need excessive energy and you feel the lift force very fast. It does not tend to over-shooting characteristics and provides a leisurely launch time with your passenger.

We recommend to take off with closed trimmers.

## **9. In flight characteristics**

DUET PRO has the best glide performance in a normal trim position with no any brakes.

In strong thermals and turbulence, we recommend gently pull both brakes to increase stability without trim released.

To familiarize yourself with the DUET PRO your first turns should be gradual and progressive.

To make efficient and coordinated turns with the DUET

PRO first look in the direction you want to go and check that the airspace is clear. Your first input for directional change should be weight-shift, followed by the smooth application of the brake until the desired bank angle is achieved. To regulate the speed and radius of the turn, coordinate your weight shift and use the outer brake.

In the unlikely event that a brake line releases from the brake handle or breaks, the glider is maneuverable using the D-risers. By pulling gently on the D-risers it is possible to steer the glider and land safely.

#### Alternative Steering:

In the unlikely event, that a brake line releases from the brake handle, or breaks, or the brake lines are tangled up, the glider is maneuverable using the rear-risers. By pulling gently on the rear-risers, it is possible to steer the glider and land safely. Don't pull the rear-risers too much, to avoid a deep stall!

## 10. Deflations

In spite of the DUET PRO has great stability of the flight, strong turbulence or piloting error may cause a portion of the wing suddenly to be deflation.

### 10.1 Asymmetric collapse

The asymmetric collapse usually happens when the pilot has not foreseen this possible reaction of the wing.

Asymmetric collapses should be controlled by weight shifting away from the collapse and applying enough brake to control your direction. And you should use the brake to re-inflate the glider.

## **10.2 Frontal collapse**

DUET PRO does not come out the symmetrical front collapse by itself. It has high internal pressure with its well designed profile. However symmetric collapse may occur in strong turbulent conditions, but It could be fast recovered if you apply the brake down to 15 to 20cm. Release the brake lines, you may recover to the normal flight.

## **10.3 Full stall**

The full stall can occur when you fully pull both brakes enough a long time. To recover to the normal flight you must release both brakes. After this usually comes a front dive with a possible front deflation. An asymmetric recovery (one control released faster than the other) from a full stall can cause a big dynamic collapse. The full-stall is a hazardous maneuver and not recommended as it requires very high forces.

The available brake travel before stalling the wing

depends on the size and the lightweight. The DUET PRO has a minimum of 65cm(Max. 70cm) travel length at maximum total load. Those numbers are just a rough indication. (The publication of the brake travel is claimed by the EN 926-2.)

It would be dangerous to use the brake travel according to those numbers, because it is not practicable to measure the brake travel during flight, and in turbulence, the stall might occur with less brake travel. If you want to use the whole brake travel of your glider safely, it is necessary to do many intended spins and full stalls to get a feeling for the stall behavior.

#### **10.4 Deep stall**

It is possible for gliders to enter a state of the deep stall. This can be caused by several situations including; a very slow release from a B-line stall; flying the glider when wet; or after a front/symmetric deflation.

When you meet this situation you should fully raise up both brakes and push the A-risers forwards or release the trims symmetrically to regain normal flight.

#### **10.5 Asymmetrical stall**

It can take place when you pull one of the brakes too hard, or while spiraling at a small speed in turbulence

you increase the angle of attack. Rotation in the asymmetrical stall is called a negative spiral. This is one of the most dangerous flying situations. In order to get out of the asymmetrical stall, just release the brakes. There may follow side thrust forward with the following wing collapse.

### **10.6 B stall**

We do not recommend a B stall with the DUET PRO. This technique is generally very hard to use with DUET PRO by the high force needed to pull down the B lines.

### **10.7 Cravat**

In case a cravat should occur from an asymmetric collapse or other maneuvers, it is important to keep your flying direction by applying some brake on the opposite side and weight shift.

You can also use strong deep pumps on the brake to the cravatted side. If a pull of the brake line is unsuccessful, pulling the stable line which is the outermost line on the B-riser may work.

If you can not do it and the rotation is increasing, you must use the parachute.

## **11. Descent Techniques**

### **11.1 Big ears**

The sink rate can be decreased in a controlled way by folding both wingtips. While holding the brakes you should symmetrically pull the outermost A-risers.

In order to return to the normal flight, you should release the A-risers and pull the brake short times until wing tips regain pressure.

Spiraling is not permitted with big ears, because of the increased load on the remaining lines so that they can be physically deformed.

### **11.2 Spiral dive**

When you hold the one-sided brake down for a long time, the glider goes into a fast sharp turn and loses a lot of height. The sink rate could be more than 15 m/sec. To get out of the spiral dive you must release the inner brake and use the outside brake to manage your sink rate. Mind that DUET PRO may take one more turn after releasing the brake.

## **12. Special Flying**

### **12.1 Towing**

The DUET PRO does not experience any problem when being towed. Only qualified personnel should handle the qualified equipment to carry out this operation. The wing has to be inflated in the same way as in normal flight.

## 12.2 Acrobatic flight

The DUET PRO HAS NOT been designed for acrobatic flight and we DO NOT recommend continued use in this type of flight. We consider an acrobatic flight to be any form of piloting that is different from a normal flight. To learn safely how to master acrobatic maneuvers you should attend lessons which are carried out by a qualified instructor and over water. Extreme maneuvers take you and your wing to centrifugal forces that can reach 4 to 5g.

Materials will wear more quickly than in normal flights. If you do practice extreme maneuvers we recommend that you submit your wing to a line revision every six months.

## 13. Landing

We recommend landing with trimmers to the normal slow position. Don't use sharp turns or radical maneuvers.

When you are 1-2m over the ground, you should face into wind and pilot and passenger standing upright and ready to run if necessary. Finally, you may pull the brakes smoothly to minimize vertical speed.

Don't hit the ground by your overtake the glider.

If you in windy condition, as soon as you touch the ground you have to turn around with your passenger

to face the glider and move towards it during full pulling break symmetrically.

#### **14. Packing your DUET PRO**

The DUET PRO needs to be folded cell to cell to keep the plastic reinforcement at the leading edge lie flat on each other and don't get bent. Try to pack your DUET PRO as loosely as the packing bag allows because every fold weakens the fabric.

Avoid packing the glider where it is wet or abrasive conditions(sand, asphalt pavement, concrete)

#### **15. Maintenance and cleaning**

Cleaning should be carried out with only pure water. If the glider comes in contact with salt water, clean thoroughly with fresh water. Do not use solvents of any kind, as this may remove the protective coatings and destroy the fabric.

#### **16. Caring tips**

- Do not expose your glider to the sun any longer than necessary
- Keep it away from water and other liquids
- Do not let the front edge hit the ground
- Keep your glider away from fire
- Do not put anything heavy on your glider, do not pack it in a rucksack too tightly.

- Regularly inspect the canopy, lines, risers and harness. If you find any defects, contact your dealer or the manufacturer. Do not attempt to repair the paraglider by yourselves.
- If you detect a damaged line, inform the dealer or manufacturer about the line number according to the line plan
- Keep your DUET PRO in a bag in a dry well-ventilated place under neutral temperature and humidity conditions
- If you do not use the glider, then once a month you should unpack it, ventilate it well, and then pack it back in the bag

## **17. Warrantee**

The producer guarantees the correctness of the declared characteristics and the paraglider's normal performance for two years after the purchase date. The producer conducts special, and after warranty repairs and maintenance at the owners' request for an extra price. The warranty does not cover misuse or abnormal use of the materials.

We recommend inspecting your paraglider (including checking suspension line strength, line geometry, riser geometry, and permeability of the canopy material) one time at two years, or every 150 hours of flying time (whichever comes first); Those inspections must be made by the manufacturer, importer, distributor, dealer

or other authorized persons. The checking must be proven by a stamp on the certification sticker on the glider as well in the manual book. Also, they will offer you spare materials like magnetic, trimmer webbing, and so on.

The Nylon fabric-reinforced on the leading edge of DUET PRO is specially designed to extend the life of the glider in tough and somewhat harsh environments by applying additional reinforcement in consideration of the Davinci Gliders. Even if the fabric and nylon reinforcement layer are separated by abrasion, there are no major problems with the strength and glide safety of the product itself, except for aesthetic issues.

## **18. Respecting nature and environment**

Finally, we would ask each pilot to take care of nature and our environment. Respect nature and the environment at all times but most particularly at take-off and landing places. Respect others and paraglider in harmony with nature.

Do not leave marked tracks and do not leave rubbish behind. Do not make unnecessary noise and respect sensitive biological areas.

The materials used on a paraglider should be recycled. Please send old Davinci gliders back to us Davinci Gliders offices. We will undertake to recycle the glider.

### Checked line sheet(with riser)

The measured values at the lower surface of the tailing edge, cll depth and spacing of the articulation points were determined under tensile load of 50N. The tolerance should not be more than ±10mm between the below length and reality.

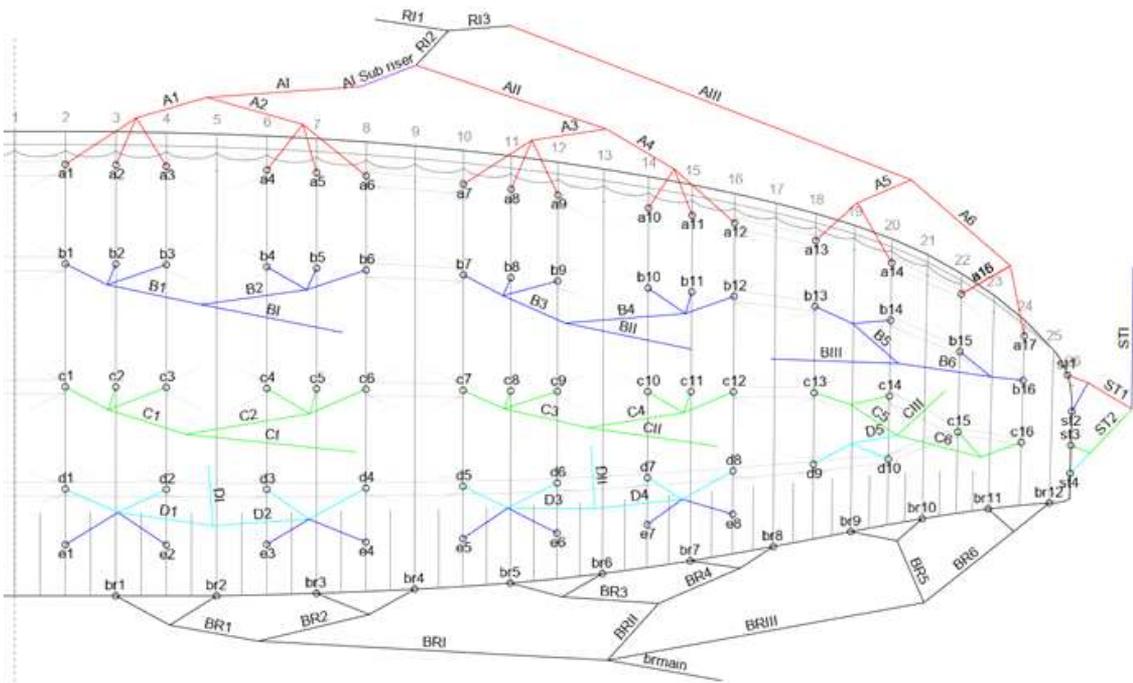
### DUET PRO 40 size (With riser)

	A	B	C	D	E	Brake
1	8767	8644	8700	8749	8843	9561
2	8676	8554	8613	8670	8772	9209
3	8681	8561	8619	8656	8756	9026
4	8669	8550	8605	8718	8807	9038
5	8654	8534	8589	8687	8778	8765
6	8729	8613	8666	8622	8703	8583
7	8708	8581	8634	8596	8675	8555
8	8629	8501	8555	8629	8680	8623
9	8640	8520	8571	8462		8574
10	8615	8501	8551	8309		8456
11	8597	8487	8536			8430
12	8656	8551	8593			8513
13	8542	8452	8414			
14	8388	8328	8294			
15	8232	8213	8201			
16	8146	8119	8111			
ST	7932	7883	7904	7929		

### DUET PRO 42 size

	A	B	C	D	E	Brake
1	8952	8831	8873	8926	9025	9765
2	8857	8740	8786	8846	8953	9421
3	8865	8747	8791	8833	8938	9269
4	8853	8736	8778	8896	8989	9286
5	8838	8721	8762	8864	8960	8925
6	8914	8801	8840	8799	8884	8739
7	8893	8788	8812	8772	8856	8711
8	8813	8707	8733	8805	8861	8781
9	8824	8725	8748	8645		8739
10	8798	8707	8728	8489		8619
11	8780	8692	8713			8591
12	8840	8757	8770			8675
13	8724	8637	8589			
14	8567	8511	8466			
15	8407	8393	8371			
16	8319	8297	8279			
ST	8101	8056	8068	8104		

Name	Manufacturer	Name	Manufacturer	Name	Manufacturer	Name	Manufacturer	Name	Manufacturer	Name	Manufacturer
a1	TNL 145	b1	TNL 145	c1	TNL 125	d1	TNL 80	e1	TNL 80	br1	TNL 80
a2	TNL 145	b2	TNL 145	c2	TNL 125	d2	TNL 80	e2	TNL 80	br2	TNL 80
a3	TNL 145	b3	TNL 145	c3	TNL 125	d3	TNL 80	e3	TNL 80	br3	TNL 80
a4	TNL 145	b4	TNL 145	c4	TNL 125	d4	TNL 80	e4	TNL 80	br4	TNL 80
a5	TNL 145	b5	TNL 145	c5	TNL 125	d5	TNL 80	e5	TNL 80	br5	TNL 80
a6	TNL 145	b6	TNL 145	c6	TNL 125	d6	TNL 80	e6	TNL 80	br6	TNL 80
a7	TNL 125	b7	TNL 125	c7	TNL 80	d7	TNL 80	e7	TNL 80	br7	TNL 80
a8	TNL 125	b8	TNL 125	c8	TNL 80	d8	TNL 80	e8	TNL 80	br8	TNL 80
a9	TNL 125	b9	TNL 125	c9	TNL 80	d9	TNL 80			br9	TNL 80
a10	TNL 125	b10	TNL 125	c10	TNL 80	d10	TNL 80			br10	TNL 80
a11	TNL 125	b11	TNL 125	c11	TNL 80					br11	TNL 80
a12	TNL 125	b12	TNL 125	c12	TNL 80			st1	TNL 125	br12	TNL 80
a13	TNL 125	b13	TNL 125	c13	TNL 80			st2	TNL 125		
a14	TNL 125	b14	TNL 125	c14	TNL 80			st3	TNL 125		
a15	TNL 125	b15	TNL 125	c15	TNL 80			st4	TNL 125		
a16	TNL 125	b16	TNL 125	c16	TNL 80						
A1	TNL 200	B1	TNL 200	C1	TNL 145	D1	TNL 145	ST1	TNL 125	BR1	TNL 125
A2	TNL 200	B2	TNL 200	C2	TNL 145	D2	TNL 145	ST2	TNL 125	BR2	TNL 125
A3	TNL 180	B3	TNL 180	C3	TNL 145	D3	TNL 145			BR3	TNL 125
A4	TNL 180	B4	TNL 180	C4	TNL 145	D4	TNL 145			BR4	TNL 125
A5	TNL 145	B5	TNL 145	C5	TNL 145	D5	TNL 145			BR5	TNL 125
A6	TNL 145	B6	TNL 145	C6	TNL 145					BR6	TNL 125
AI	TNL-400	BI	TNL-400	CI	TNL-280	DI	TNL-280	STI	TNL 145	BRi	TNL 180
AII	TNL-400	BII	TNL-400	CII	TNL-280	DII	TNL-280			BRii	TNL 180
AIII	TNL-280	BIII	TNL-280	CIII	TNL-280					BRiii	TNL 180
Ai sub	Dyneema 6mm										
										BRi	TNL-400



## Overview

