



## **STORM and CF STORM Flight Characteristics and Frequently Asked Questions**

### **What does CF stand for?**

CF stands for Canopy Formation. Many of you know CF as CRW. The FAI/IPC utilize the term CF for defining this discipline. Same as FS is short for Formation Skydiving, CF stands for Canopy Formation.

### **So what is this STORM?**

This is truly a seven-cell that thinks it is a nine-cell. The Storm is a slightly tapered, seven-cell zero-porosity main canopy from Performance Designs. The Storm will be available in two versions, the “Storm”, and the “CF Storm.”

- ❑ The Storm is focused on the every day skydiver who wants a fun canopy to fly.
- ❑ The CF Storm similar to the Storm, but altered to meet the needs of skydivers interested primarily in the Canopy Formation discipline, or for those jumpers who do CF demo jumping.

Bear in mind that the airfoil of these two canopies is the same, so if you are interested in doing light or casual CF with your Storm, have a blast!

### **In what sizes will the STORM be available?**

The Storm is produced in sizes ranging from 230-97 square feet. 230, 210, 190, 170, 150, 135, 120, 107, 97. Span and Chord values can be found at the end of this document, or on the PD website.

### **Who is this STORM canopy for?**

This canopy will appeal to a wide variety of jumpers. There has been a growing interest in a canopy that has predictable openings, that is snappy, fun to fly and also has a powerful flare. Even though you can “swoop” the Storm, you probably won’t win any competitions with it.

With the growing understanding that many skydiving injuries occur under fully functional parachutes, there has been a general trend to place more emphasis on canopy piloting skills. This education may include CF training at a basic level. Some skydivers have expressed their interest in a canopy that is CF friendly but that can be used for their every day skydiving as well.

Others have been looking for an “upgrade” to their Spectre.

Wingsuit flyers have found the predictable opening characteristics of the Storm to be exactly what they are looking for, “exciting to fly and a powerful flare”, which means the ride down after a wingsuit jump doesn’t have to be boring to be safe any more.

If one of the above sounds like you, you may find what you’re looking for in the Storm.

### **Sounds a lot like a Spectre. Will this canopy replace the Spectre?**

Perhaps- For some jumpers this canopy may be just that, an upgrade to their Spectre. It has a stronger more predictable flare, and greater versatility (it surprised us too). Some CF enthusiasts have been hesitant to use the Spectre for CF. They may have desired a canopy that is a bit more solid to handle the bumps of CF a bit better. They will find that in the Storm. It is funny to listen to our highly experienced test jumpers come down from test jumps laughing about bouncing these canopies off each other like beach balls and the

canopies were quite resistant to collapse. (This should only be tried by experienced CF flyers that have received and thoroughly understand CF safety procedures).

### **What are the opening characteristics?**

We have found the openings of the Storm to be soft, on heading and very forgiving to minor inconsistencies in body position during deployment. Some would compare them to that of a Spectre, but with a slightly quicker inflation. Note, even though the Storm and the CF Storm share the same planform, the CF Storm comes standard with a mesh slider. We highly recommend sub terminal openings only when using a mesh slider. The CF Storm will have fast on heading openings due to the slider being made of mesh. You can, however replace this mesh slider with a regular Storm fabric slider if you want softer inflating openings.

The openings of the Storm are quite comparable to that of the Spectre, with one noticeable but subtle difference. As the sizes increase on the Spectre, the inflation tends to be slower. However the inflation time does not increase on the larger size Storm as it does on the Spectre. The inflation speed of the Storm is quite comfortable, but ever so slightly quicker than the Spectre on the smaller sizes as well.

Like the Spectre, the Storm is fairly forgiving of packing technique, body position, and the airspeed at which it is deployed. We've also found that the Storm is more resistant to off-heading openings than many other canopies. It also tends to turn less and recover more quickly if it does open off-heading.

You will get the best results by using the packing method we recommend, and by deploying at a reasonable airspeed while in a good body position. As with any canopy, it is important to position the slider correctly, make proper line stows when packing a Storm, and use a pilot chute that is the correct size. See our information sheet titled "Solving Deployment Problems" for more information.

### **How Does the STORM perform during flight?**

The Storm flies somewhat similar to the Spectre but has a much larger speed range. In full flight the Storm will have greater speed than the Spectre, giving it more of the flight "feel" of a Sabre2, for example. You will notice the performance difference when you apply the brakes. Its ability to perform in a braked configuration is excellent. Not only does the Storm have the ability to fly fast in full flight, but it also has great slow flight glide when the brakes (or for that matter rear risers) are applied.

We refer to this as the "range of speed" you can achieve, and just as the Velocity or Sabre2 have become known for their range of speed, so will the Storm. Bottom line, in full flight, the canopy is very quick and agile, but it floats along nicely in deep brakes as well.

### **How does the STORM respond to toggle turns?**

If you have been jumping a flat gliding canopy like a Stiletto or a Silhouette, you may feel that the Storm is not quite as responsive and has a slower turn rate. At full glide the first one half of the toggle stroke will seem less responsive to that of a Silhouette or a Stiletto, but when you get past that first one half of the toggle stroke, you'll see just how sharp this canopy can turn. You will find that the Storm will dive longer and lose more altitude in a turn than a comparable sized Stiletto or Silhouette, but not quite as much as a Sabre2.

In braked turns (flat turns) the Storm really shows its expanded control range to the user. Flat turns are an important technique to learn on any canopy. While extremely agile, the Storm maintains a much lower descent rate than at full glide.

With all that said, keep in mind that the smaller your canopy gets the faster it will turn, and the more altitude it will lose in a turn or in full flight.

### **How does the Storm respond to front and rear riser input?**

The Storm utilizes the same planform as that of the CF Storm. In CF flying, responsive risers and understanding how they work are important. The front riser pressure of the Storm is slightly higher than that of the Spectre, but requires less input to receive the same response. In comparison to a Lightning the riser pressure is higher, but with much greater responsiveness.

As a very useful tool in extending the glide or turning with less tail deflection, the Storm is very maneuverable by utilizing the rear risers. Understanding and exploring the use of the rear and front risers is essential to fully capitalize on all of the flight capabilities the Storm has to offer.

### **I've never stalled my canopy before. Is stalling a canopy a necessary skill?**

Depending on a variety of factors, including riser length, harness fit, body type, and canopy size, you may not be able to stall a Storm even if you hold the toggles all the way down. Quite a few skydivers, even very knowledgeable and experienced ones, mistakenly believe that you must be able to stall a canopy with the toggles all the way down in order to land it correctly. This belief does not apply to most modern canopies, including the Storm. When a canopy actually stalls, its lift decreases dramatically and its rate of descent rapidly increases. A stalled canopy is not really "flying." If you want a soft landing, you want your canopy to keep creating lift and maintaining a low rate of descent until your feet are on the ground. If a canopy stalls while landing, it may set you rather abruptly on the ground. If you adjust your steering toggles so that your canopy is easier to stall, it may actually become more difficult to land softly.

The Storm will reach a fairly low airspeed before stalling. The "feel" of the stall on the Storm is similar to that of a Spectre, but is more predictable and not as sharp. In line with what was said earlier regarding the wider speed range of the Storm, understanding the stall point of the Storm can be a useful tool if and when you find yourself flying near that point.

### **How does the STORM land?**

It may be a seven-cell that thinks it's a nine-cell, but you're not going to rival the distances of the Velocity with the Storm. With that said, there are quite a few highly experienced pilots who have flown the Storm and realized it can be a great docile canopy for a novice, and that it also holds potential for great performance in the hands of a highly skilled pilot.

The Storm tends to have a lower flare point or "sweet spot" than some of our other modern canopies such as the Silhouette or Stiletto. This means you will need to pull the toggles a bit farther to stop your descent, but not quite as far as a Katana or Sabre2. The approach of the Storm will appear a bit quicker than that of an equally sized Spectre. The flare point on the Storm is similar to that of the Spectre, but quite a bit more powerful. We've found this to be beneficial for transitioning downward speed into horizontal speed if you happen to flare a little late, and also comes in quite handy if you happen to start flaring a little early. You'll be surprised how much power there is in the bottom one quarter of the flare, if you use it;--).

**A note about control line length:** The Storm was designed with a bit of slack in the control lines for several reasons, some of which are explained in this document. We recommend keeping the control lines at their original length. Some jumpers have shortened their control lines by changing the point where the toggles are attached because they felt the slack in the control lines was excessive. If you believe your control lines are too long, we suggest you read an article on our web site titled "Getting the Best Performance From Your Canopy," which can be found on the PD website in the informational articles. If you have read the article on "Getting the Best Performance From Your Canopy" and still want to shorten your control lines, you should only shorten them by an inch or two (2 – 5 cm). Then jump the canopy a few times to see how it performs. There should always be some slack in the control lines when the brakes are released to allow the canopy to perform the way it was designed. Keep in mind that you may need to lengthen the steering lines again after a certain number of jumps to keep them at the correct length. Also, remember that modifications like this should be performed by or under the supervision of a qualified rigger.

### **What kind of line is offered on the STORM?**

The Storm will be offered with the choice of cascaded 550 microline, 825 microline, or 600 dacron. Continuous center lines are available with the casual CF kit.

### **What is the Casual CF kit?**

For those who might have an interest in trying canopy formation flying on a casual basis, but don't want to buy a canopy intended only for canopy formations we offer a kit for your Storm. The kit gives you a retractable pilot chute bridle and attachment points for the top of your canopy. It also includes continuous center A and B lines so you don't have to worry about your feet getting snagged in cascaded lines.

You can order your Storm with the kit installed at no extra charge, or you can purchase the kit separately at a later date.

Though CF can be explored without these options, some prefer them before starting their exploration into the CF world.

### **How often will I need to reline my STORM?**

Your Storm may have microline or dacron depending on which you selected. The life expectancy of microline depends on several factors, and there is no specific jump number that dictates when a line set should be replaced. You may generally make around 400-500 jumps on microlined canopies before the lines need to be replaced. Very well maintained canopies could see more than 500 jumps, canopies that get more abuse might see less than 400 jumps. It's best to base this decision on the actual condition of the line set rather than the number of jumps on the lines. Monitor your line set and when you see signs of wear (broken carriers, very "fuzzy" lines, etc.) replace them. Pay special attention to high abrasion areas such as the steering lines around the brake locking loop, and the line between the brake locking loop and toggle. These will all travel through the guide ring and are subject to accelerated wear as compared to the rest of the lines.

If you notice a significant change in the way your canopy opens, flies, or lands, this may indicate that you need to replace the lines even if the lines still look good. You may want to have a rigger check the canopy's trim differentials and determine if it is out of trim.

Removing the twists from your steering lines can help prolong the life of your line set, and help the steering lines remain in trim. If you do not remove the twists from your steering lines on a regular basis, the twists will become permanently "set" in the lines and exaggerate the shrinkage that occurs normally

### **Why would I choose Dacron for my STORM?**

Though most people prefer the lower bulk and drag of microline, dacron is often the best choice for some applications. In recent years when asked why certain customers chose microline over dacron, their reason was "because that's what everyone gets". That's not really the case and we sometimes find dacron being under appreciated by many jumpers who could benefit from its use. Dacron is a fairly elastic line, so it gives a little when there is a sharp "spike" to the opening force. This elasticity won't change the typical/normal opening very much, but it can take the edge off the occasional abrupt opening where your packing was a little off or your airspeed was a little high at opening time. For those interested in CF (Canopy Formation flying), dacron is most often the preferred choice. PD does not encourage or promote CF with microline. Only experienced CF flyers should attempt formations with microline.

Some camera flyers with heavy helmets sometimes also prefer dacron lines. Jumpers who may have a lower tolerance for subjecting their bodies to hard openings may want dacron to help reduce the impact should something get a little out of control at opening time. Frankly, any jumper who may want to take the extra edge off the potential opening shock that may occur may want to look at Dacron as an option.

If you have chosen a CF Storm, it comes with Dacron lines.

### **What is the delivery time for a STORM?**

Delivery times for the Storm are comparable to that of our other main canopies. At the time of printing these FAQ's that is 7-10 weeks

### **Can I try one first, to see if I like it?**

There are a few ways to "fly before you buy"

- ❑ Visit [http://www.performancedesigns.com/demo\\_sport.asp](http://www.performancedesigns.com/demo_sport.asp) and fill out a demo request form. Our demo coordinator will get in touch with you to arrange a demo to be shipped directly to you (US only).
- ❑ You can visit our PD tour reps at an event. The PD Tour program in the US, Europe, and abroad will be carrying the most popular sizes of the STORM for you to try. Find their schedule here: <http://www.performancedesigns.com/pdzone/tour.asp>
- ❑ Ask your Authorized Dealer to arrange a Demo. Many of our dealers either own their own fleet of demo canopies, or regularly arrange demo's with PD for their frequent customers.

## When and how can I order a STORM?

NOW! If you are reading this, you can order it. PD will begin taking orders in May, 2008. The STORM can be ordered through the authorized PD dealer of your choice. A list of authorized dealers can be found at [www.performance designs.com](http://www.performance designs.com)

## Great, I'll take one, how much do they cost?

Introductory price of the Storm is \$1,930.

The kit can be added at the time of purchase for no additional cost, or \$55 at a later date.

The CF Storm retail price is \$2,105 with all the bells and whistles.

## Will the CF Storm replace the Lightning?

Over the years there have been a handful of high profile CF teams that have used early versions of the CF Storm in competition with excellent results. The Storm will be offered alongside the Lightning. The CF and Demo teams around the world will make their decision on which canopy best suits their needs.

## What is the difference between the Storm and the CF Storm?

As far as the canopy is concerned, they are essentially the same. If you're interested in trying casual CF with your regular Storm, have a blast! Below are some of the noticeable items on the CF Storm that are not on the Storm. They are basically add-on items to handle the abuse of CF a little better and a mesh slider for sub terminal quick openings. The CF storm does not have "options" in the sense that you have to pay for, or choose what you would like or not like. You can have it all. That's right, the CF Storm comes with all the items below included in the retail price.

Dacron lines- continuous A1&A4 Red

Mesh Slider (fabric slider available as additional purchase)

Reinforced Stabilizers

4 ring PCA Attachment points

Retractable bridle

Target Panels on 1,6,7 top surface

Tail pocket

#5 links

The items above are the primary differences. The Storm is set-up more for the general-purpose skydiver where the CF Storm is designed to meet the needs of the CF Competitor.

## Canopy Sizing

The chart below shows our suggested maximum weight limits for the Storm. We provide this information with each of our canopies to help you choose the correct canopy size for your weight and experience level. It is important to understand what the information really means so you can use these charts correctly.

Exit weight is your body weight plus the weight of your clothing, rig, main and reserve canopies, and anything else you will be wearing when you exit the aircraft. The average jumper's exit weight is about 20 to 25 lbs. more than his or her body weight.

There are various exit weights listed on the chart below, divided into several experience categories. It's important to note that these are **maximum** weight limits. For example, the maximum exit weight listed under "Novice" for a Storm 190 is 190 lbs. This means we feel the Storm 190 is appropriate for a novice jumper who has an exit weight of 190 lbs. **or less**. It does **not** mean you must weigh at least 190 lbs. to make this canopy perform correctly. In fact, a much lighter jumper might be perfectly happy flying a Storm this size. The canopy will have a slower forward speed and lower rate of descent when flown by a lighter jumper, and is likely to be more forgiving and easier to land. These may be the exact characteristics wanted by a novice jumper, or one who is a conservative canopy pilot!

Of course, a light jumper on a large canopy may be affected more by high winds. This is why the **minimum** exit weight "varies with weather and landing conditions" (VLC). If the winds are light, a 150 lb. jumper might enjoy flying a 230 square-foot canopy, but that jumper might choose to stay on the ground when the winds are very strong and gusty.

The chart below can help you determine the canopy sizes that might be appropriate for you, but we don't recommend making your decision based solely on this information. Just as you need to try on a pair of shoes to see if they actually fit, jumping a canopy of a particular size is the best way to really know if it is right for you. When purchasing a canopy, it's best to choose a model and size that you know from experience will provide the performance you want.

If you review the Storm wingloading chart in comparison to that of the Spectre, you will notice that some of the maximum weight limits for different categories are higher. Due to the intense focus our sport has placed on canopy piloting safety, these values represent weights that a skilled pilot will be able to realistically perform. This is not an indication that the Storm is "safer" or less likely to catastrophic outcomes if you do not actively and adequately pilot your canopy or attain proper canopy control education; but that in the hands of a skilled pilot, the Storm will be challenging to fly and capable of performance at the weight limits listed below.

**If you plan to jump a canopy that is smaller than any you have used before**, your exit weight should be within the "Student" or "Novice" category for that canopy, and you should be trained to use the canopy by a qualified instructor. Or, you should have made at least 50 jumps on a canopy that is no more than 15% larger (approximately one size), and be able to consistently make soft, accurate landings with that larger canopy.

CANOPY MODEL	STUDENT (Lbs.)	NOVICE (Lbs.)	MAXIMUM EXIT WEIGHT – LBS / (KG)					CHORD (FT.)	ASPECT RATIO
			INT (Lbs.)	ADV (Lbs.)	EXP (Lbs.)	MAX. (Lbs.)	SPAN (Ft.)		
Storm-97	N/R	N/R	N/R	116 (53)	150 (68)	175 (79)	14.42	6.87/6.25	2.14:1
Storm-107	N/R	N/R	N/R	128 (58)	166 (75)	193 (88)	15.15	7.21/6.98	2.14:1
Storm-120	N/R	N/R	114 (51)	144 (65)	192 (87)	216 (98)	16.04	7.64/6.98	2.14:1
Storm-135	N/R	122 (55)	128 (58)	169 (77)	216 (98)	230 (104)	17.01	8.10/7.39	2.14:1
Storm-150	N/R	143 (65)	150 (68)	188 (85)	225 (102)	240 (109)	17.93	8.54/7.72	2.14:1
Storm-170	N/R	170 (77)	170 (77)	213 (97)	238 (108)	255 (116)	19.09	9.09/8.29	2.14:1
Storm-190	*133 (60)	190 (86)	190 (86)	228 (104)	247 (112)	266 (121)	20.18	9.61/8.76	2.14:1
Storm-210	*158 (72)	210 (95)	210 (95)	242 (110)	263 (119)	273 (124)	21.22	10.10/9.21	2.14:1
Storm-230	*173 (78)	230 (105)	230 (105)	253 (115)	276 (125)	299 (136)	22.20	10.57/9.64	2.14:1

\*\* Although this model has been used successfully for this category, PD has other models that may be more suitable.

If you have further questions regarding the Storm or CF Storm, please contact Performance Designs or your Authorized Performance Designs Dealer.