

Connecting To Fluorocarbon

With the increased use of fluorocarbon line among professionals, many questions have surfaced regarding the integrity and best use of this material in tournament angling. Most pros now endorse fluorocarbon but not without trial and error. Among the ranks many have painfully discovered not all fluorocarbon is created equally.

Over the last several years, anglers have learned to appreciate the properties of quality PVDF (Poly-vinyl-i-dene Fluoride) better known as fluorocarbon. Unfortunately, with over 70 leader and mainline brands available, fisherman can easily fall to the misconceptions of fluorocarbon.

What Is PVDF?

Fluorocarbon is made from Carbon, Hydrogen and Fluoride molecules now known as Poly-vinyl-i-dene Fluoride or PVDF. The chemical company, Kureha was the first to discover fluorocarbon's filament potential, creating the first fluorocarbon line-leaders for fishing in 1971. Much has been refined since then but Japan continues to lead the world in PVDF developments.

PVDF structures are resistant to harsh chemical corrosion, abrasion and extreme temperatures. Fluorocarbon has impressive mechanical integrity, exceptional impact resilience and good pliability.

Blackwater International is a merchandising entity, responsible for the distribution of Toray fluorocarbon. Mr. Kuroye and staff have over 30 years in the Japanese filament industry. "Fluorocarbon is a material used as condenser film in air conditioning units, and as protective liners to aid against acid exposure in piping valves. The biggest market is in worldwide use among valves and pipes," explained Mr. Kuroye.

The company, Toray is known in Japan as the first line company to make fluorocarbon for lure fishing and for spinning reel management. These were considered some of the first pliable lines. Toray's diverse base of fluorocarbon lines designed for freshwater and saltwater techniques is unique. In Japan, Toray has over 31 different fluorocarbon lines for more than 10 different groups of sport fish. The company has invested in technology to increase transparency, manageability, abrasion resistance, and residual stretch (different than initial tensile strength).

In Japan, there is a wider range of bass techniques than in the United States due to the intense pressure their fish receive. The professionals use line weights ranging from 2.0 lb test to 25 lb test, a significant departure from US pro angling.

How Is Fluoro-Line Made?

To get what we call fluorocarbon fishing line, a process called extruding must occur. To extrude means to force something out, usually semi soft materials such as plastics or molten metals through a specifically designed mold or nozzle. Companies that make their own line are called extruders. The process requires the company's resin to be made in pellet form and then mixed with their raw materials creating batching (batches). Each company has their own recipe of raw materials developed to create their specific strengths, clarity, and manageability parameters. These batches go through a drying process, into a hopper (for melting) and eventually through a tool and dye (calculating the diameter) and onto cooling flats. The line is then gathered on a bulk spool and partitioned onto carrier spools for label and sale.

There are approximately five resin manufacturers of PVDF worldwide. Kureha (Japan), Daikin (Japan), Atonfina (France), Solvay (Belgium), and 3M Corporation (USA). There are also a select group of companies (approximately ten) with the capacity to extrude: Kuraray (Japan), Kureha (Japan), Duel (Japan), Unplass (Japan), Sunline (Japan), Unitika (Japan), Rhombic (Japan), Pure Fishing (USA), Monfile-trechink (Germany) and Toray (Japan).

Is Fluorocarbon A Standout?

Several years ago, Blackwater International developed fluorocarbon for "impact fishing" in the ocean. "We specifically designed Shock Leader and Hollow Braid to handle bigger fish, through a technique called Top Shotting" said Kuroye. The line was made with elongation parameters to withstand heavy tension generated by an opposing force (e.g. a 300 lb tuna). Unfortunately, average fluoros can fracture and retard under those forces. "We are talking about forces generated from giant tuna traveling at speeds of 20 to 50 mph", said Kuroye.

The difference between excellent fluorocarbon and standard line is in the creation and combining of high quality raw materials. Very few companies have the resources to painstakingly pursue distinctive materials that maintain high integrity. Demands of the markets price-points also force the creation of inferior products. Where a standard US line company may have one type of fluorocarbon, the more technically advanced company will offer several brands. For example, Toray-Blackwater has 6 different fluorocarbon lines. Mr. Kuroye reports, "... our lines begin with elaborate proprietary resin-development process. This complex formula must be balanced and intricately calibrated through the stages. The stages may vary with the type of fluoro being made. For example, fluorocarbon designed for ultra-finesse in crystal clear water utilizing diameters of 0.122 mm require different formulation than fluoros used for extremely abrasive, heavy- cover conditions.

Angling Uniqueness

Earlier generations of fluoro-lines were rigid and only used for leaders. Later, generations improved. It wasn't until recently lines were better arranged for manipulation, possessing smoother traits leading to improved line control. Kureha's U.S. distributor, Seaguar USA reports using two specific resin formulas in one line. The process is called Double Structure, which improves the lines knot strength, and tensile strength. Toray recently distributed Technique-Specific lines for the US bass market, concentrating on providing anglers with lines used in ultra refined finesse applications as well as lines for designed for harsh conditions. TORAY develop K-1 testing an unprecedented scratch test to improve fluorocarbon structure against long-term micro-abrasion.

Surface Tension

Fluorocarbon fishing line is heavier and denser than nylons or co-polymers. Some lines perform well with finesse techniques, while others are more applicable for jig fishing. It is important to note, diameter and density do affect line performance. Water is a resistant medium necessary to be breached when fishing. However, some lines are slower to penetrate the surface tension of water inadvertently making it difficult for them to descend. If you cut 2-inch lengths of monofilament and fluorocarbon (it doesn't matter the pound test) and carefully lay them on the

water's surface, you will discover both lengths will float, not breaking the water's surface tension. Turn the lines on end and they will continue to float but vertically. However, push lengths below the surface and both sink, but at distinctive rates. Fluorocarbon sinks nearly twice as fast as the nylon. Whether you cut 4 lbs. test or 12 lbs. test lengths, fluorocarbon sinks faster than (for example) 8 lbs. nylon. How does this translate into better angling? Simply applied, you can get your bait deeper more quickly with faster sinking line.

Fluorocarbon is more effective at breaching water tension, making a great difference when cranking, drop shotting, and ripping. Lighter density lines float, suspend, or slowly sink, causing trouble with strike detection. When making long casts, nylon line tends to float, creating a belly in the line. This "bowing" of line can cause slower reaction times to strike detection.

Other Benefits of PVDF

Line density not only increases sinking rates, it also helps detect line movement. The harder, heavier material has less stretch, is stiffer, and transmits better. For example, making a long cast with light line is sometimes necessary to catch wary fish. Using mono in these situations compromises your leverage because nylon stretches. Strike detection is also adversely impacted. Line that stretches can mean less hook penetration. Most nylons stretch more than fluorocarbons, however as said before, not all fluoros are created equally. Fluorocarbons can vary significantly in elongation tests, which can be the direct misfortune of quality, or desired the result of selected formulas.

In the earlier 1990's, the number one reason anglers sought PVDF was transparency. Out of all line materials on the market (braid, nylons, or fluorocarbon) fluorocarbon as a whole, has a light refraction that is closest to water. Companies make this their marketing vehicle. This arena is more challenging to measure but it should be known there are fluoros that are clearer than others. It begins with the quality of the raw materials, how they are prepared and how they are processed. "The industry says the clearer the fluors the more difficult and elaborate the process. Done incorrectly, it significantly weakens the line", indicated Toray.

Another important aspect of quality fluoro is the loading or winding process. Many Fluorocarbon brands didn't consider the winding process. Loading line on to retail spools just any ol' way can cause crush zones and chaffing. Linear precision winding eliminates places where weight and tension of the heavy material gets compressed or cross-sectioned against itself on the spool. This protects against causing weak points. Pay attention to how companies care for their fluorocarbon off or on the spool. Precision winding is not absolutely necessary but correct and careful loading on to a spool is.

Pros Speak

Kurt Dove who fishes many professional tours and is also a full-time guide on Amistad's trophy fishery knows all too well the importance of line technology. He has made a name for himself from the Potomac River to the boarder of Mexico. In 2008, Mr. Dove separated himself from the pack of Bassmaster Elite anglers on Lake Amistad's Battle of the Boarder event. Kurt managed to put over 30 lbs (five fish limit) into his boat on day one of the event. Mr. Dove has only been fishing professionally for approximately 4 years and amassed over \$120,000.00 in tournament winnings.

Kurt attributes much of his tournament success to proper presentation and excellent line. "In my opinion there's only a small handful of high quality fluorocarbon brands out there. On the tour we get introduced to a lot of product, internationally and domestically. It is hard but necessary to sift through the poor, fair, good and great products. Also, many pros are chasing endorsements (money and product) and jumping on board a company compromising their fishing with inferior product.

"My discovery came as a surprise; I had been fishing an event and actually ran out of fluorocarbon. I ran into a Japanese competitor also fishing the event and asked if he could spare me some fluorocarbon. He threw me a couple spools of his line. I put it on and went fishing. It was the most consistent, manipulative, durable product I had handled. I had fished the US labels with marginal appreciation. I decided to research more about the company and its filaments. I discovered Toray was one of the most desired lines on the Japanese pro circuit. The company secretly OEM'd for several brands internationally. Their line is also known world wide in sport tuna fishing. Toray is new to the states. Internationally, it carries the presence of the highest quality in materials and extrusion technology. It is one of the most expensive lines. At this point in my career, I have learned a couple things the hard way... get the best you can when it comes to line or pay the price later," said Kurt.

Your most expensive line technology is going to be proven in several categories: **Static tension** (fixed strain applied) to measure deformity, **Compression** (load force) against the material to determine fracturing propensity, **Elongation** to measure percentage of change in the length of the line, **Tensile Strength** (measuring maximum extension through force before failure), **Distend Assessment** (absorbing or swelling of a material due to fluids), **Abrasion Resistance** (to measure fragmentation and wear) **Longevity** (measuring aging and endurance) and **Residual Strength** (strength tested after stress which is not measured by most companies).

"Some line companies may have huge variances in their line performance, for example lacking abrasion resistance while others may fracture or retard during elongation. Still others may perform well initially but simply not last over time. I don't change my line out nearly as frequently as before... Yes... unfortunately true... the very best fluorocarbons are expensive...but, can be used multiple times...weekend battlers are going to be able to keep the same spool of line on several months, even years", says Dove.



Southern bass guide, Warren Barnes (in red) has seen his share "Fluoro-imposters" as he put it, " a little research pays off ". Barnes cautions anglers against "just reading the package". " I learned from a great friend to test your lines by diameter only, it will illuminate your vision and steer you away from the marketing hype." Barnes also noted, "Unfortunately, the better performing fluoros are going to cost significantly more but hold their value longer.

Living With Choices

Whether you are looking at a new brand, or an established brand, take the time to research and test your line. Gain an idea which lines "appear" consistent, manageable, durable and seem to last. Most experienced anglers know objective tensile strength tests are relatively easy to control. On the other hand, without a cycle machine, abrasion resistance testing is more subjective but can be assessed, by rubbing a coarse material against the line surfaces and discerning which brand "appears" to wear faster. Clarity testing (also subjective), may be accomplished by tying

lengths of line (same diameter) between two pipes and laying the platform against a submerged background (rock or vegetation) in high and low light conditions. Also, view the lines against several solid (dark and light) backdrops with varying light and at different angles. These tests lack scientific control but can give some idea of line integrity and quality.

If you're a serious competitor, testing your line will help you make prudent decisions in choosing a fluorocarbon. At this stage in the game there appears to be a strong correlation between fluorocarbon costs and quality. Your choice could mean the difference between line reliability, performance and fish. Remember, fluorocarbon lines are NOT created equal.



Footnote: A trophy hunter for years, Manabu Kurita proved to the world that fishing fluorocarbon for big fish pays off. Not sponsored by the Japanese company, TORAY fluorocarbon helped net him, not one, but TWO ALL TIME JAPAN RECORDS and now he is recognized for officially tying the distinctive Largemouth World Record (22 pounds, 5 ounces).

