NEOPRENE: THE INSIDE STORY

Wetsuit information guide

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A MESSAGE FROM SEVENTHWAVE

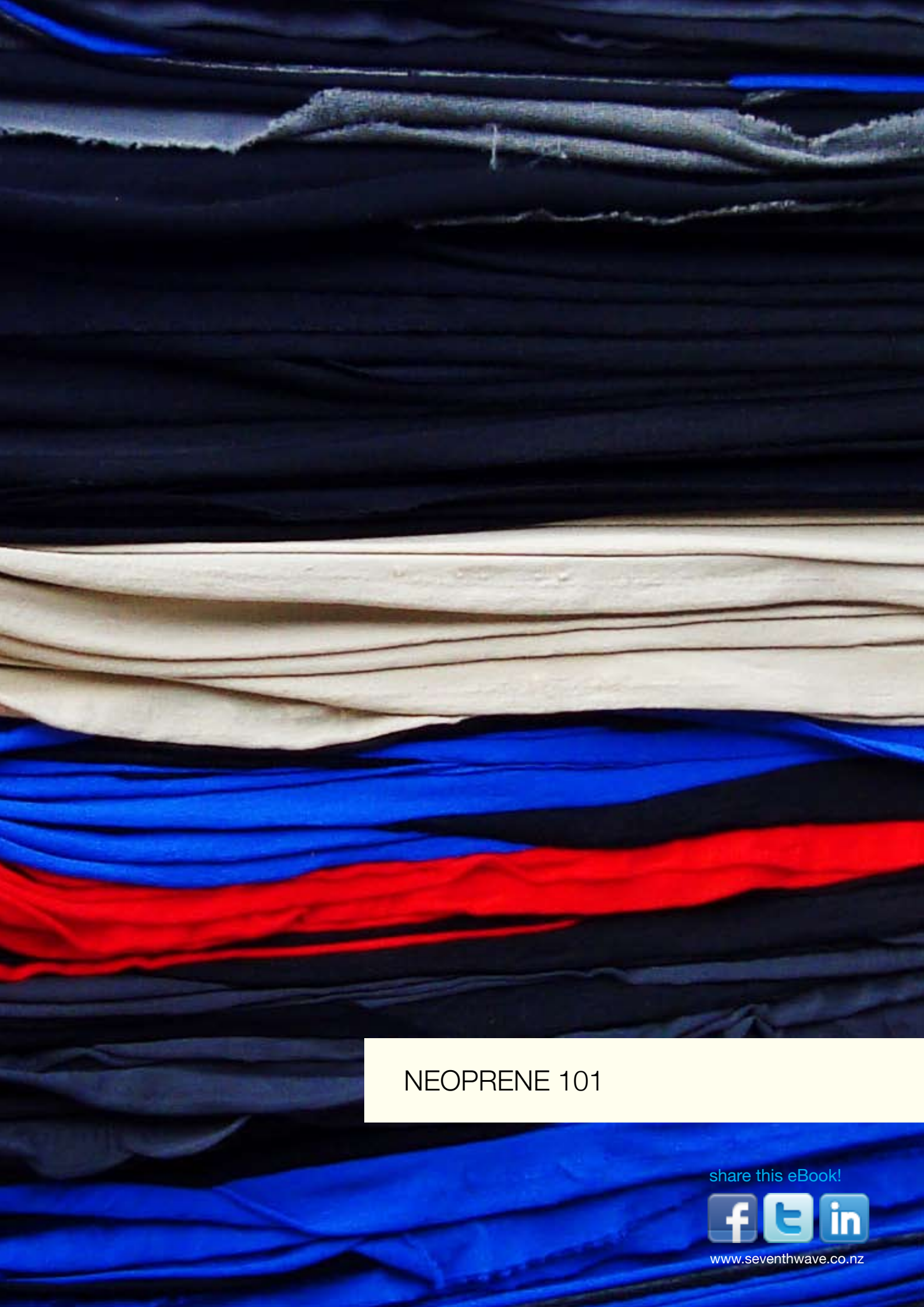
Thanks for downloading this eBook and congratulations on your decision to become more knowledgeable about all things neoprene!

As you will soon read, Seventhwave wetsuits are very different to most other brands of wetsuits available today. Seventhwave wetsuits are made from Japanese Yamamoto limestone neoprene. The base element in the neoprene we use is calcium from limestone—an ingredient very different to the traditional neoprene commonly used for most wetsuit production, which has an oil or petroleum base. The calcium in our neoprene creates a very high micro-cell structure of around 94%, making it totally impervious to water. In other words, it does not absorb water, unlike oil-based neoprene which can double in weight after a few hours in the water. This also means a Seventhwave wetsuit is warmer and lighter than other brands. and will dry very quickly. If you hang it up somewhere with good circulation after use in the morning you'll find it dry and ready for reuse later the same day. All excellent features that give you maximum enjoyment and comfort for your chosen water activity.

The other major difference is the Seventhwave Custom-Fit service. This unique service ensures you get a wetsuit with the best fit for you—we totally personalize to your size and measurements. Because warmth in a wetsuit comes down to fit, the firmer the fit, the warmer the wetsuit. You could have the most amazing wetsuit in the world, but if its too big, or has loose fitting areas, you will not be at all warm in it. Our speciality ("claim to fame"), the Custom-Fit service, avoids this problem. If we have your completed custom order form with your measurements on it, we can make up any model from our range to fit you perfectly. We guarantee it and we've made thousands of wetsuits over the last 25 years and most of them are still being used today.

If you like what you read in this book and do decide to become a Seventhwave customer, we welcome you to our family and I want you to know you can be assured we will do our best to make your experience with Seventhwave memorable and that you get a great mileage from any of our gear that you choose. If you're a current customer, welcome back!

Paul Zarifeh
Seventhwave Wetsuits Ltd



NEOPRENE 101

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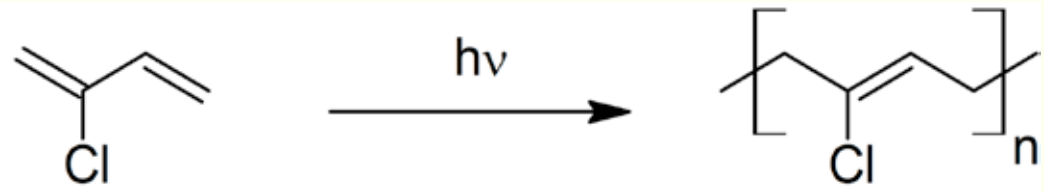
1.1
INTRODUCTION

Neoprene has been around since 1930, but it wasn't until the 1950s that it was used to make wetsuits. Developments in how neoprene is made, and what it is made from, means today's wetsuits are far from the same. Different brands use different types of neoprene, hugely affecting a wetsuits warmth and performance.

Whether you're in the market for a new wetsuit, or like us, interested in knowing all about wetsuits and how they are made, the following guide is designed to help you learn more about the differences in neoprene and how it effects you.

1.2
WHAT IS NEOPRENE?



Put simply, neoprene is a type of foamed synthetic rubber. In technical terms neoprene is a type of polymer (a large molecule composed of repeating structural units) known as polychloroprene that is produced by the polymerization (chemical reaction) of chloroprene (an organic compound of colourless liquid with the formula $CH_2=CCl-CH=CH_2$). Chloroprene is the monomer in this process (a molecule that binds chemically to other molecules to form a polymer).

In other words, neoprene is made through a chemical reaction using chloroprene. It is chloroprene that binds all the molecules of this reaction together, leaving us with polychloroprene chips. These chips are melted and mixed together with foaming agents and carbon pigments, and then baked in an oven to make it expand. The end result is then sliced like bread, leaving smooth neoprene sheets. Nylon fabric can then be laminated to the neoprene to give it strength.

1.3
NEOPRENE: A BRIEF HISTORY

DUPONT'S DISCOVERY

During the 1920s the increasing demand for natural rubber led to higher and higher prices, sparking a search for an equivalent synthetic rubber. It was during 1930 that Wallace Carothers, a chemist in DuPont's fundamental research group, produced a rubber-like substance during a polymerization experiment using chloroprene.

DuPont marketed its discovery in late 1931 under the trade name Duprene. Because neoprene was more resistant to water, oils, heat and solvents than natural rubber, it was ideal for industrial uses such as telephone wire, insulation and gaskets, and hose material for automobile engines.

DuPont improved both the manufacturing process and the end product throughout the 1930s. The original manufacturing process left the product with a foul odor, so a new process was developed which eliminated the odor-causing byproducts and halved production costs. The company began selling the material to manufacturers of finished end-products.

DuPont discontinued the Duprene trade name in 1937 in favor of the generic term "neoprene" to signify that the material was an ingredient, not a finished consumer product. It was used in consumer goods like gloves and shoe soles, but World War II removed neoprene from the commercial market. Although production was stepped up, it was all claimed by the military.

After World War II, Dupont purchased a government-owned neoprene plant to keep up with the increasing demand for neoprene. Essentially unchanged since 1950, neoprene continues to be essential in the manufacture of adhesives, sealants, power transmission belts, hoses and tubes.

NEOPRENE MEETS THE OCEAN

It wasn't until the 1950s that neoprene was first used in a wetsuit. At that time a number of people around the world began experimenting with neoprene as a way to stay warm in the water. Who was first depends on who you are talking to, but nonetheless, a few key people got there in different ways.

Hugh Bradner, a University of California, Berkeley physicist is often considered the original inventor

and “father of the modern wetsuit.” In 1951 he had the insight that a thin layer of trapped water could be tolerated between the wetsuit fabric and the skin, so long as insulation was present in the fabric in the form of trapped air bubbles. The air in the fabric meant water would quickly reach skin temperature and continue to act as thermal insulation to keep it that way. The wetsuit did not need to be dry to be insulative. Dr. Bradner clearly understood that the air (gas) in the wetsuit fabric provided the best thermal insulation.

Corporate legend has it that it was Jack O’Neill from San Francisco who pioneered the wetsuit. Jack loved the ocean and spent every opportunity down at Ocean Beach bodysurfing in bathing trunks in the briny cold water. The story goes that Jack began experimenting with different materials that would prevent him from, quite literally, freezing his balls off. He experimented with PVC stuffed into his trunks, but it wasn’t until his bodysurfing friend, Harry Hind, showed Jack a sample of neoprene foam that his first wetsuit-type vests emerged. Hind knew that neoprene was an insulating material thanks to his own laboratory work.

After experimenting with neoprene and finding it superior to other insulating foams, Jack founded the wetsuit manufacturing company ‘O’Neill’ in a garage in 1952, later relocating to Santa Cruz, California in 1959 with the motto “It’s Always Summer on the Inside”.

Bob and Bill Meistrell, from Manhattan Beach, California, also started experimenting with neoprene around 1953. They started a company which would later be named Body Glove.

However neoprene was not the only material used in early wetsuits, particularly in Europe. The French-made Pêche-Sport Suit and the UK-made Siebe Gorman Swimsuit were both made out of sponge rubber. The Heinke Dolphin Suit of the same period, also made in England, came in a green male and a white female version, both manufactured from natural rubber lined with stockinet.

THE MODERN WETSUIT IS PERFECTED

Originally, neoprene wetsuits were made with raw sheets of foam-rubber that did not have any backing material. This type of wetsuit required extra caution while pulling it on because the raw foam-rubber by itself is both fragile and sticky against bare skin. Stretching and pulling excessively easily caused these wetsuits to be torn in half. This was somewhat remedied by thoroughly powdering the wetsuit and the body with talc to help the rubber slide on more easily, but it was far from ideal.

During the early ‘60s everybody was “goin’ surfing” and many needed wetsuits to do it. The problem of how to keep the neoprene from tearing and how to make wetsuits easier to slip on and off was solved with one simple solution: laminating elastic nylon jersey to the surface of the neoprene. Using nylon as a backing material to strengthen

the neoprene, combined with the introduction of the zig-zag stitch, was a huge leap forward.

NEW KIDS ON THE BLOCK: YAMAMOTO CORPORATION

During the 1960s a new type of neoprene was pioneered. Up until this time, the process of manufacturing neoprene involved petroleum and petro-chemicals. The chloroprene rubber chips needed for the first stage of production were produced during the polymerization process by heating oil (which we are currently running out of worldwide) to extremely high temperatures.

Yamamoto Corporation developed special technology to convert the calcium carbonate from limestone into chloroprene rubber chips and then further processing to achieve neoprene foam with a very high micro-cell structure. This new process results in neoprene with very different characteristics to oil based neoprene. Yamamoto has been marketing their Yamamoto limestone neoprene since this inception.

TITANIUM-LINED NEOPRENE

During the 1980s Yamamoto developed the warmth of neoprene by lining it with a Titanium Alloy Alpha coating prior to laminating, or directly onto the rubber finish. This Titanium-lining was a major discovery in making wetsuits thinner and warmer, as it reflects body heat back to the inside and at the same time repels cold on the outside. Since this discovery many Asian suppliers have tried to copy the technology but have not been able to get the high results that Yamamoto have.

NEWER KIDS ON THE BLOCK: SEVENTHWAVE

It was in 1987—just before the Sharemarket crash in September—that Paul Zarifeh and Geoff White founded Canterbury Wetsuit Co Lot, which began manufacturing and repairing wetsuits in Christchurch, New Zealand. Everything was new and every aspect of production had to be worked out from scratch. What Paul and Geoff did know however, was that Yamamoto neoprene had an excellent reputation—so ever since that first order of 300 spring suits for R&R Sports, Seventhwave has used limestone neoprene.

The name changed to Seventhwave Wetsuits Ltd in 1996 to reflect the move from wholesale to a retail business. This change, coupled with the newly developed Custom-Fit system and the introduction of the internet, led the company to the path it is on today: online custom-fit wetsuits, delivered worldwide.

LIMESTONE NEOPRENE

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2.1
LIMESTONE NEOPRENE

As mentioned earlier, neoprene was first invented in the 1930s by Dupont Chemicals, USA, as a synthetic rubber made by the polymerization of chloroprene. The original process involved oil which was used along with other petroleum based chemicals to produce the chlororprene rubber chips for the first stage of neoprene production.

The 1960s saw a new type of neoprene pioneered by Japan's Yamamoto Corporation. Instead of traditional oil-based neoprene, Yamamoto developed special technology to convert the calcium carbonate from limestone into chloroprene rubber chips, producing limestone neoprene.

LIMESTONE, THE GOOD STUFF

The core ingredient of limestone neoprene, of course, is limestone. Limestone ($CaCO_3$) is a sedimentary rock composed largely of the minerals calcite and aragonite, which are both different crystal forms of calcium carbonate (the stuff needed for limestone neoprene).

Limestone makes up about 10% of the total volume of all sedimentary rocks. It has numerous uses: as a building material, as aggregate for the base of roads, as white pigment or filler in products such as toothpaste or paints and as a chemical feedstock.

As a key part of construction, limestone and lime has been used for thousands of years. Archeological discoveries in Turkey indicate lime was used as a mortar as far back as 7,000 years ago. Ancient Egyptian civilization used lime to make plaster and mortar. In the United States, lime use has changed dramatically. In 1900, more than 80% of the lime used in the U.S. was for construction uses. Today, nearly 90% is used for chemical and industrial uses.

LIMESTONE NEOPRENE?

It was Yamamoto Corporation from Osaka, Japan that first developed neoprene from limestone—and with no oil at all—thanks to an abundance of pure limestone close by in the mountains of Japan (their reserve of limestone is estimated to be sufficient for the next 3,000 years). Yamamoto has set the standard for quality and innovation in the neoprene industry with their advanced manufacturing techniques, leading to the creation of a limestone neoprene that has a completely independent cell structure and multi-directional stretch capacity.

The calcium carbonate, found in the limestone, is used as the base with chloroprene by a process of polymerization to produce limestone based-chloroprene rubber chips. This is the first of four stages that form the basic process of converting limestone to neoprene [read the next chapter on how this is done].

WHAT ARE THE ADVANTAGES OF LIMESTONE NEOPRENE?

Limestone neoprene has a high micro-cell structure. These are independent closed

cells (bubbles basically) within the neoprene that are packed together at an extremely high density. Oil-based neoprene has a cell penetration of 60-70%, whereas limestone neoprene has a 94% cell penetration. What this means in simple terms is that limestone neoprene has a lot more air bubbles inside the rubber than other brands (over 30% to be exact), and is way less dense than oil-based neoprene.

Because of this micro-cell structure, limestone neoprene provides several serious distinct advantages to the functionality of wetsuits compared to the traditional oil-based neoprene:

It is more impermeable
It is lighter in weight
It is warmer
It is more durable
It is stretchy

It is more impermeable

The more air neoprene has inside it, the less water can soak into it. Each individual closed-cell in limestone neoprene is filled with nitrogen gas. Because these cells do not absorb water, the neoprene itself has low water penetration. Less water absorption also means limestone neoprene dries very quickly.

Because of it's lower cell penetration and its liquid base, traditional oil-based rubber has less air and more rubber in the neoprene, making it easier for water to penetrate into it (to soak up water). In short, wetsuits made from limestone neoprene don't absorb as much water as other wetsuits.

Watch the video: *http://youtu.be/9FcZKHhXnZM*

It is lighter in weight

Because the nitrogen closed-cells prevent water absorption, limestone neoprene is considerably lighter than oil-based neoprene. The weight of the limestone neoprene remains almost the same wet or dry—it does not soak up water during use, unlike

oil-based wetsuits that come out of the surf weighing heavier than when you changed into it.

It is warmer

The nitrogen gas enclosed in all the individual closed-cells makes limestone neoprene super warm, thanks to its excellent thermal insulation. The nitrogen closed-cells are a better insulator than air, which allows for exceptional heat retention and efficiency.

The best thing about the nitrogen cells in limestone neoprene is that you can wear a thinner wetsuit than you normally would without sacrificing warmth. As so much of our Feedback confirms, limestone 2mm is just as warm as 3mm of traditional rubber.

It is more durable

The uniform micro-cell structure in limestone neoprene means if any part of the neoprene's surface is defaced or scarred, new independent concave micro-cells are exposed insuring continuous functionality.

In plain English, limestone neoprene tears less because of the structure of its independent cells. In traditional, oil-based wetsuits cells are more connected with each other, so a tear is likely to cause more damage that limestone neoprene with lots of stand-alone cells.

Limestone neoprene is also designed to disperse stretch, elongation, pressure and compression, ensuring a lightweight material with great strength and longevity [there's more on this in the next chapter].

It is stretchy

While oil-based rubber can be made to feel super soft, it often stretches after a few seasons and ends up being a size or two larger than when you purchased it. Limestone neoprene has what is called 'cell memory'—meaning it molds to your body shape and doesn't get loose over time.

Limestone neoprene also has an elongation of 480-580%. Compare that to the elongation of the human skin under the arm, which is 60-70%. This gives limestone neoprene amazing elasticity, memory, and multi-directional stretch capacity.

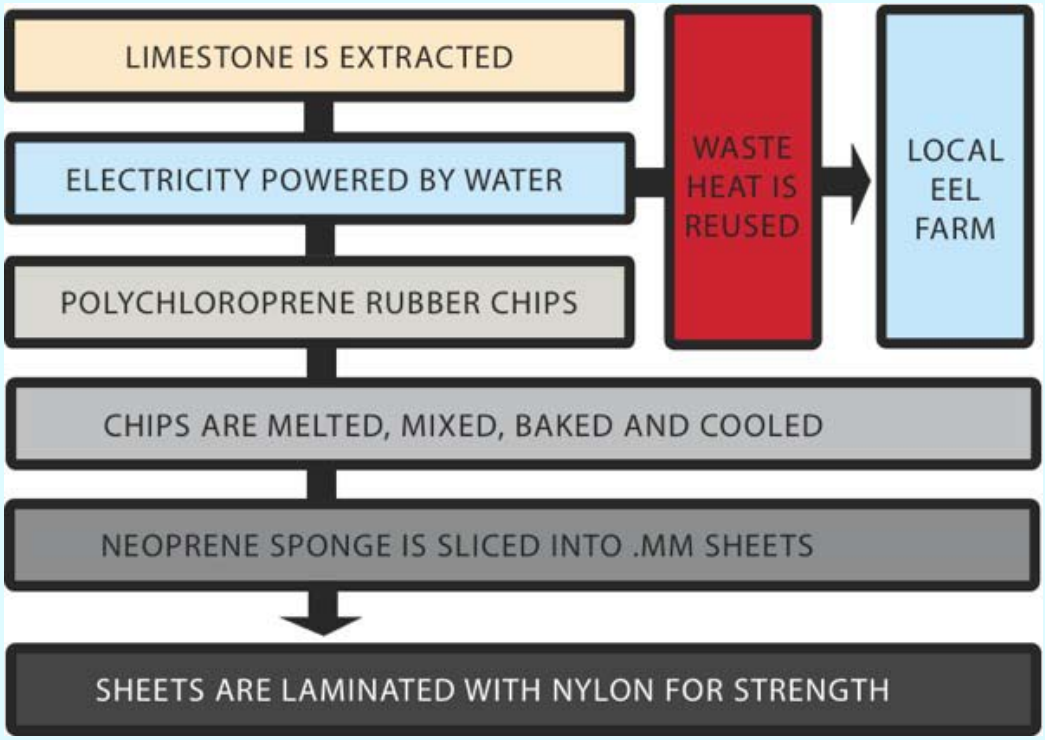
WHAT ARE THE PROBLEMS OF INFERIOR-QUALITY NEOPRENE?

The advantages of limestone neoprene are many, but it's worth quickly noting the problems associated with inferior-quality neoprene:

Delamination: *blisters between the nylon and rubber which deteriorates quickly.*
Compression: *neoprene 'cave-ins', especially around the knee/elbow areas.*
No memory: *does not return memory (hold its shape) and the fit gives out over time.*
Splits: *neoprene splits unnecessarily within the nylon layers.*

These are just some of the reasons why Seventhwave only uses Yamamoto neoprene in all of its products.

2.2
HOW IS LIMESTONE NEOPRENE MADE?



STAGE 1: POLYCHLOROPRENE CHIPS

The first stage in the production of Yamamoto limestone neoprene is to make the polychloroprene rubber chips. As described in the introduction, these are made through a chemical reaction using chloroprene. It is chloroprene that binds all the molecules of the reaction together, leaving us with polychloroprene chips. Oil-based methods use butadiene derived from petroleum to do this, while Yamamoto uses acetylene derived from the calcium carbonate found in limestone.

To do this, extracted limestone is fed into a furnace and heated at a temperature around one-tenth of that used for refining petroleum. The source of the heat is from burning used tires and hydroelectric power sourced from several local dams (any waste heat is then reused to power a local eel nursery). From the furnace, components are reacted with other chemicals to make the acetylene gas needed for the chloroprene rubber chips.

The next process—polymerization—is similar for both oil-based and limestone-based methods, and both achieve the same results (albeit with different ingredients). At this stage what is produced is not that different in terms of strength and insulation. However it is the next stage of the manufacturing process that gives limestone neoprene its micro-cell advantage.

STAGE 2: BAKED IN THE OVEN

The next stage is the creation of a neoprene sponge block—similar to baking a loaf of bread, but much larger. The polychloroprene rubber chips are melted and mixed

together with foaming agents and black carbon pigments, and then baked in an oven to make it expand. It's during this process that Yamamoto's specialized technology combines with the calcium carbonate to create the micro-cell structure of limestone neoprene.

Once cooked, the sponge is cooled, leaving a big neoprene sponge block about 150mm thick and with a very high independent closed-cell structure of 94%—each cell filled with nitrogen gas.

STAGE 3: SLICED INTO SHEETS

Once this sponge block has cured the next process is to slice it up into sheets. Again, this is like slicing a loaf of bread, except it is slit horizontally and to the desired neoprene thickness, ie 2mm, 3mm or 5mm (or whatever thickness may be required). Because the thickness of limestone neoprene is measured before the nylon is added, it is a true indication of a wetsuits thickness (compared to many Chinese-made suits, which include neoprene and nylon in the measurement and end up being thinner than what they claim to be).

Each sliced sheet of foamed neoprene has absolutely no strength—at this stage it is easier to rip than a piece of paper! But even now its very high micro-cell structure gives it exceptional thermal insulation properties.

STAGE 4: LAMINATED WITH NYLON

The last process is laminating the soft sheets to give them strength. High stretch nylon or polyester jersey knit is laminated to one side or both sides of the neoprene sheet, to make smoothie (neoprene with a single side of nylon) or double lined neoprene (nylon on both sides). The nylon jersey layer is very strong and gives the neoprene its strength and colour, and also allows it to slide over the body without sticking to the skin (like it would if it was a rubber or cell finish). It can also be lined with Titanium Alloy Alpha to make it even warmer.

The quality of the laminated bond between the nylon jersey and the neoprene foam is critical to strength and longevity. A strong bond will not degrade, blister or delaminate. This can be a major problem with any inferior bonding during manufacture.

THE RESULT: YAMAMOTO LIMESTONE NEOPRENE

What we end up with after these stages is super strong and highly insulated sheets of limestone neoprene, which are then shipped to Seventhwave, ready to be cut and constructed into a wetsuit.

GREEN NEOPRENE?

3.1
CAN NEOPRENE BE GREEN OR ECO-FRIENDLY?

It's a big question and before we try to answer it, we need to know exactly what we're talking about. So here's a few definitions to start us off:

> **Environmentally friendly** *(also eco-friendly, nature friendly, and green) are terms used to refer to goods and services, laws, guidelines and policies claimed to inflict minimal or no harm on the environment. Companies sometimes use these terms to promote goods and services by making environmental marketing claims and with eco-labels.*
>
> **Green brands** *are those brands that consumers associate with environmental conservation and sustainable business practices. Such brands appeal to consumers who are becoming more aware of the need to protect the environment. A green brand can add a unique selling point to a product and can boost corporate image. However, if a company is found or perceived to overstate its green practices its green brand may be criticized as greenwash.*
>
> **Greenwash** *(a compound word modeled on "whitewash"), or "green sheen", is a form of spin in which green PR or green marketing is deceptively used to promote the perception that an organization's aims and policies are environmentally friendly.*

With these definitions in mind, we would have to say that any neoprene is not totally environmentally friendly to our planet and environment. The eco-friendliness of any type of wetsuit is pretty dubious. What can you do with a used up wetsuit when you're finished with it? Most likely it will end up in the landfill—there's only a certain amount of punching bags that need filling!

However, currently there are two very distinct types of neoprene available, oil-based neoprene and limestone-based neoprene, and they have very different characteristics. So really the question should be: 'Can one neoprene be more green or eco-friendly than the other?'

SO, CAN ONE NEOPRENE BE MORE GREEN OR ECO-FRIENDLY THAN THE OTHER?

On its own, limestone neoprene is not necessarily more eco-friendly than oil-based neoprene. What contributes to limestone neoprene being more 'green' depends on its use of more sustainable and less toxic resources during production, and the longer its useful life span is (ie the longer it will stay out of landfill).

With this in mind, we explore the eco possibilities of the two kinds of neoprene below.

Ingredient extraction

The core ingredient (97%) of limestone-based neoprene is calcium carbonate. Although a finite resource that needs diesel-powered equipment to mine it, there is an estimated reserve of limestone to last for 3,000 years. Arguably the extraction of limestone has less of an impact on the environment than oil-based neoprene,

which depends on oil exploration, drilling, and potentially dangerous transportation (think oil spills). Also current oil reserves are fast being depleted. So despite both extraction methods being far from environmentally friendly, limestone would seem to be the more ‘green’ of the two.

Production of polychloroprene

Like oil-based neoprene, the production of limestone neoprene is an energy-intensive process, and needs heat to create the polychloroprene chips. However, Yamamoto, the main producer of limestone neoprene, argues that its production process uses one-tenth of the heat used in refining petroleum. This heat is made from burning used tires and using hydroelectric power sourced from several local dams, and any waste heat is then reused to power a local eel nursery.

The fact that limestone neoprene is considerably warmer due to its high micro-cell structure also means that less polychloroprene is needed in the production of a limestone-based wetsuit. In other words, 2mm limestone neoprene is as warm as a typical 3mm sheet of neoprene made from oil, which means there is less polychloroprene/raw materials needed and proportionally, less of an environmental impact.

Sustainable components

The use of sustainable production techniques and components in the manufacturing of wetsuits is another way to lessen its impact on the environment. As pointed out by Patagonia, using recycled polyester or other kind of lining in the lamination process, as well as more environmentally friendly or nontoxic glues and adhesives would reduce a wetsuits environmental footprint. In other words, the whole manufacturing process needs to be refined in order to be really green.

Shelf life

Because of the durability of limestone neoprene, wetsuits made from it tend to last 2 to 3 times longer than wetsuits made from oil-based neoprene. Lasting wetsuits reduce the ‘turnover’ rate of wetsuits, which means less wetsuits will end up as landfill if constructed from limestone neoprene, as opposed to oil-based neoprene. In this regard limestone is definitely more sustainable than other neoprene.

SO...

In conclusion, limestone neoprene is arguably more eco-friendly than petro-chemical neoprene, but there’s a long way to go before a wetsuit and its production can be truly green. That’s why Seventhwave, although proud to use limestone neoprene, has never tried to push its environmentally friendliness—we prefer green rooms than greenwash!

NEOPRENE EXTRA

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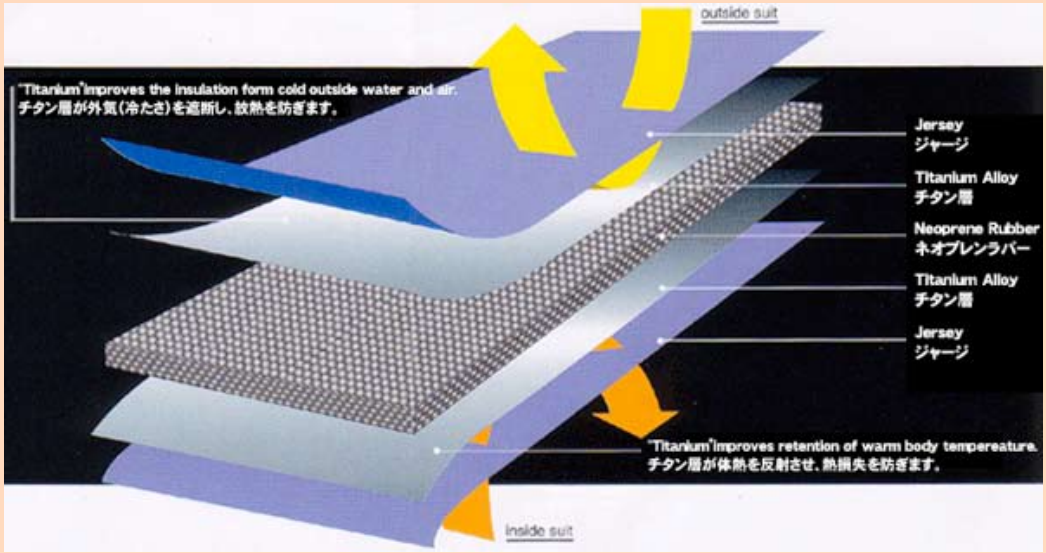
4.1
TITANIUM-LINED NEOPRENE



Whether surfing the oceans or wakeboarding a lake, water temperatures will always be lower than your core body temperature. So you will need a wetsuit for most water activities—unless, of course, you're fortunate to be in a very warm climate with little or no wind. Even then you still need some coverage if you want to stay and play for any length of time in the water.

A wetsuit or wetsuit apparel will give you extra warmth and protection, maximizing your water time and enjoyment. This is especially critical when you are in cool, cold, very cold or freezing water temperatures. Traditionally wetsuits were made thicker and thicker to compensate for the cold. Thickness created stiffness, and turned the wearer into the proverbial 'Michelin Man'. However many of today's wetsuits now utilize 'Titanium-lined neoprene'.

WHAT IS TITANIUM-LINED NEOPRENE?

Pioneered by the Japanese Yamamoto Corporation in the 1980's (also the innovators of limestone neoprene), 'Titanium' is the process of applying a thin Titanium Alpha metallic alloy coating to the neoprene surface prior to the bonding of the outer jersey fabric, and is designed to reflect heat.

Yamamoto was influenced by NASA science research aimed at reducing overheating and thermal conductivity during Spaceship re-entry. Once it has been applied to neoprene it looks like a coating of silvery-grey paint. If the neoprene is nylon covered on both sides, you can still see if the Titanium lining is there by applying pressure under the neoprene: you will see the glint of the Titanium shine through.

As soon as you enter the water, the heat from inside your wetsuit wants to escape and dissipate. This is called thermal diffusion. As it tries to escape, the thermal heat hits the Titanium-lining that then reflects the heat back towards you, continually. In fact, every time you move, paddle, or expel energy, more heat is created inside your wetsuit and reflected back to you—increasing heat retention by an amazing 40%.

HOW DOES THIS BENEFIT YOU?

The great advantage is that you can wear a much thinner, lighter wetsuit than ever before without compromising warmth, meaning you can beat the cold water blues and leave those old-style, traditional, thicker wetsuits in the dusty closet where they belong! The thinner the wetsuit, the more flexible you are. You will have more energy and power. Your paddle efficiency will sky rocket. Your sessions will be twice as long. You will feel 10 years younger. You will surf like Kelly Slater.

So next time you are looking to replace an old wetsuit or thinking of adding a whole new dimension to your water sports, consider the benefits of wearing a Titanium-lined limestone neoprene wetsuit from Seventhwave and experience the super power of Titanium.

4.2

‘SMOOTHIE’ NEOPRENE

SMOOTHIE NEOPRENE

STANDARD NEOPRENE

WHAT IS SMOOTHIE?

‘Smoothie’ has become a common way to describe single-sided nylon neoprene. This is neoprene with a nylon (fabric) finish on one side and a rubber finish (smoothie) on the other. Smoothie can have a faint or heavy pattern embossed into it, and can go by other names. The light patterned smoothie we use most at Seventhwave is called mesh skin.

WHEN AND WHERE IS IT USED?

The trend over the last 20 years has been to use smoothie in the center chest panel and center back panel of wetsuits. It was originally used in these panels to lower the wind chill factor, as after immersion in water the smoothie drained away any water particles. Because the smoothie did not hold water the wind chill factor against the chest was much lower.

For petro chemical neoprene with a nylon outer (as opposed to Limestone neoprene, which we have explained throughout this ebook) the opposite happens—water particles are stuck between the nylon weave and when hit by wind it can have a cooling effect.

Another reason smoothie is used is for looks. Many customers like the look of the smoothie on the chest area. It also has a certain feel to the way it sucks onto your skin and tends not to move at all.

WHY IS IT GOOD?

For wetsuits made of petro chemical neoprene it has a much lower wind chill factor than nylon. Smoothie can look better to some people, and is marginally cheaper.

WHY IS IT BAD?

Smoothie can rip easily and is usually the first panel on a wetsuit to deteriorate over time. Repeated rubbing on the same spot ie from ribs against a board causes the smoothie to wear thin. This is because smoothie is not as strong as neoprene with nylon on both sides (nylon/nylon)—the strength of neoprene is in the nylon and not the rubber. For the same reason smoothie is not as strong around seams, and is very susceptible to sharp objects, especially fingernails. This means you have to be extra careful when you grip it.

Also due to its texture, most bodyboarders prefer non-smoothie nylon over smoothie.

WHY DOES NEOPRENE TYPE MAKE A DIFFERENCE WHEN CHOOSING SMOOTHIE OR NOT?

As well as the reasons mentioned above, choosing to have smoothie or non-smoothie is dependent on what type of neoprene your wetsuit is made from.

As explained throughout this ebook, there are two totally different types of neoprene in existence. The original type of neoprene (first invented in 1931) is made from a petroleum base and is known as petro chemical neoprene. Because the main ingredient of this neoprene is a liquid it is heavy and absorbs water like a sponge. In fact it has a cell penetration count of 64%—making it even heavier during and after use.

The other type of neoprene—the neoprene we use at Seventhwave—was invented by Yamamoto Corporation (c.1964) and is made from calcium derived from pure Limestone. Limestone neoprene has nitrogen cells with a cell penetration count of 94%, making it much lighter in weight and less absorbent. In other words, it is more water repellent than petro chemical neoprene.

Because the Limestone neoprene does not absorb any water, we have found that our nylon/nylon neoprene is actually warmer that petro chemical neoprene with a smoothie finish. It is also more durable.

WHY CHOOSE THE NON-SMOOTHIE OPTION?

To summarize, if you choose not to have smoothie on your wetsuit you will definitely get a much longer life from your wetsuit and it will be just as warm (or warmer) if it’s made from Limestone neoprene.

4.3
NEOPRENE + CUSTOM-FIT = MAXIMUM WARMTH

As well as a wetsuit's neoprene type, how the wetsuit fits also affects the maximum output of its neoprene. You can have the thickest, warmest, best made wetsuit money can buy, but if it doesn't fit you then it's a waste of time and money. This is because a correctly fitted wetsuit insulates and protects your body from the cold, while an ill-fitting wetsuit will flush water and then 'pool' in any air pockets, lowering your body temperature and making you cold... fast. Basically, a snug, firm fit all over is the ideal. The firmer the fit, the warmer the wetsuit.

Because a good fitting wetsuit is critical in cold water, and because not everyone fits a size off the rack, Seventhwave offers a specialist custom-fit service to make sure your wetsuit will be the warmest it can be: *http://www.seventhwave.co.nz/custom-fit.html*

With most other brands your only option is a standard size, despite the fact that approximately a third of people don't fit a standard sized wetsuit. So if you want the best fit, maximum warmth and top performance then a Custom-fit wetsuit tailored to your 22 unique measurements is the best option.

Thanks to our custom-fit form, we don't even have to see you to make you your own custom-fit wetsuit. Whether your in Australia, America or Africa, by filling in our custom-fit form we can process your measurements and hand-craft a wetsuit to fit.

Watch how a custom MAX is made:
http://youtu.be/ZCnR0GjGO94

Watch how to measure up for a custom:
http://youtu.be/j4K8634wCM8

For more tips, information and water-related content, check out

www.seventhwave.co.nz

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