

Scaffolding Shrink Wrap - Buyers Guide

Technical characteristics, performance indicators and what buyers should look for when comparing data sheets and specifications.



At Rhino we see the problems that poor quality wrap creates for scaffolders and contractors at the 'sharp end'. This guide aims to explain the most important factors that determine the quality and performance of a shrink wrap film and help buyers make an informed decision when comparing suppliers.

Introduction

Using a shrink tight sheeting to create encapsulation and containment around a scaffolding structure is a demanding application that requires a shrink wrap film that has been engineered / designed for purpose. The quality of a scaffold shrink wrap film is determined by the chemical ingredients used and the manufacturing process.

Ingredients - What is scaffold shrink wrap made from?

To make shrink film for scaffolding the resin must be a 100% fractional melt virgin resin that is not reprocessed / recycled material, with a primary mixture of low density polyethylene (LDPE) and a secondary mixture of linear-low density polyethylene (LLDPE).



By Steve Irlam, Managing Director, Rhino Shrink Wrap

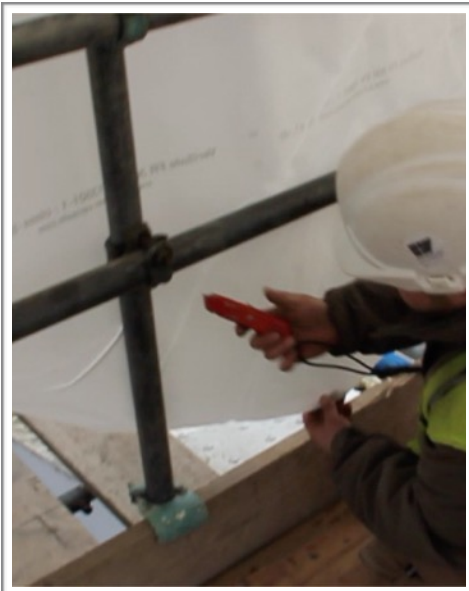


Shrink Wrap Additives

The following additives are used to give scaffold shrink wrap the performance characteristics we need.

Flame Retardancy

There are many flame retardant standards in different countries. In the United Kingdom we use the European EN13501 standard and the LPS1207/1215 scheme. For the purpose of this article you should ensure that you get a copy of the standards that apply to your country and be aware of the difference between a simple flame retardant 'test' (such as EN13501) and a more extensive verification 'scheme' (such as LPS1207/LPS1215) which requires yearly audits of the manufacturing process and supply chain. Once again, manufacturers have a vested interest that is different from the end user. As flame retardant is a highly expensive additive (£5,000-£50,000 / ton) the manufacturer will want to use as little as possible and so it is up to the end user to check that they are meeting their health and safety obligations.



LPS1207 & LPS1215 is the standard required by many UK insurers and specifiers for temporary protection materials used in buildings under construction or undergoing renovation. Check with your site before you start as using the wrong film could mean that insurance cover is void.

UVI

A light stabilizer (ultra-violet inhibitor/UVI) of the hindered amine gives the shrink film a minimum service life of 1 year. Verisafe is specified as having a UV stability of 12 months in Northern Europe. You should be aware that films that if a flame retardant shrink wrap film claims to have a UV stability beyond this it is unlikely to also have enough flame retardancy added as these two additives 'compete' with each other.



EVA

EVA (ethyl-vinyl-acetate) additive gives the shrink film flexibility, greater puncture resistance, mechanical strength and deters splitting and brittleness in high winds and extreme cold weather.

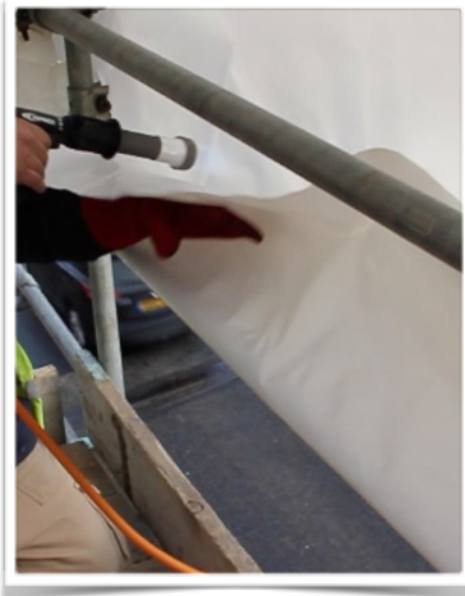
Anti Block

Anti block agent (slip) prevents the film surfaces from sticking together during the manufacturing process and allows for easy unroll/unfold from the roll by the user. Excess or low quality anti-block material will cause the film surface to feel oily and prevent tape from sticking to the surface or film-to-film-fusion.

Colour additives

Colour additives are used to give the shrink film a white tint that should provide an opacity of at least 65%

Scaffold Wrap Manufacturing Process



The shrink wrap extrusion process starts with the blending of resins and additives. They are melted and blown through a die. After exiting the die the shrink film goes through the air cooling ring and travels up to the guide rolls, where the film bubble is collapsed and flattened and then to the winder where it is rolled on to cores.

The manufacturing process is vital to the following shrink wrap characteristics;

Shrinkage

It may seem obvious, but an important factor in how well a shrink wrap sheeting will encapsulate a scaffolding is how well it shrinks. If a shrink wrap sheet shrinks well, it will fit tightly and it will not flap or 'chafe' in high winds. It will be strong.

If you look at the specification sheet of a shrink wrap film you should see that the shrinkage, sometimes known as the 'shrink ratio', is described in two ways; Machine Direction



(MD) and Transverse Direction (TD). A shrink wrap film should have balanced shrinkage, which means that the shrinkage in both the MD and TD should be similar. However, while most shrink-wrap films have a good shrink ratio % in the Machine Direction (MD) very few have good shrinkage in the Transverse Direction (TD). As well as making the installation process difficult for the shrink wrap installer / end user, a poor shrink ratio may also cause the shrink wrap film to loosen or become slack in the first few days after installation.

So what affects the shrink ratio? It is mostly due to the size of the die from which the shrink wrap film is extruded. At Verisafe we use a very small die (700mm) from which the melted plastic polymers are blown into a large bubble of shrink film that has a circumference of 7 metres. This difference between the size of the die and size of bubble, (sometimes called the 'blow up ratio'), is critical in achieving a powerful shrinkage because when the film is heat shrunk by the end user, around a scaffolding for example, the shrink wrap has a 'memory' and will try and return to it's original size at the point of extrusion.



However, to speed up the manufacturing process most shrink wrap manufacturers use a die that is much larger than we do to manufacture their shrink wrap film. (A larger die has a higher production rate / hour). Typically, a die will be 1800mm to 2000mm wide. This larger die, although making a machine more profitable for the manufacturer, will produce a shrink wrap film with a much poorer shrink ratio, particularly in the transverse direction (TD). So, although our film is a little bit slower to manufacture, by using a smaller die we ensure that our customers get a shrink wrap film that has a shrinkage of 45% in the transverse direction (compared with a typical figure of 10-15% for competitor films). The end result of this is that Rhino Verisafe® is much easier for our customers to install properly, even in tough weather conditions, and once fixed in place is much more resistant to high winds.



Layers

Looking at the specification sheet should also tell you whether the shrink wrap film you are using is a mono (1 layer) film or a multi layer film. In a similar way to 'die size', explained above, it is generally more convenient for manufacturers (but not the end user) to supply a multi layered film as it is faster to manufacture and multi layered machines can produce a wide variety of products. However, it can enable unscrupulous manufacturers to 'hide' poor quality but cheaper regenerated plastic material within layers.

A mono layer film is slower to manufacture but it means that any additives, such as flame retardancy, are contained throughout the whole film, and not just the outside layers, and it means we can only use premium resins to manufacture our film.



Thickness

Take a micrometer and measure the thickness of the film in different places. The thickness of lower quality films can vary by as much as 50-75 microns and the result is many points of failure (holes) during the heat shrink process.

Dart Drop

This is a very important measure of the basic mechanical strength of the film, which for scaffold shrink wrapping means the wind loading that the shrink wrap will bear. It is a standard test procedure outlined in ISO7765-1/2. Compare between alternative films and try and buy a shrink wrap film with the best performance in this area.

Seal Range

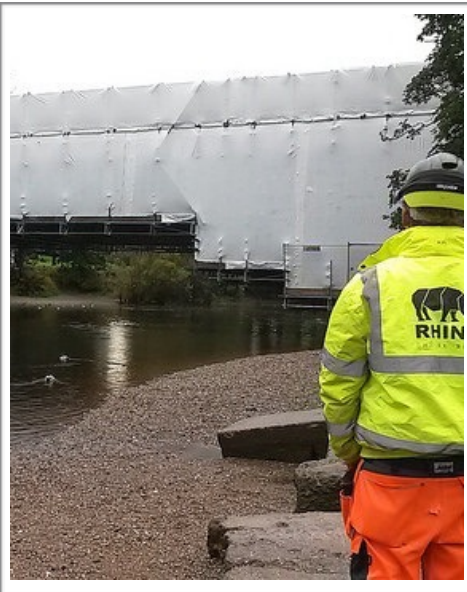
The seal range of Verisafe shrink wrap film is in the range of 95 to 125 Degrees Celsius. This is an important value because the lower temperature a film requires to seal, the easier it will be to heat weld by the end user. Again, the



reason why some shrink wrap films are difficult to heat weld properly is that they have a much higher seal range and this is because many shrink wrap manufacturers add HDPE to their LDPE films, to speed up the production process and make each machine more profitable. However, an film with HDPE added will have a higher weld temperature and so be more difficult for the end user to weld, especially when weather conditions are challenging. It should not be necessary to apply additional strengthening by applying shrink wrap tape to a welded joint between two pieces of shrink wrap film.

Tensile Strength (Yield)

Another test that relates to strength, but with a focus on elasticity - i.e. the ability of the film to return to it's original form when hit by a force such as the wind. You may notice that scaffold wrapping films with poor elasticity may sag after time, even if they at first seemed 'drum tight' when initially installed. This is due to poor tensile strength.



Final Thoughts

Most shrink wrap plastic film is made in a way that is most convenient for the manufacturer, even if makes life more difficult for the end user. We think it makes more sense to start with the end user and work backwards to make sure the whole manufacturing process is designed to create a film with the desired performance.

Always try and purchase from an ISO accredited supplier, as they will have the necessary quality controls in place to ensure consistency between batches. Always ask your supplier for a specification sheet / data sheet and look closely at the shrink ratio, dart drop and seal range. If you are buying a flame retardant film consider using a film that is part of a certification scheme such as LPS1207 and LPS1215 that includes an annual independent / third party audit of the product as this is the only way to prove that a product meets the required standard.

Further information;

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