



*CJP Sales Ltd*

PVC and Polymer Distribution

# **Injection Moulded and Extruded UPVC Components Weathering and Warranties**

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## Weathering and Warranties



High impact weathering

This bulletin is designed to help understand how UPVC Mouldings and Extrusions perform in service and to explain how UPVC grades are selected and how they are formulated.

UPVC offers very good resistance to weathering has very good light fastness for outdoor applications and provides good colour retention when subject to UV light. In order to make this possible the UPVC formulation must contain a good quality stabiliser package and a high level of good quality pigment. This also needs to be balanced with

process aid and lubrication to allow it to be processed through an injection moulding machine and a complex mould tool.

In order to achieve good colour retention a number of factors need to be taken in to consideration.

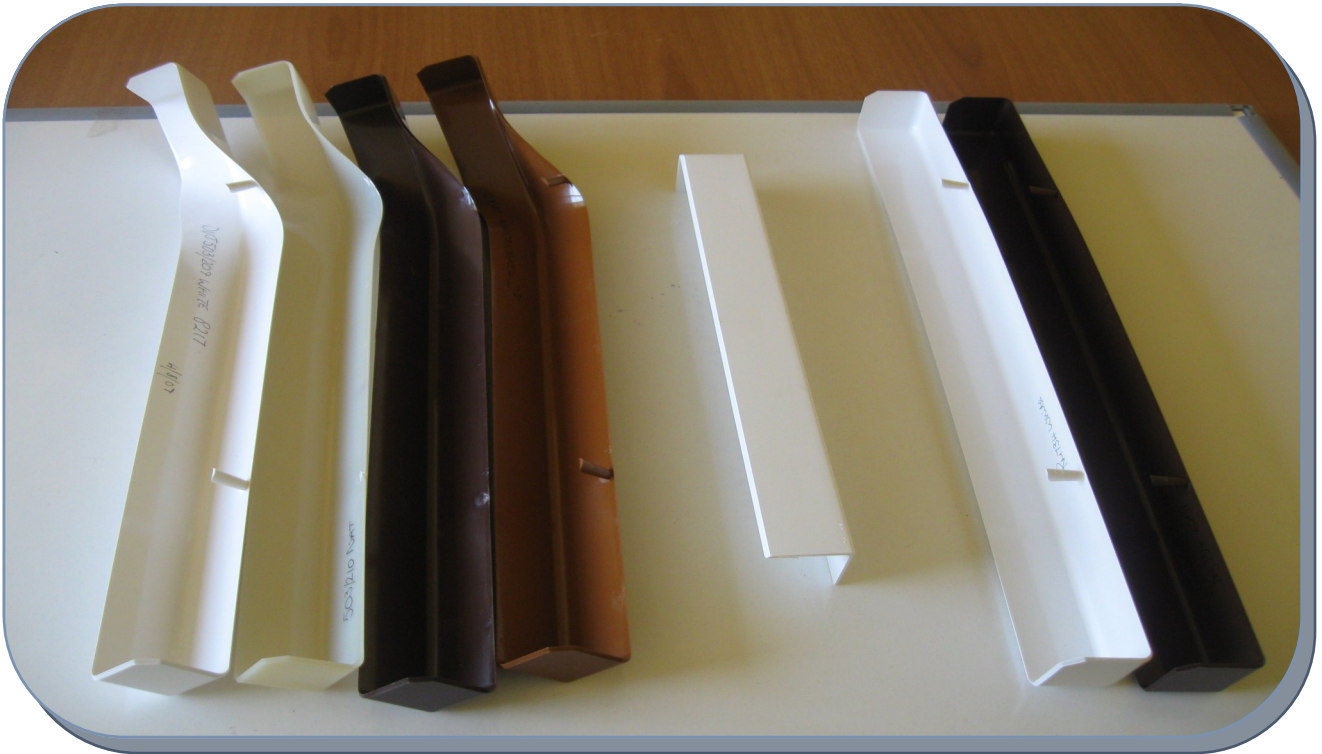
- \* The location of the finished component and the time it is in direct sun light.
- \* What level of colour fade is acceptable and over what period? Everything fades in the sun, but to what level over what period of time?

\* Processing the moulded products is a factor. Each grade contains stabiliser which absorbs energy, such as Heat, Radiation and UV Radiation. All of these factors affect the stability of the PVC. The stabiliser package within the grade allows it to be compounded, moulded and provides the long term stability for colour fastness. If the moulding process uses too much stabiliser there may not be enough left for long term environmental stability. (See Processing Guide)



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The mouldings on the left have a vicat of 65c on the right both were heated to 45c and put under pressure.

### Vicat Softening Point

The vicat softening point is the temperature at which the material actively starts to soften. At this point, the mechanical properties start reducing and components can deform under pressure. It is not ideal to use UPVC where a maximum service temperature of 55c is required. The main area for concern is handling and packaging of components as they can become deformed if left in a vehicle or steel container during periods of hot weather.

#### Standard UPVC Moulding grades

DVJ 503/210—Window accessory grade.

RM734—Window parts and pipe fittings grade.

PVC grades offered for outdoor use are engineered with high quality Calcium Zinc Stabilisers and very

good lubrication packages, which help the moulding process and reduce the stabiliser used. They offer a high quality medium impact and a good high gloss surface finish with a vicat softening point between 65c and 78c.





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**Moulding Grades and Extrusion Grades**

There is a mis-conception that Moulding and extrusion grades are the same. Unfortunately this is not the case, the basic raw materials are the same, however, they are engineered to process in different ways. Injection moulding grades need a very high pressure to break down the compound to enable it to fill the tool; this increases the use of stabiliser and reduces the mechanical properties

(strength). Extrusion grades are designed to process with lower pressure and don't require such a high flow, which uses fewer stabilisers, and maintains the mechanical properties.

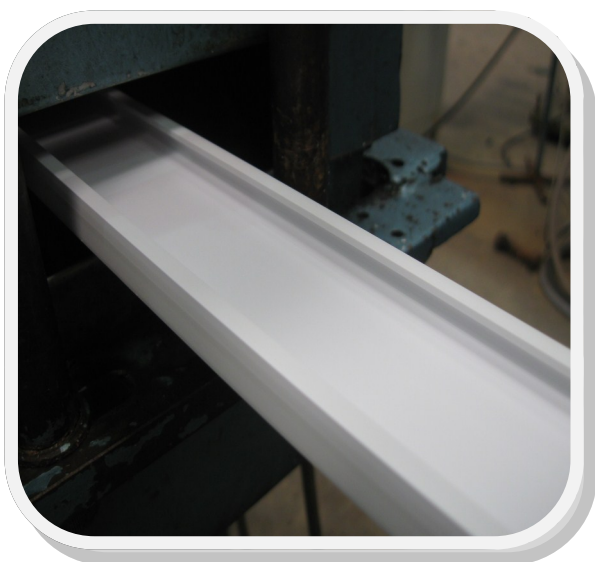
**High Impact grades**

DVX5125/206— Pipe fittings hollow tubes and fittings.

These use the same high quality Calcium Zinc Stabiliser package and are also easy to process grades. They have been impact modified and

have additional process aids which improve the impact, without reducing the weathering properties, and have a vicat of 76c.

These grades are formulated to process on a wide range of injection moulding machines and mould tools and when processed with care, perform without signs of degradation.

**Extrusion****Moulding**

### Weathering Properties

For white applications, the industry standard BS7413, states a Delta E of 5 when exposed to a Northern European Climate for 10 years. In most cases, this is achievable, as the mouldings weather in line with the extrusions and it is very rare for mouldings to fail. In order to uphold this, the mouldings would have to be measured prior to sale and then again if a failure occurs. At this point, all other processing factors need to be considered. It is possible to degrade the material when injection moulded, if the correct processing conditions are not used. Obviously, this can result in reduced performance. DVJ 503/209 has provided a Delta E reading of 1.5 after 15 years.

For colours it is more difficult to predict the colour change, as colour pigment light fastness is visible. The picture to the right shows DVJ503/210 natural with added Vynacol Masterbatch in brown and dark green. The weathering and colour retention is good but does not compare to similar weathering conditions with white components.

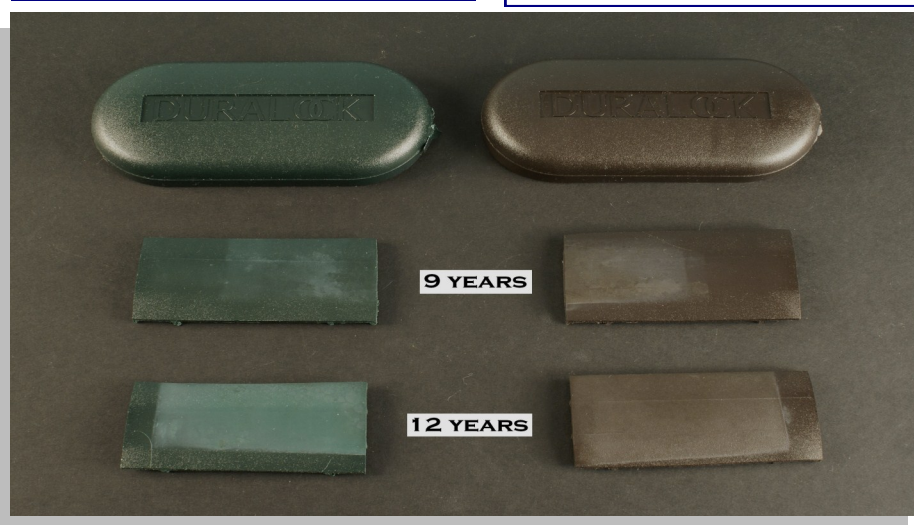
### Tropical Grades

Grades that are specifically designed for tropical climates contain a high level of Titanium Dioxide white pigments, typically up to 7- 8 parts. This is workable in an extrusion grade but can actually reduce the long term colour stability in a moulding grade. This is due to the level of pigments affecting the moulding ability of the grade and using up the stabilisers. In weathering tests DVJ 503/210 has performed better for light fastness because of its ease of processing, resulting in less stabiliser being used.

### Conclusion

Many concerns come about because customers want guarantees relating to weathering performance. It is important to realise that the grades formulated contain the stabilisers that will provide long term weathering and light fastness properties.

The stabilisers in a formulation are designed to stabilise through the compounding process and through the injection moulding or extrusion process. It is very important to ensure that the processing conditions are set correctly and the compound is not over heated, in order to retain stabiliser for the long term weathering protection. It is unusual to receive complaints regarding the colour fading of white moulded products, even when used in tropical climates. Unfortunately there are no hard and fast guarantees available, we can assure you that our grades are formulated with the highest level of stabiliser and quality pigments available. When tested in the laboratory, under accelerated weathering conditions, and over a 3 month period, grades pass the Delta E test. However how they perform after moulding, and in which environment they are subjected to, is out of our control. “



Vynacol Masterbatch and Natural UPVC

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