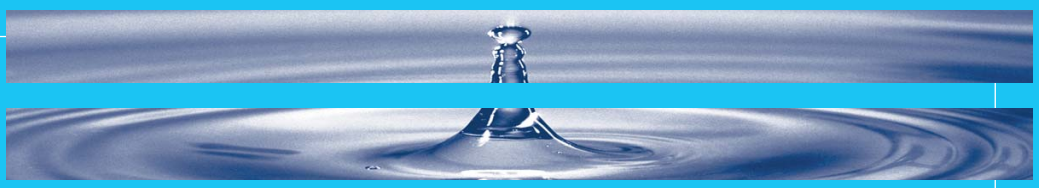
TPO SAFETY AND ENVIRONMENT



YOUR ROOFING AND WATERPROOFING PARTNER

Safety & Environment

FOREWORD

In the past industrial design was principally market driven.
Today, we also consider the mode of manufacture, from first concept to end product, that product's use and even the issuses of waste and recycling.
This new way of thinking about industrial projects respects the environmental and ecological sensitivity that is now evident throughout the world.

THE PRODUCTION OF TPO

Synthetic rubbers were developed as early as 1839, but production on an industrial scale began in the USA in 1942.
In 1954, G. Natta, using a Ziegler catalyst, produced high molecular-weight polymers from propylene and olefin.
Polypropylene was created by propylene polymerization in strictly temperature controlled, pressed conditions.
Ziegler-Natta catalysts, and later metallocenian catalysts, have enhanced polymerization of olefin monomers creating polymers of greater structural purity.
The most recent generation of catalysts and processing has led to the development of TPO manufacturing (FPO, FPP or FPA).

TPO PROCESSING

The new generation of TPO membranes is manufactured by processing polymers and additives in granule or powder form. This method reduces the risk of accident to a minimum during granulation, stocking and movement during production.
The risk of environmental impact is thus minimised.
Powder and gas emission are much lower than the maximum average concentration (MAC) acceptable in working environments.
Water for plant cooling is re-circulated in a closed-circuit avoiding any environmental pollution.
Such a very low level of noxious substances is emitted from the manufacturing site that it is not considered a source of pollution for the external atmosphere.
Ageing tests carried out on TPO membranes, and information given by raw material suppliers, do not indicate particular problems caused by bacterial attacks, running water or airborne substances.
TPO membranes do not pose any danger for people or the environment.

FLAGON TPO liners

THE DISPOSAL OF TPO

As with other plastic products waste is disposed by :

1. Monitored landfills

2. Incineration

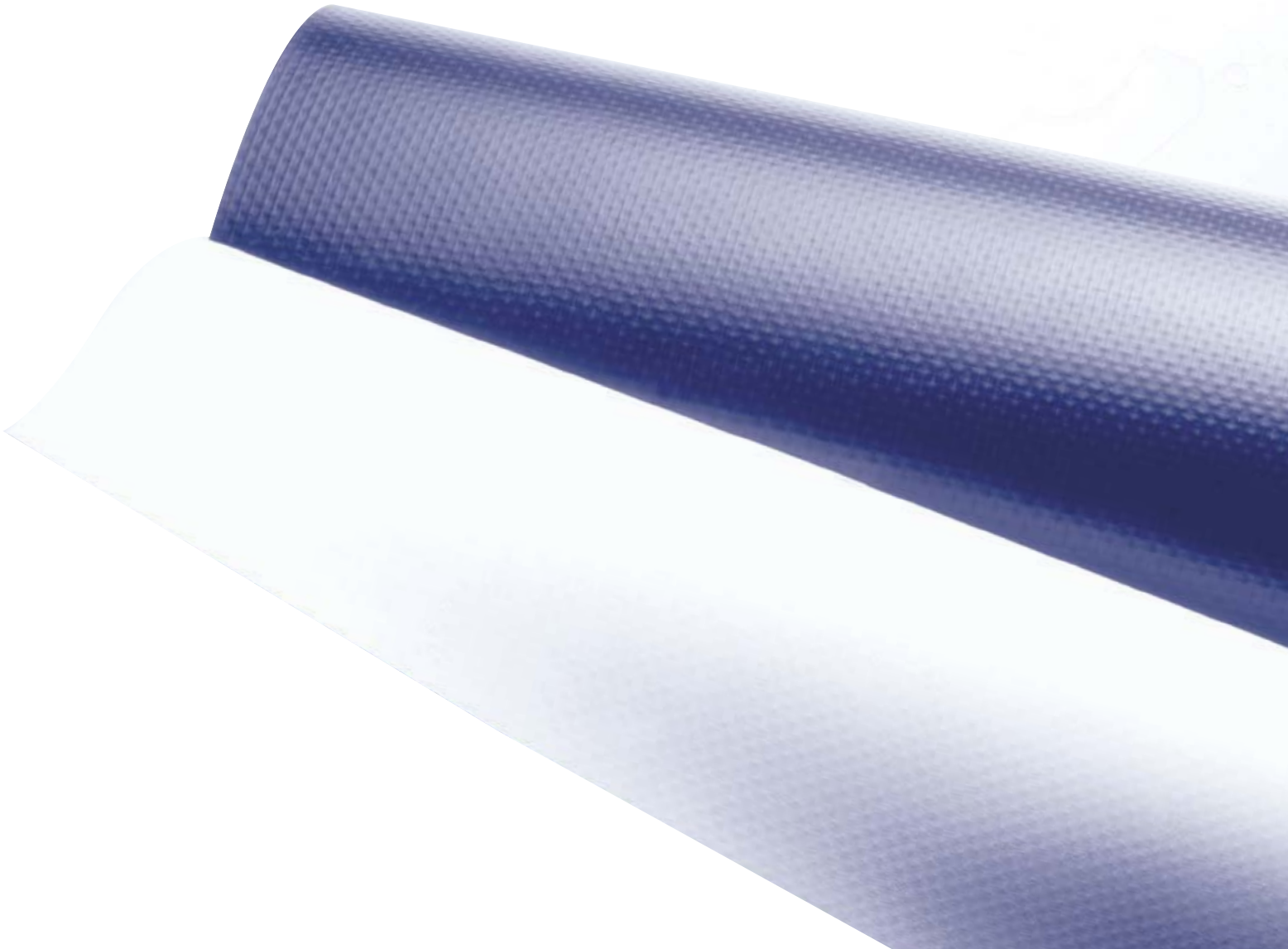
3. Recycling

Let's examine TPO behaviour using the three systems:

1. Monitored landfills

Disposal in landfills, in compliance with local laws, avoids ecological problems because the raw materials and additives used are inert and perfectly stable. Micro-organisms in the ground do not attack polymers.

But this is not the most ecological way to process TPO membrane at the end of its life because the remaining energy in the sheet is not recycled.



2. Incineration

In compliance with local laws, combustion of TPO membranes in a modern incinerator doesn't cause any environmental problems.

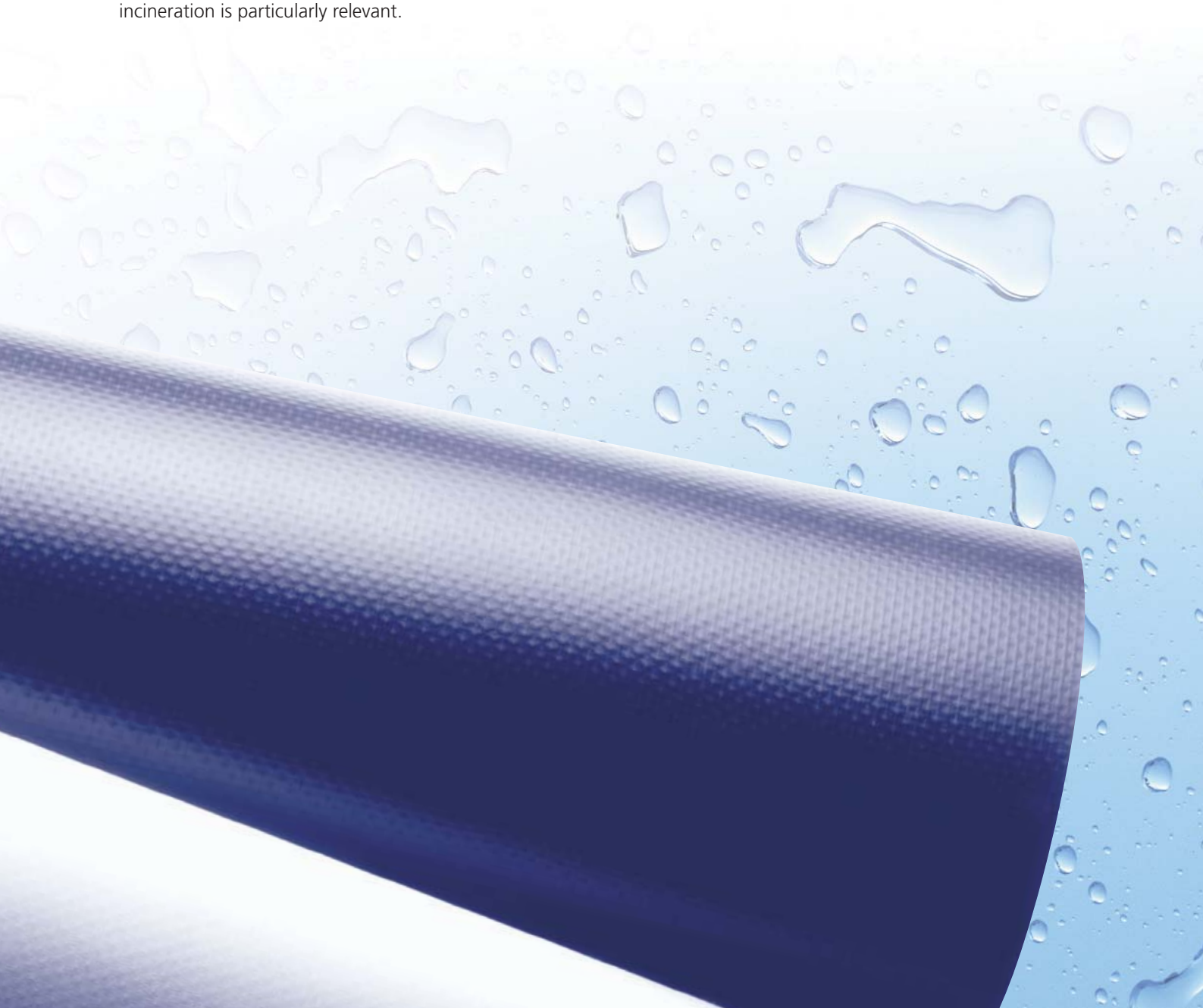
During the pyrolysis process, non-polluting gases are produced in the atmosphere.

The inorganic part undergoes an oxidising process that, after proper neutralisation, can be stocked in a waste dump without damage to the environment.

The polymeric material is a source of useful energy when incinerated.

The neutral nature of the combustion fumes and the solid waste resulting from pyrolysis means the process is absolutely safe, in terms of both incinerator procedures an surrounding areas.

When TPO membranes are dirty or polluted by external agents, disposal by incineration is particularly relevant.



3. Recycling

TPO membranes, like other kinds of synthetic sheets, can be recycled at the end of their life.

Mechanical recycling has no environmental impact. While the manufacturing process itself creates some unavoidable waste, this can be recycled and used to replace new raw materials, thereby helping to save energy.

At the end of their life, TPO membranes can easily be recycled thus justifying any costs incurred for collection, treatment and energy expenditure.

In terms of pollution, recycling is comparable to the original manufacturing process. On this point Flag has already carried out manufacturing tests to produce surfaces that have an additional function, such as separation or protection layers, because the normal ageing process of the polymeric matrix and the unavoidable residues present after TPO liners' cleaning process make them unsuitable for the production of new FLAGON TPO liners.

CONCLUSIONS

The choice and evaluation of materials or manufacturing processes must be based on comparable tests and technologies.
Each aspect must be examined in terms of general environmental impact.
TPO has been studied and tested for decades to ensure that, today, it can be used in total safety.
Both during production, and when installed in location, elasto-olefin polymers are considered harmless to human health and the environment.
The conclusion about the environmental impact of TPO membranes is, therefore, positive.

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