

# ArmaPET<sup>®</sup> Insights

# PROCESSING

# ArmaPET Curve

ArmaPET<sup>®</sup> Curve is the first fully recyclable and thermoplastic foil product based on 100% recycled plastics. It has been designed for recyclable, thermoformable, micro-sandwich solutions produced in a continuous manufacturing process.

With its superior temperature resistance, closed-cell surface and long life-cycle, it offers an excellent solution for automotive interiors and much more.

## PROCESSING CAPABILITIES

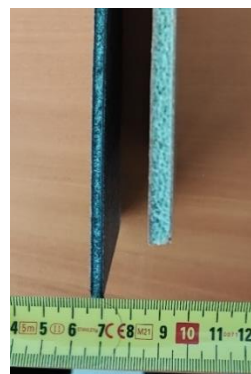
The potential of ArmaPET Curve is illustrated by its processing versatility using its superior stiffness and compression properties combined with chemical and temperature stability.

### Post-Expansion Process

Our ArmaPET Curve comes in 4 densities: 100, 150, 200 and 300 kg/m<sup>3</sup>, corresponding to a thickness of 3, 2.5, 2.5 and 1.5 mm respectively. It is possible to post-expand it, meaning increasing its thickness up to 7 mm, thus decreasing the density down to almost 50 kg/m<sup>3</sup>, to dramatically increase its rigidity, specifically its flexural rigidity. This process can be achieved using skins, or combined with any of the following processes mention in this insights report, multiplying the possibilities of designs, shapes, and applications.

To post-expand ArmaPET Curve, we advise using a double-belt machine to obtain the best results, however, it can be performed using a heated press.

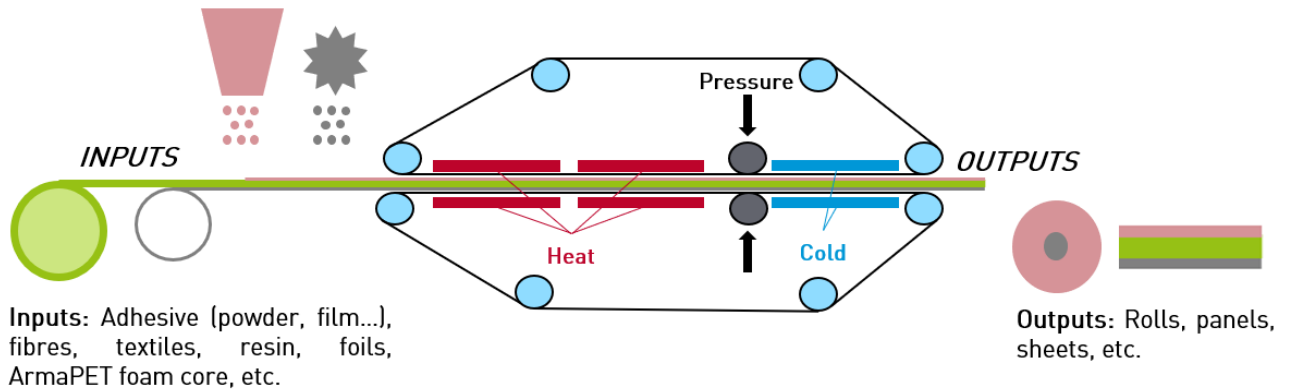
Double Belt Parameters	
Top belt heat	195-200 °C
Bottom belt heat	200-205 °C
Height	Up to 7 mm
Roll pressure	30 N/cm <sup>2</sup>
Speed	1m/min
Cooling height	4.8 mm



Values are generic and given for information only, fine tunings should be made depending on tooling and local conditions. Trials are necessary to set optimum parameters and should be calibrated, especially before industrialisation. Please contact our technical service engineers for any help and information on the subject.

## Continuous lamination

This process is the best and most efficient way to create panels using ArmaPET Curve. Packaged in roll, it is perfect for continuous processes. The thermal resistance of ArmaPET Curve allows for high process temperature of up to 220°C in short cycle.



It can be used to bond skins, with or without adhesive depending on the materials, and/or to post-expand the ArmaPET curve as presented in the point above.

Process parameters will then only depend on the other raw materials used with our ArmaPET Curve thanks to its thermal stability and high compatibility with the vast majority of adhesives and skins complex.

It is also the perfect process to manufacture a full thermoplastic micro-sandwich which is fully recyclable and still thermoformable.

## Thermoforming

Being a thermoplastic material, ArmaPET curve can be thermoformed to obtain almost any desired shape, to fulfil design requirements, reduce waste and integrate functions. To thermoform ArmaPET Curve you need:

// Temperature between 190-210°C

// ~30s per mm thickness (IR heating may decrease the heating time)

// The thicker the ArmaPET Curve the longer the heating time will have to be (especially if you post-expanded it beforehand).

// The lower the density the lower the temperature

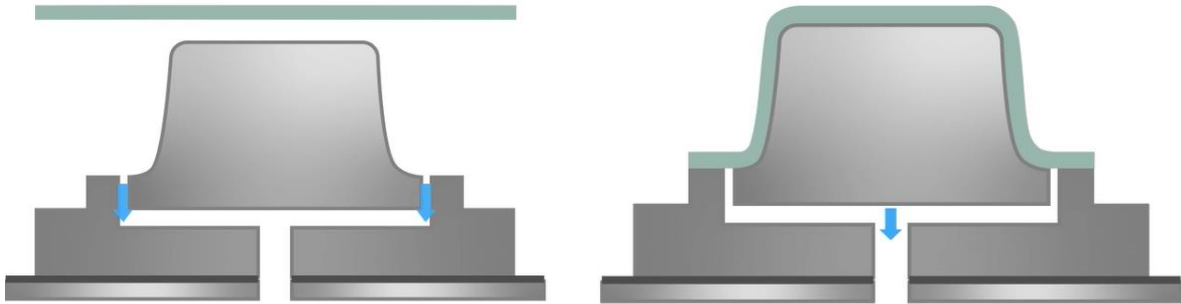
CURVE DENSITY (KG/M <sup>3</sup> )	<200	>200
Thermoforming temperature (°C)	190-200°C	200-210°C
Heating time	~30s/mm thickness	~30s/mm thickness



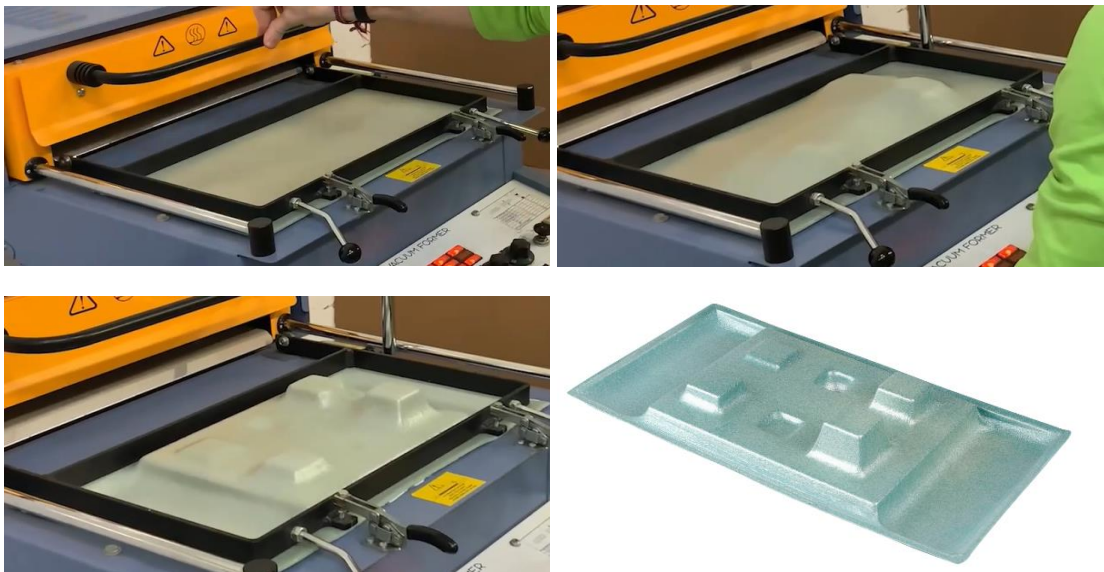
Values are generic and given for information only, fine tunings should be made depending on tooling and local conditions. Trials are necessary to set optimum parameters and should be calibrated, especially before industrialisation. Please contact our technical service engineers for any help and information on the subject.

Two types of **thermoforming** techniques can be used:

### Vacuum forming



**Vacuum forming** is a type of thermoforming where a vacuum is used to form the part once the materials have softened from heating. Thanks to the strength of the vacuum, the material takes the wanted shape, which sets when cooling down. This works particularly well with ArmaPET Curve thanks to its closed cells surface and its low thickness.

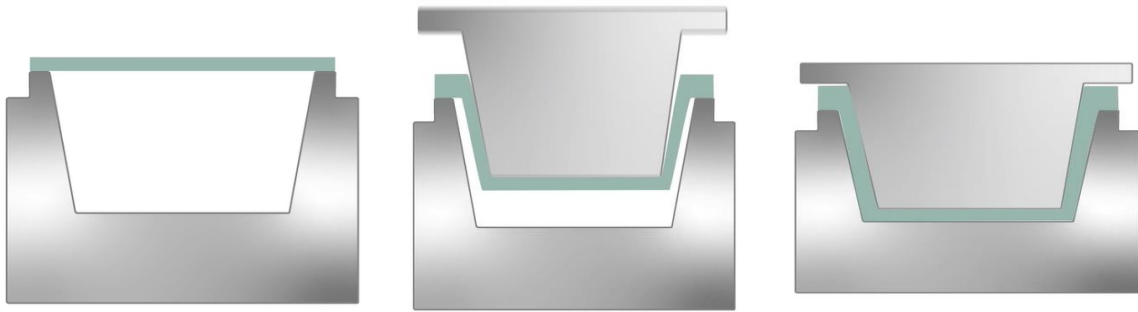


### Pressure forming

Similarly to vacuum forming, this process is used to give a material a specific and possibly complex shape. The main difference between the two is that instead of vacuum, mechanical pressure is used to give the desired aspect.

After heating up ArmaPET Curve with or without skin up to its softening point (see table above), mechanical pressure is applied with a machine like a cold press mounted with the appropriate mould in order to shape the ArmaPET Curve.

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Of course, this list of processes is not exhaustive. The defined methods in this document can often be replaced by others. For example, post-expansion and panels can be realised using a heated press, vacuum forming can be done under a vacuum bag similarly as in an infusion process, and pressure forming can be achieved by any means of mechanical pressure. Feel free to contact our application development engineers if you need help with one of the aforementioned processes, or to try developing something with the methods of your choice.

If you would like further information about the unique thermoforming properties of ArmaPET Curve, with its superior temperature resistance, closed-cell surface and long life-cycle contact your local representative.

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