

# Material Properties

## ASTM E595 Outgas Testing

Braskem FL105PP Polypropylene (PP) Filament

Braskem FL900PP-CF Carbon Fiber Reinforced Polypropylene (PP) Filament

### ASTM E595

ASTM E595 is a standard test method for total mass loss (TML) and collected volatile condensable materials (CVCM) from outgassing in a vacuum environment. NASA has established requirements that are quoted and used. The most commonly quoted requirement is CVCM < 0.1% and TML < 1%.

### WHY IS IT CRITICAL

Outgas can be critical in during the use of 3D printing in space or environments under vacuum. In particular, outgassing can effect critical electronics and optical equipment is not managed properly. When volatile compounds evaporate, they eventually will find a place to condense, which can result in surface contamination, corrosion, or fogging of critical components.

### OUTGAS TESTING RESULTS

Braskem FL105PP unfilled polypropylene filament and FL900PP-CF carbon fiber reinforced polypropylene filaments were tested by an independent testing agency to determine outgas results.

Sample	TML (%)	CVCM (%)	WVR (%)
FL105PP	0.24	0.05	0.03
FL900PP-CF	0.30	0.06	0.03

Outgas Test was performed in a vacuum environment of less than  $5 \times 10^{-5}$  torr according to ASTM E595, for a duration of 24 hours, at 125 degrees Celsius.

### At a glance

According to an independent testing agency, Braskem FL105PP and FL900PP-CF meet NASA established requirements for off gas of CVCM < 0.1% and TML < 1%

### Key Results



#### CVCM

Collected Volatile  
Condensable Material  
< 0.1%



#### TML

Total Mass Loss  
< 1.0%



#### WVR

Water Vapor Recovered  
< 1.0%

Note: Information included on this document should be used for informational purposes only. Braskem does not guarantee any results presented in these case studies. Properties may vary based on print conditions and external environment



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1735 Market Street, Philadelphia, PA 19103