Application of Polymer Processing Aids (PPA) in Plastics

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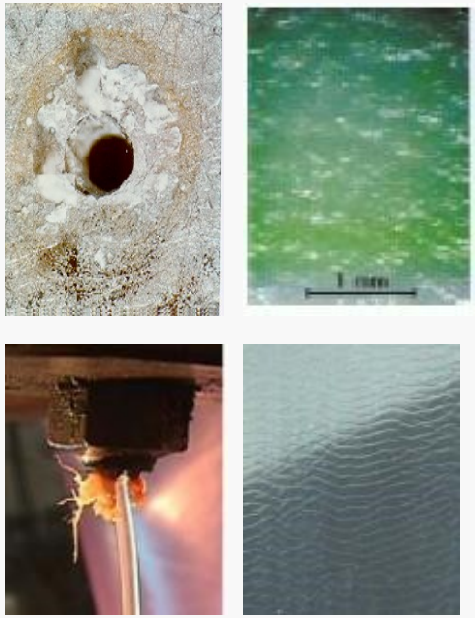
Reason to choose Polymer processing aids(PPA)

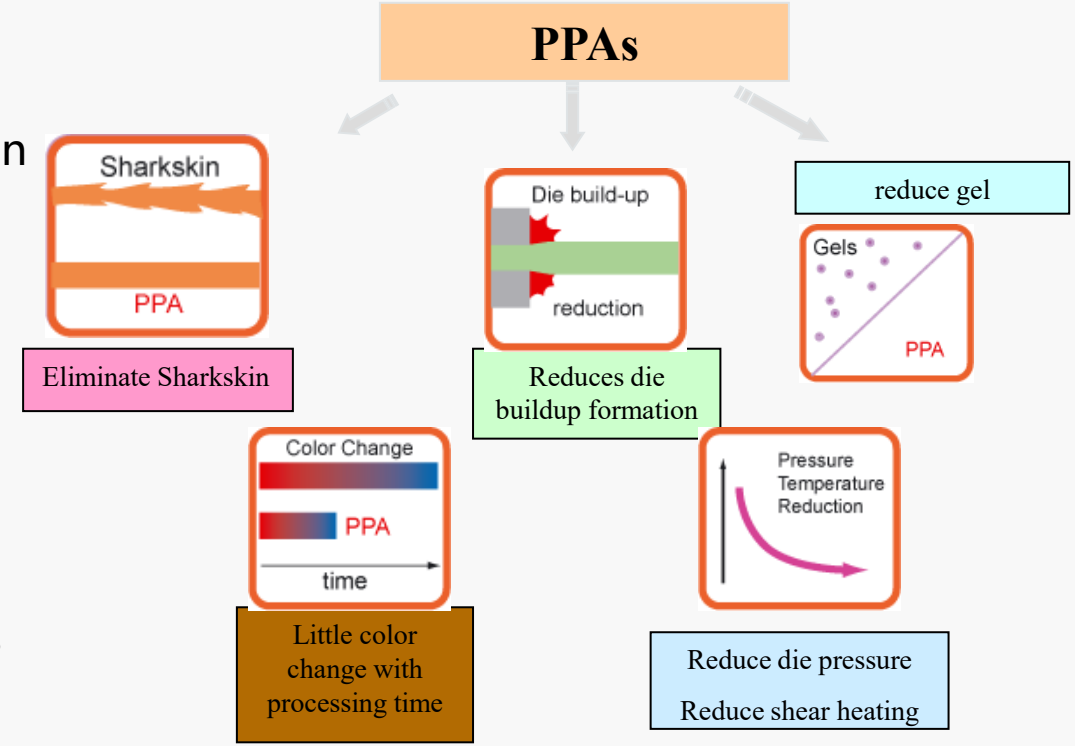
Manufacturers of extrusion blown film and products such as pipe, cable jacketing and fittings typically face two major hurdles: melt fracture and extrusion instability, which impact product quality, production efficiency and throughput.

Usually, the methods that can be used to solve these two types of problems are:
Change the production process, raw materials or processing temperature, add a small amount of processing aids, etc. And methods that involve changing links in the production process often imply high costs and uncertainties. Therefore, for production enterprises, PPA is an appropriate solution.



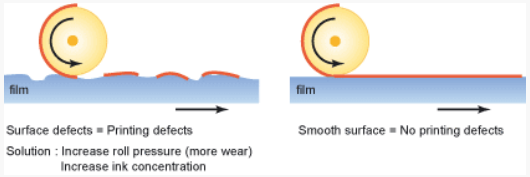
Functions of PPAs

- ✓ Improve resin processing rheology
- ✓ Reduces melt fracture and eliminates "shark skin" phenomenon
- ✓ Reduce die deposit
- ✓ improve product quality
- ✓ Uniformity of film
- • Reduce crystal point
- • Improve product surface finish and transparency
- • Improve the mechanical properties of products
- ✓ Facilitate the dispersion of colors and reduce the color switching time
- ✓ Broaden the range of raw materials
- ✓ Reduce energy consumption
- ✓ Increase productivity

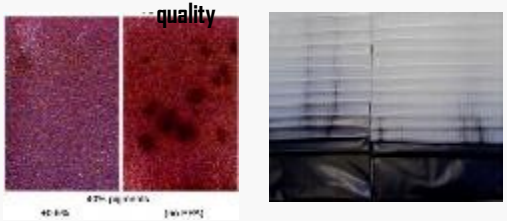


Functions of PPAs

Reduce die deposit

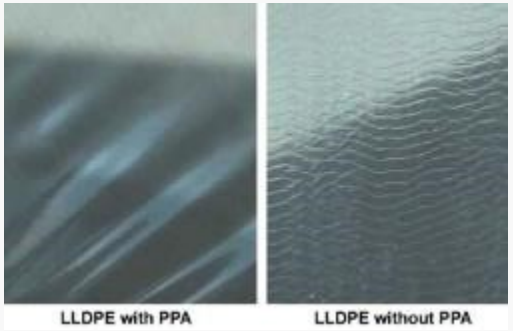


Improve print quality

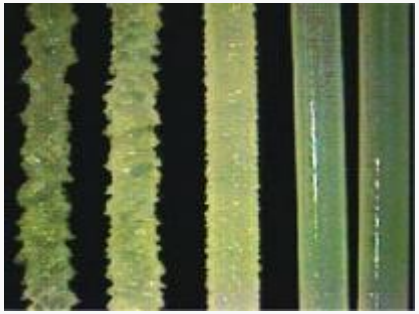


Improve pigment dispersion

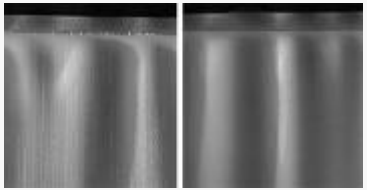
Speed up color changes



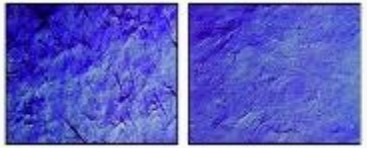
Eliminate melt fracture



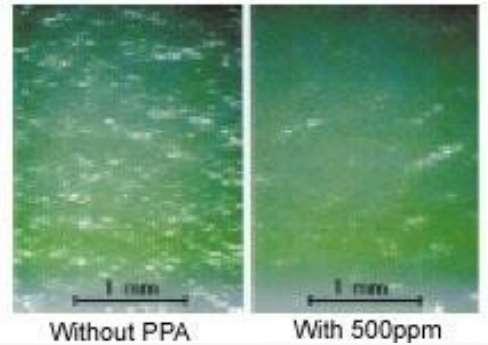
Eliminate Sharkskin



Improve film uniformity



Improve surface finish



reduce gel

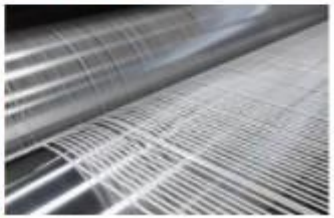
Application of PPA in Polyolefin

Applications

- LDPE
- LLDPE
- mLLDPE
- HDPE
- UHMDPE
- PVC
- PP
- PA

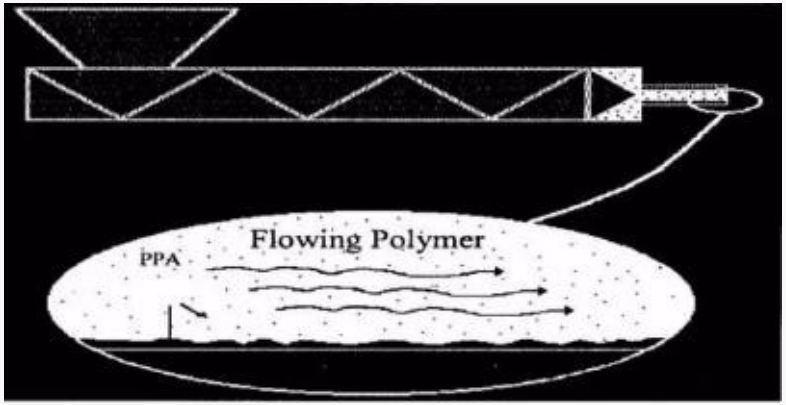
Industries

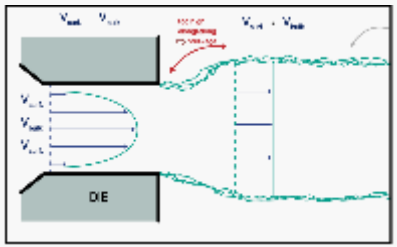
- Blowing film
- Cast film
- Tube extrusion
- Fiber
- Wire & cable extrusion
- Sheet extrusion
- Masterbatch

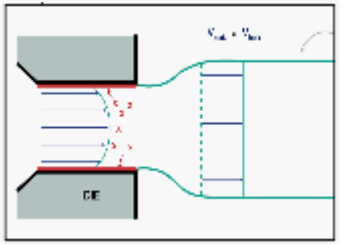


The Mechanism of PPA

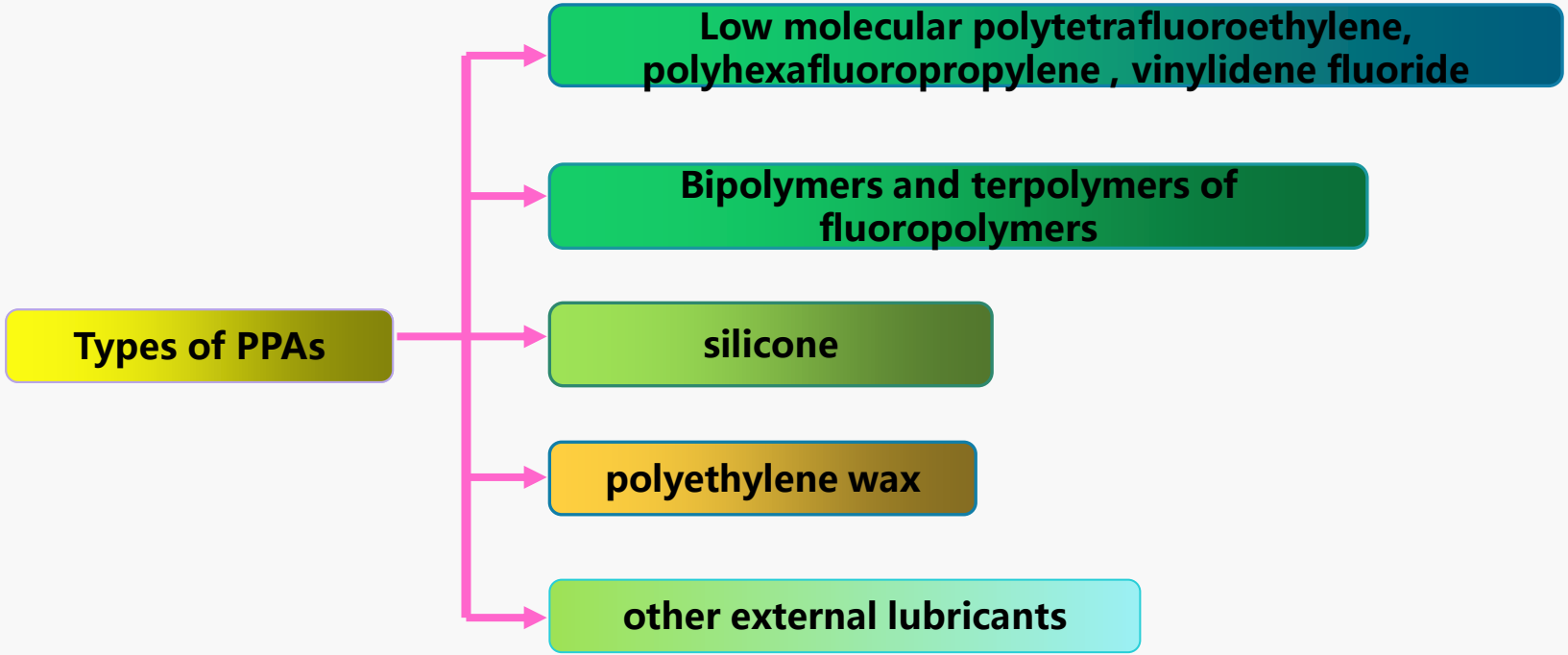
PPA has a high adhesion to the metal die, and will adhere to the die wall to form a dynamic coating with low surface energy. The melt slides over the surface of the coating to lubricate the melt.
(In the finished product, PPA exists in the form of dispersed particles inside the product, and does not gather on the surface of the product performance is not affected.)







Types of PPAs

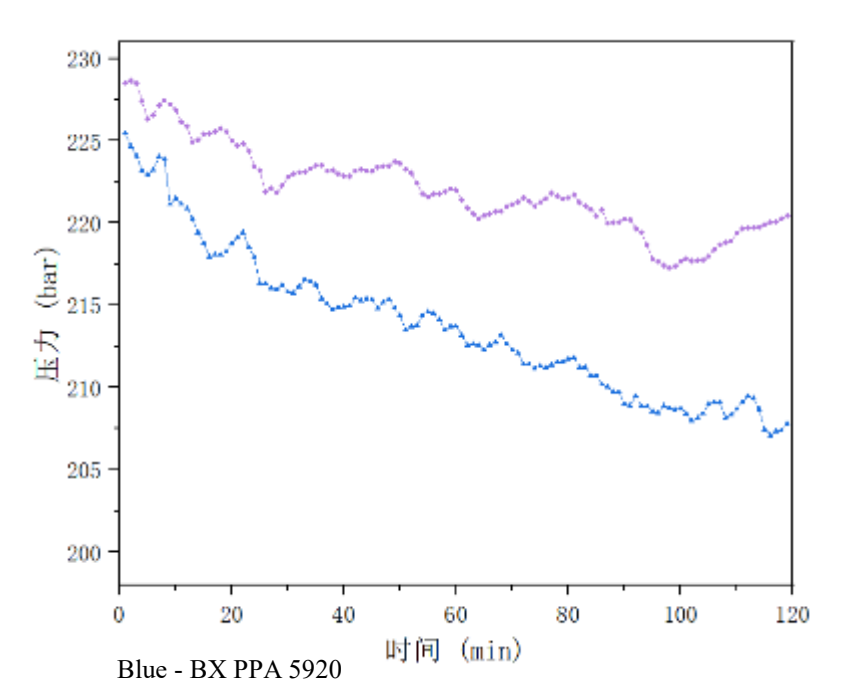


Comparison between BX PPA & 3M

Baoxu Chemical	3M	Dakin
BX PPA 5911	Dynamar FX 5911	DA 310ST
BX PPA 5922	Dynamar FX 5922	
BX PPA 5920	Dynamar FX 5920	DA 910
BX PPA 5924	Dynamar FX 5924	DA 912
BX PPA 9613	Dynamar FX 9613	
BX PPA 9614	Dynamar FX 9614	
BX PPA 5922M	Dynamar FX 5922M	
BX PPA 5927M	Dynamar FX 5927M	
BX PPA 5929M	Dynamar FX 5929M	

Comparsion of PPA on melt extrusion pressure

BX PPA 5920 vs **3M 5920A**



Blue - BX PPA 5920
Violet - 3M 5920A

name	Onset time min	Maximum pressure Bar	Terminal pressure Bar	Pressure drop Bar
BX PPA 5920	20	225.586	208.008	17.578
3M 5920A	100	228.932	220.45	8.482

Comparsion of PPA on surface gloss of melt

BX PPA 5920 vs 3M 5920A

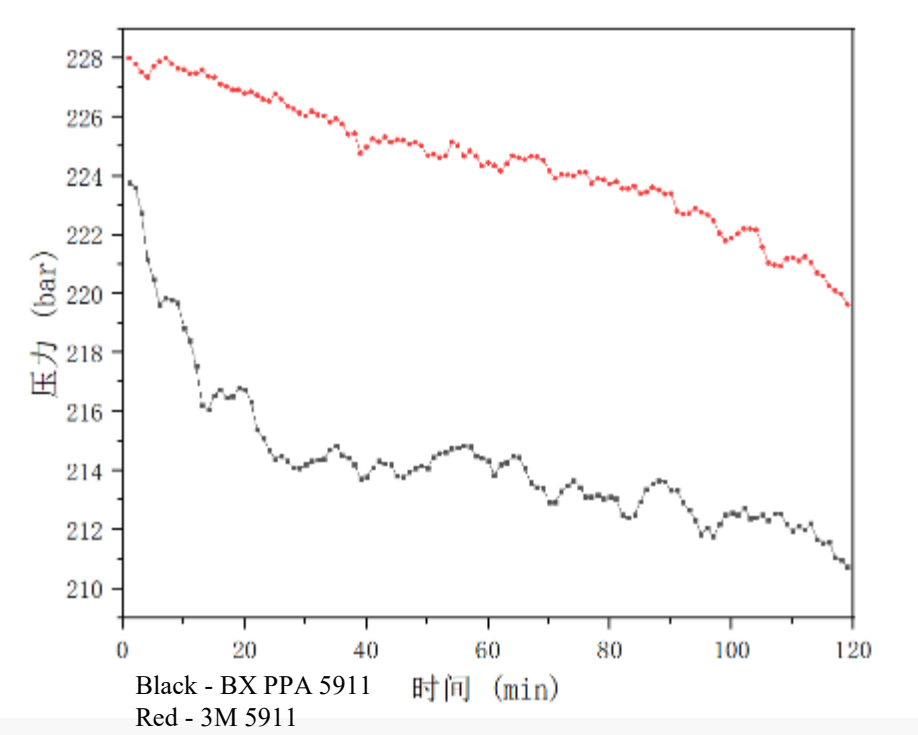
name \ time	blank	10min	30min	60min	90min	120min
BX PPA 5920						
3M 5920A						

Conclusion:

Our product BX PPA 5920 is much more effective than the competing product 3M 5920A . The full onset time of our product BX PPA 5920 is 30 minutes . It is precisely because of this that its pressure drop is relatively small, while the competing product 3M 5920A has no obvious effect within 120 minutes.

Comparsion of PPA on melt extrusion pressure

BX PPA 5911 vs **3M 5911**

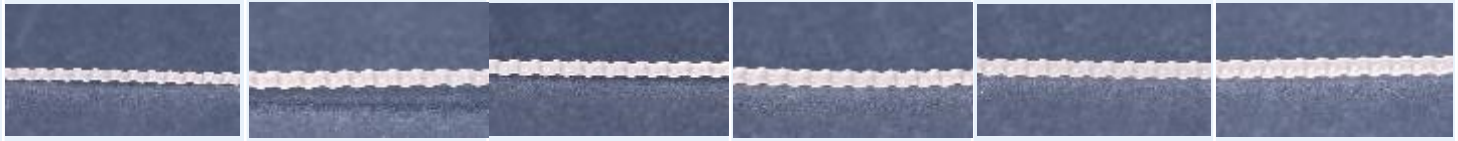


Black - BX PPA 5911
Red - 3M 5911

name	Onset time min	Maximum pressure Bar	Terminal pressure Bar	Pressure drop Bar
BX PPA 55911	immediate	224.013	210.793	13.220
3M 5911	not obvious	228.208	219.076	9.132

Comparsion of PPA on surface gloss of melt

BX PPA 5911 vs 3M 5911

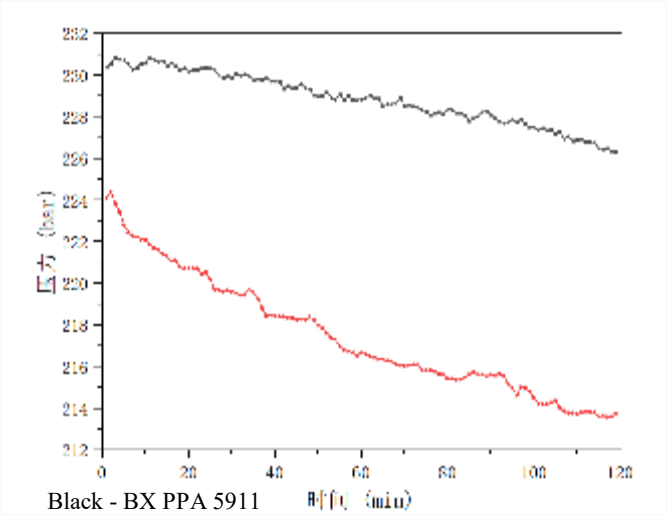
name \ time	blank	10min	30min	60min	90min	120min
1#BX PPA 5911						
2#3M 5911						

Conclusion:

Our product BX PPA 5911 is much more effective than the competing product 3M 5911. Our product works immediately, and the time for complete smoothing is 40 minutes, while the competing product 3M 5911 has no obvious effect on the surface

PPA performance evaluation

Capillary rheometer test : appearance roughness (smooth record time); extrusion volume; pressure drop



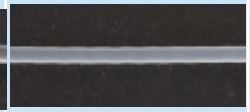
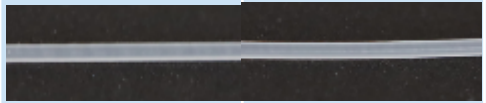
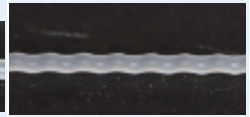
Black - BX PPA 5911
Red - 3M 5911

name	Onset time min	Maximum pressure Bar	Terminal pressure Bar	Pressure drop Bar
BX PPA 5911	immediate	224.465	213.759	10.706
3M5911	not obvious	230.975	226.273	4.702

Figure 1 Comparison of the influence of PPA on melt extrusion pressure

The melting pressures of the two samples showed a downward trend with the extension of time, and tended to balance after 10 minutes, and the melting pressure of the sample added with 3M 5911 was slightly higher after the balance.

PPA on the surface gloss of the melt

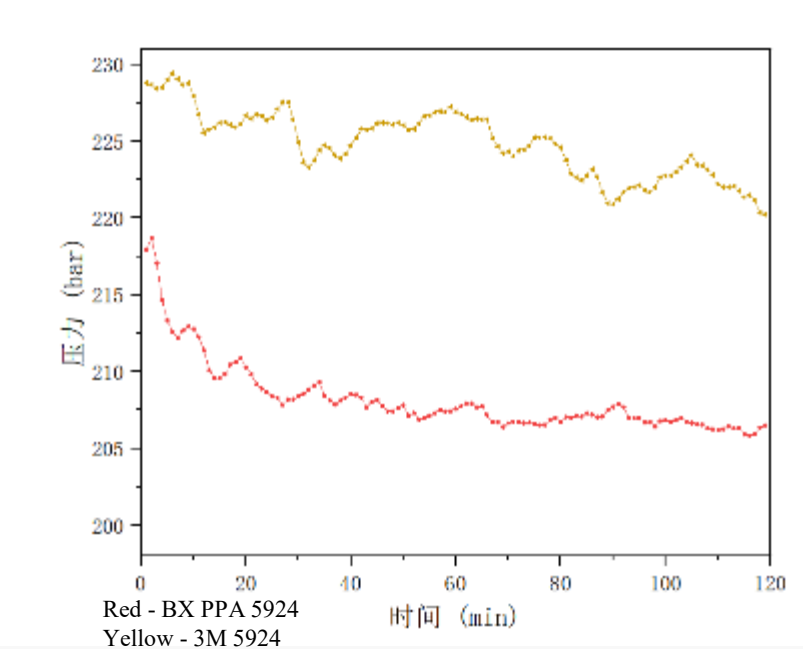
name \ time	blank	10min	30min	60min	90min	120min
1# BX PPA 5911						
2#3M 5911						

Conclusion:

Our product BX PPA 5911 is much more effective than the competing product 3M 5911. Our product works immediately and is completely smooth in 10 minutes, while the competing product 3M 5911 has no obvious effect on the surface.

Comparsion of PPA on melt extrusion pressure

BX PPA 5924 vs 3M 5924



Red - BX PPA 5924
Yellow - 3M 5924

name	Onset time min	Maximum pressure Bar	Terminal pressure Bar	Pressure drop Bar
BX PPA 5924	immediate	218.822	206.29	12.532
3M 5924	none	229.474	220.052	9.422