Jiangyin Hetron Elastomer New Material Technology Co., Ltd.

Thermoplastic Polyester Elastomer (TPEE)

HetroFlex grade introduction

2023.11

HETRON

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01

Company Outline

About Company

Heshili

Jiangsu Heshili New Material was founded in 2006, Heshili is dedicated to be an top PBT expert producer in China ,it supplies both high quality PBT resin and PBT filament yarn.

Hetron

Jiangyin Hetron elastomer New Material Technology Co., Ltd. is the subsidiary company of Heshili. Started TPEE production from 2015, as a leading TPEE supplier in China.

Our Business Philosophy

People oriented, scientific management, pioneering& innovation.

Slogan: Use our technology to making life more glorious.

Company View

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Factory Area : 120,060 m²

Employee: 400 employee
(Heshili+Hetron)

Turnover:
USD 200 million

Plant View

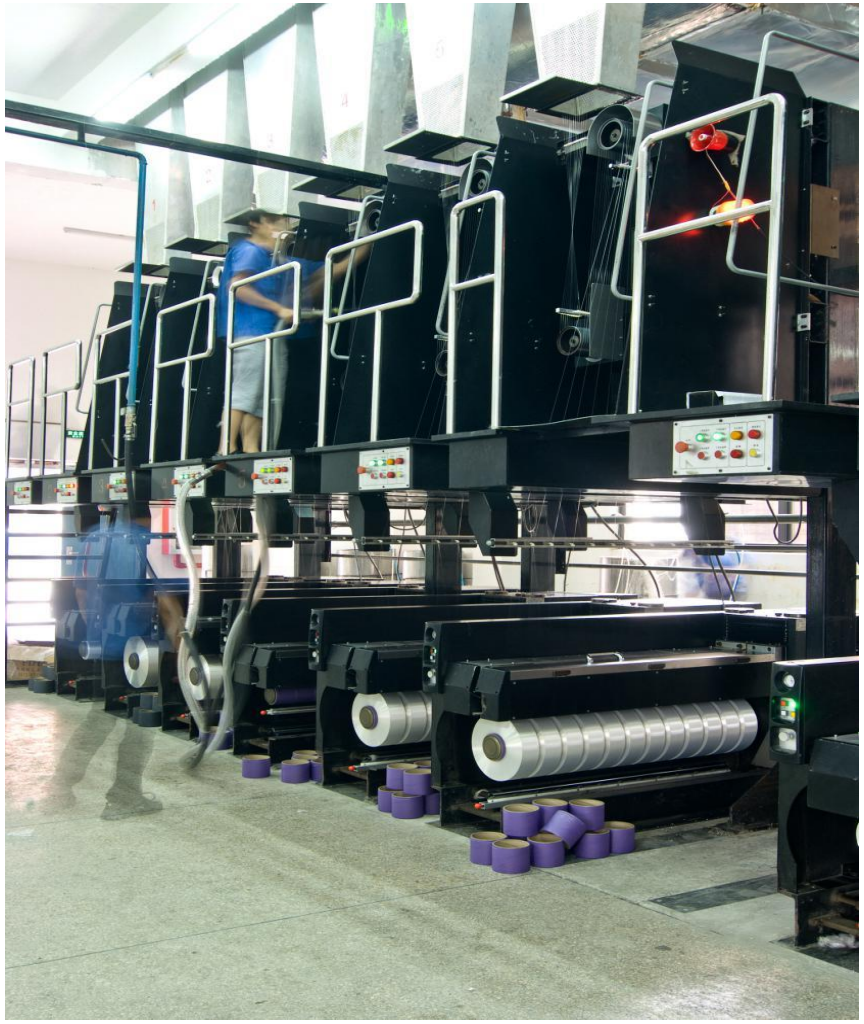




Heshili company View

HESHILI is a professinal manufactory which produce both PBT resin & PBT fiberin China, meanwhile owns the leading capacity of PBT fiber globally.

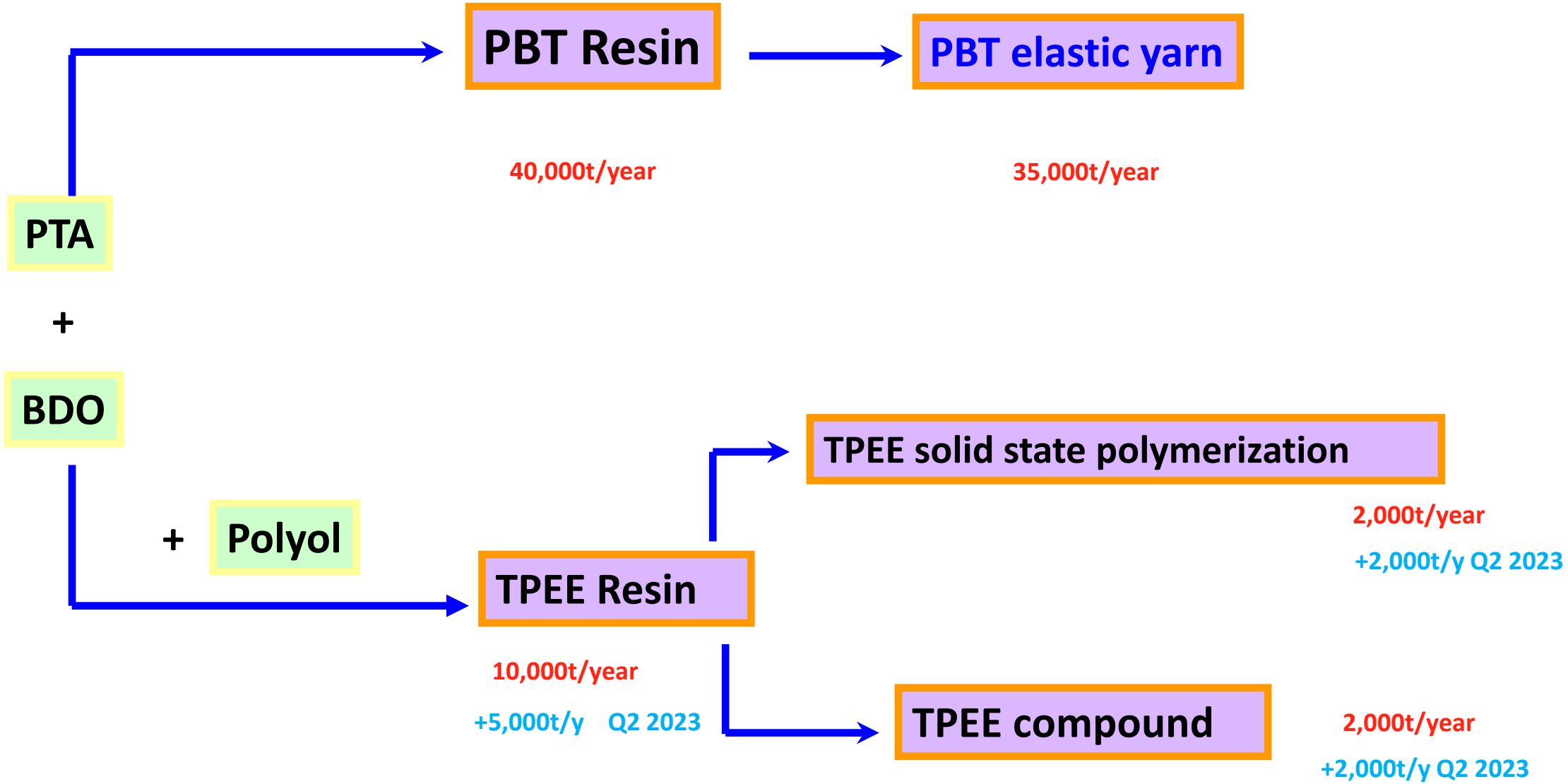




Heshili & Hetron integration

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Capacity Analysis



ISO TS16949 Certificated

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NSF ISR

Certificate of Registration

This certifies that the Quality Management System of

Jiangyin Hetron Elastomer New Material Technology Co., Ltd.

Building 2 and Building 6, No. 32, Songwentou Road, Industrial Concentration Area, Yunting Town, Jiangyin, Wuxi City, Jiangsu Province, China 214422

has been assessed by NSF-ISR and found to be in conformance to the following standards(s):

ISO/TS 16949:2009

Scope of Registration:
Design and Manufacturing of Thermoplastic Polyester Elastomer

IATF Certificate Number:	0242669
Certificate Number:	CNTS023071
Certificate Issue Date:	08-JUL-2016
Registration Date:	07-JUL-2016
Expiration Date*:	14-SEP-2018

Carl Blazik,
Vice President, Technical Operations, NSF-ISR, Ltd.

NSF International Strategic Registrations

789 North Dixboro Road, Ann Arbor, Michigan 48105 | (888) NSF-9000 | www.nsf-isr.org

Authorized Registration and /or Accreditation Marks. This certificate is property of NSF-ISR and must be returned upon request.
*Company is audited for conformance at regular intervals. To verify registrations call (888) NSF-9000 or visit our web site at www.nsf-isr.org

ISO 14001 Certificated

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WSF 世标认证

CERTIFICATE OF REGISTRATION

Registration No.03816E24723R0S
Organization Code/Unified Social Credit Code:
91320281321639032 2

This is to certify that the Environmental Management System of

Jiangyin Hetron Elastomer New Materials Technology Co., Ltd.

Audit Address: 32 Songwentou Road, Yunting Town Industrial Concentration Area, Jiangyin/Registered Address: 32 Songwentou Road, Yunting Town Industrial Concentration Area, Jiangyin, Jiangsu, China

has been audited to conform to

GB/T 24001-2004/ISO14001:2004

For the whole process of

design, development and production of thermoplastic elastomer and related environmental management activities in the involved sites

Date of Initial Issuance:2016-8-25

Date of Issuance:2016-8-25 Date of Expiry:2018-9-15

This certificate will not remain valid only if the certified organization accepts at least one surveillance audit annually within the validity period of the certificate in which the surveillance audit conforming mark is in the designated position. Please follow WSF customer service by scanning QR code or visit www.wsf.cn and www.cnca.gov.cn for this certificate's validity status and related services.

World Standards For Certification Center Inc. Issued by :

Add: Room 701 & 702, Floor 7, Building 8, Yuanyangfengjing, No.15, Deshengmen Xidajie, Haidian District, Beijing, 100082, China

WSF ISO14001

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

CNAS Management System CNAS C038-E

02

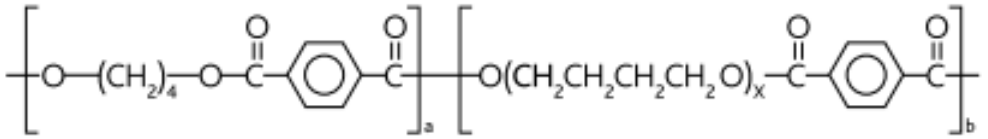
Hetron TPEE introduction

HetroFlex Grade

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TPEE Resin

HetroFlex H



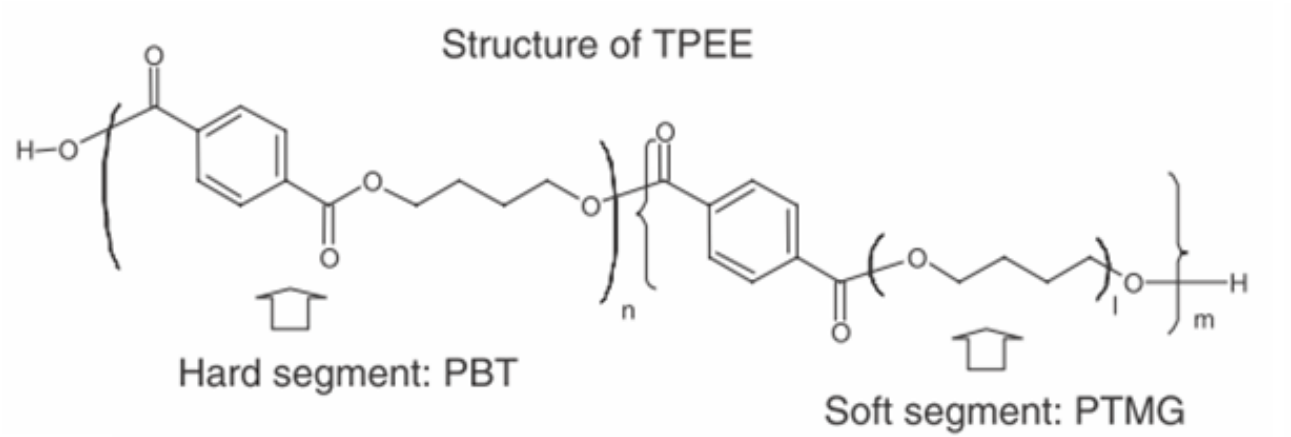


Paper-Aluminum Packaging

- Injection
- Extrusion
- Blow molding
- Heat resistant
- Soft

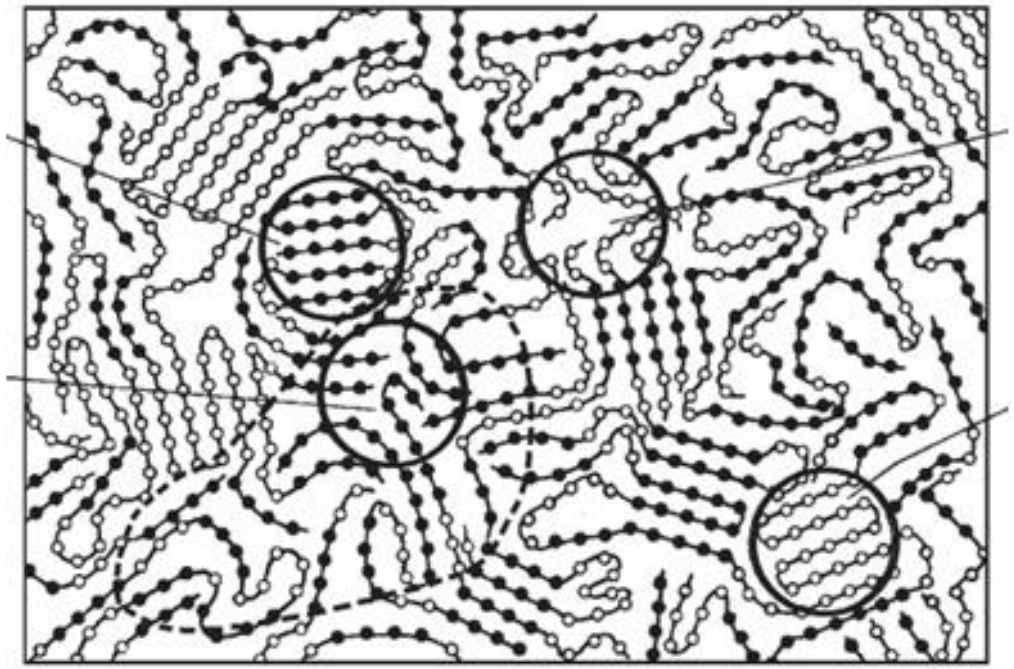
TPEE morphology

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PBT crystalline

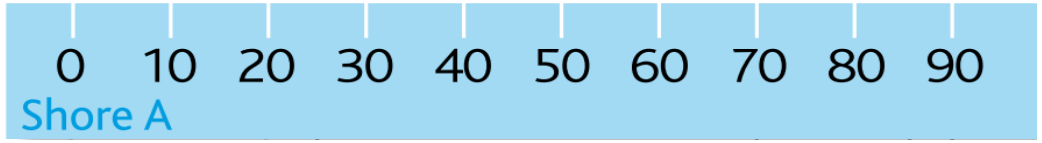
PBT amorphous



PTMG amorphous

PTMG crystalline

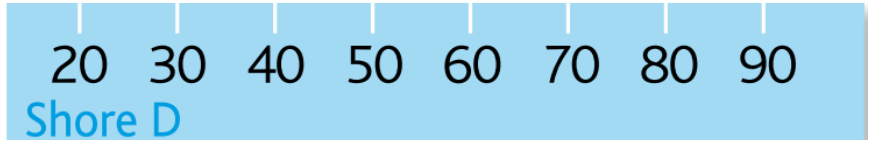
Hetroflex TPEE hardness



TPE-Olefin, Styrenic

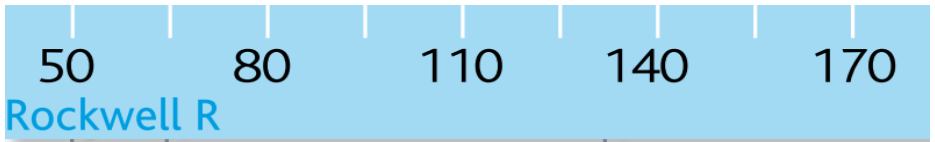
TPV

TPU



We provide TPEE
Hardness range Shore D 25-72 **(TPEE)**

Plastics



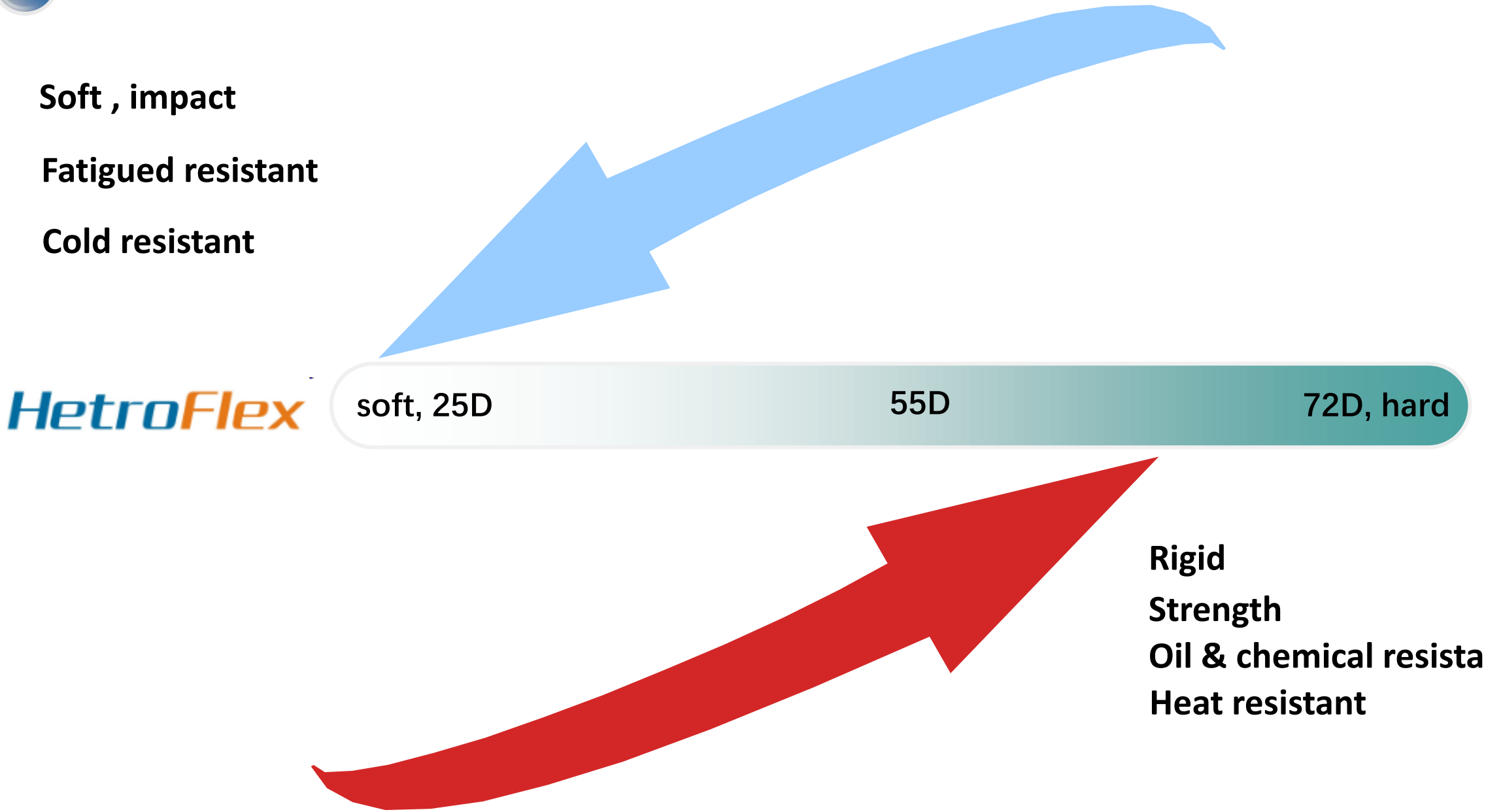
Hetroflex TPEE hardness vs. properties

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Soft , impact

Fatigued resistant

Cold resistant



Rigid

Strength

Oil & chemical resistant

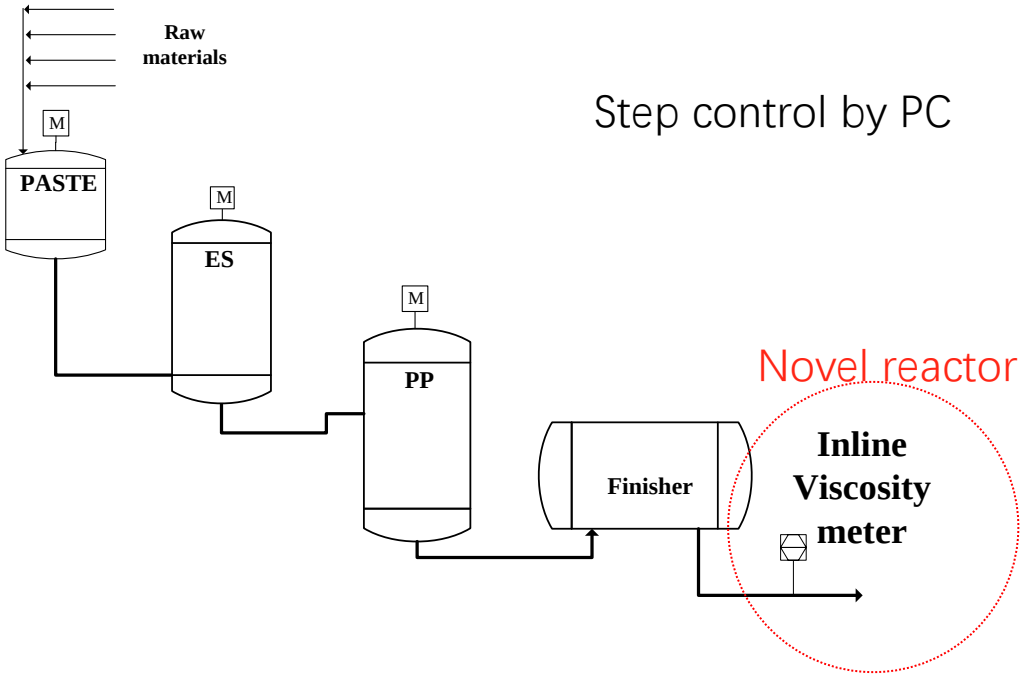
Heat resistant

Process between Continuous and batch(1)

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Continuous process

PC control the feed ratio



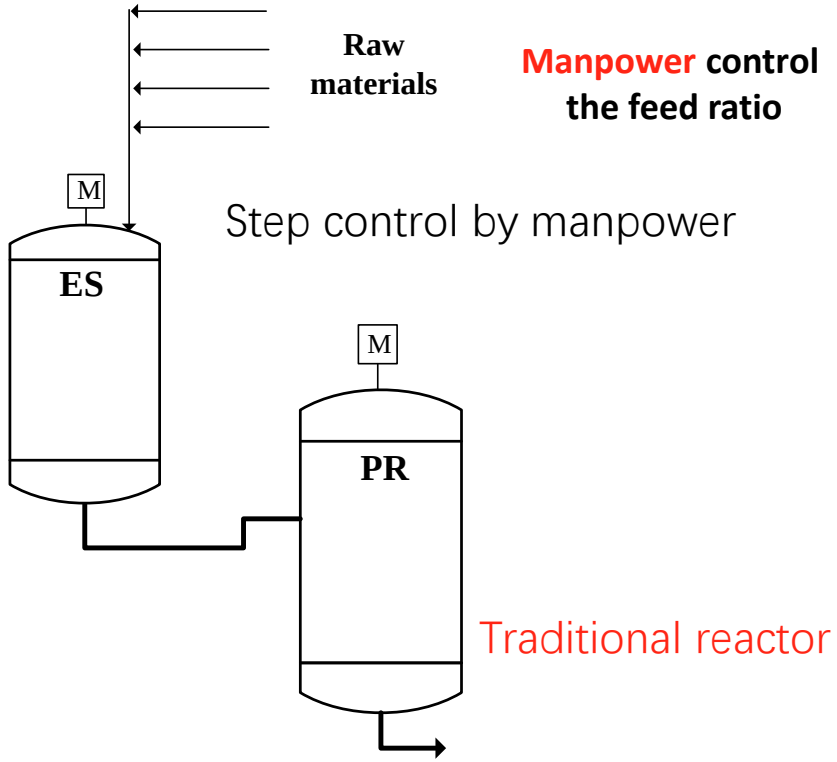
Step control by PC

Novel reactor

Viscosity control with in online meter

DCS manage

batch process



Manpower control the feed ratio

Step control by manpower

Traditional reactor

Viscosity control with torque

PID control

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Process between continuous and batch type

Hetron use novel reactor technology TPEE polymerization with continuous process

- Precise composition control
- Precise Viscosity
- Low Acid Value (hydro-resistant improved)
- Low thermal history => heat resistant improved

Continuous process ensure the quality stability

Hetroflex-Nomenclature

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Type

H: PTMG
Mv: MVTR
Bio: Bio Mass

Function

G : General (Resin)
T : thermal stability
S : Soft
F : Flammability
U : UV resistant

H 40D M G — Color

Shore hardness

Shore D
Shore A

Viscosity

L : Low viscosity
M : medium viscosity
H : High viscosity
B : Blow molding viscosity

HetroFlex

Type of HetroFlex

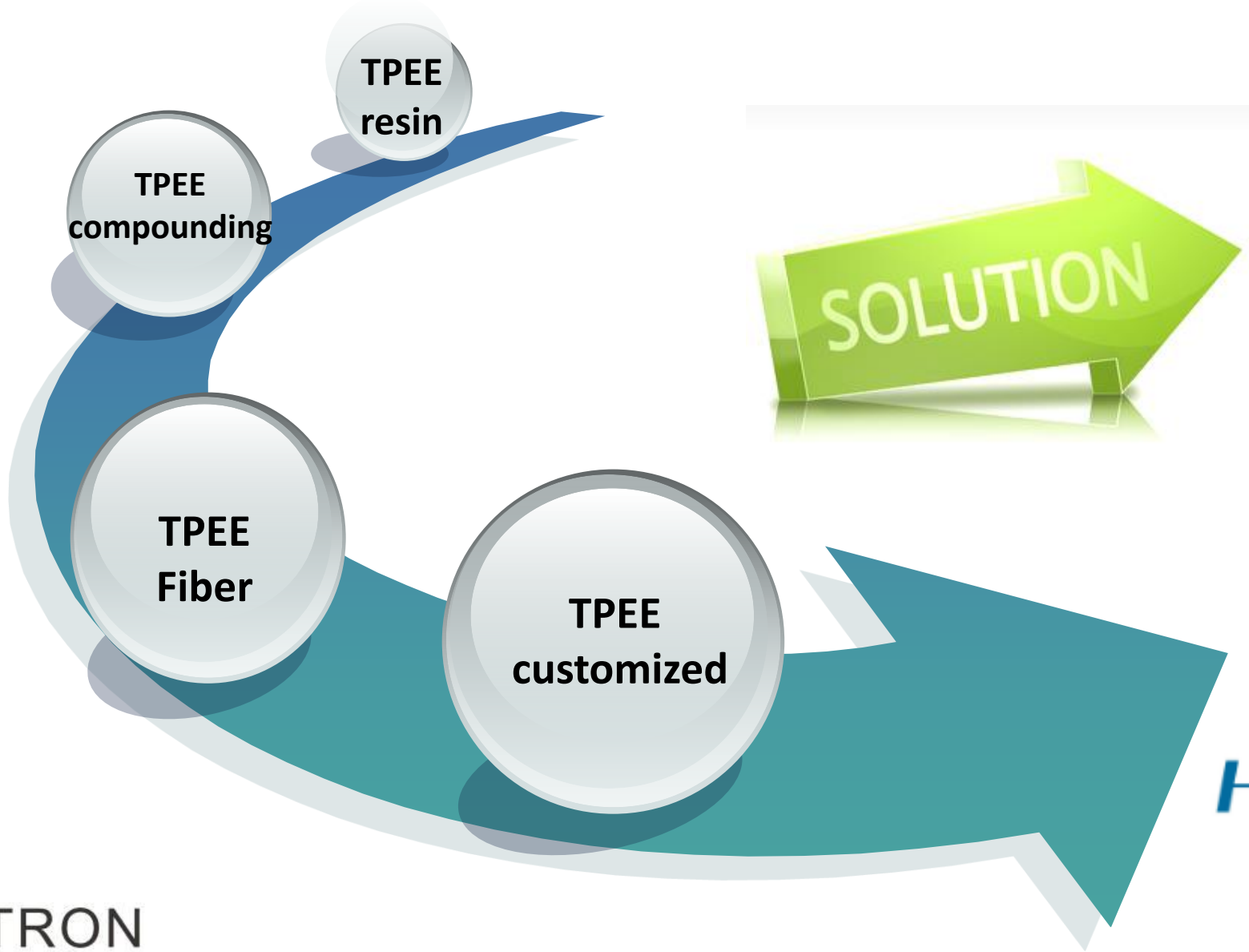
Type of Hetroflex	Soft block	Major properties
HetroFlex H	Polyether	Good mechanics, general purpose.
HetroFlex MV	Polyether	Good water vapor transmission
HetroFlex Bio	100% Biobased polyether	Biobased, similar properties to HetroFlex H
HetroFlex C	Polycarbonate	Excellent heat and hydrolysis resistance.

Worldwide main TPEE maker distribution and capacity analysis

Company	Capacity (t/yr)	Market sahre (%)	Brand name	Location	Equipment technology
Celanese	54,000	29%	Hytrel	US/EU	DMT Continuous process
CCP(OEM for Hytrel)	40,000	21%	Hytrel/Boexy	TW	PTA Continuous process
LG chem	20,000	11%	Keyflex	KR	PTA process + DMT process
DSM	19,000	10%	Arnitel	EU	DMT, batch process
Hetron	15,000	8%	HetroFlex	CN	PTA Continuous process
Taro Plast S.p.A.	10,000	5%	Pibiflex	EU	DMT, batch process
SK Chemical	8,000	4%	Skypel	KR	DMT, batch process
Eastman	4,000	2%	Ecdel	US	DMT, batch process
DuPont-Toray	6,000	3%	Hytrel	JP	DMT, batch process
TOYOBO	6,000	3%	Pelprene	JP	DMT, batch process
Samyang	5,000	3%	TRIEL	KR	DMT, batch process
Total	187,000	100%			

Solution

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Local production provide solution

HetroFlex

TPEE

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HetroFlex-TPEE similar grade(1)

Hardness	HetroFlex TPEE	DuPont(Hytrel)	DSM(Arnitel)
30D	H28DMG	3078	EL250
35D/40D	H35DMG/H40DMG	4068/4069	EM400
45D	H45DBT	HTR8341C	EB464
50D	H50DBT	HTR4275BK	PB582H
50D	H50DMG	/	/
55D	H55DLG	5526	EL550
	H55DMG	5556	EM550
	H55DHT/H55DMT	5555HS	
63D	H63DMG/H63DMT	6356/6358	EL630/EM630
	H63DHT	HTR8163HVBK	EM630H
72D	H72DMG/H72DMT	7246/7248	EL740

HetroFlex-TPEE similar grade(2)

Hardness	Hetron	LG chemical	SK chemical	Samyang	Kolon
25D	H25DMG	BT 10288D		5250SP	
30D	H28DMG	BT 1030D	G130D		
33D	33DLG	BT 1033D			
35D	H35DMG			5300	
	H35DLG/H90AMG	BT 1035D			
40D	H40DMG	BT 1245D		5400	KP3340
45D	H45DLG	BT 1045D		5450	
45D	H45DBT	BT HB9242D			KP3942BM
50D	H50DAB	BT S5035			KP3855FB
55D	H55DLG	BT 1055D			KP3355
	H55DMG	BT 1155D	G155D	5500/5550	KP3755
	H55DHT				
63D	H63DLG	BT 1063D			KP3363
	H63DMG	BT 1163D	G163D	5600/5650	
	H63DHT				
72D	H72DMG	BT 1172D	G172D	5700	KP3372

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03

HetroFlex TPEE Applications

Hetron TPEE application

- Resin application
- Extrusion, compounding
- Blow molding, compounding
- Modification

Grade TDS

TPEE Resin, TPC-ET

Grade	H90AMG	H25DMG	H28DMG	H33DLG	H35DMG	H35DLG	H40DMG	H45DMG	Unit
Process	Injection Exrusion	Injection Exrusion	Injection Exrusion	Injection	Injection Exrusion	Injection Exrusion	Injection Exrusion	Injection Exrusion	
Physical Properties									
Hardness	38	25	28	33	36	36	40	45	Shore D
Melt index (230°C/2.16 kg)	15	18	16	21	11	32	13	12	g/10min
Density	1.115	1.060	1.070	1.090	1.110	1.110	1.130	1.140	g/cm3
Mechical Properties									
Flexuralmodulus (23°C)	60	15	25	40	55	55	80	100	MPa
Tensile stress at break (23°C)	22	18	18	18	23	23	24	26	MPa
Elongation at break (23°C)	780	960	940	860	850	820	760	690	%
Charpy impact strength, (23°C)	No Break	No Break	No Break	No Break	No Break	No Break	No Break	No Break	KJ/m2
Charpy impact strength, (-30°C)	No Break	No Break	No Break	No Break	No Break	No Break	No Break	No Break	KJ/m2
Thermal Properties									
Melting temperature,	162	168	170	183	195	195	202	208	°C
Vicat softening temperature,,10N	120	65	80	110	130	130	140	155	°C
Flammability,1.60 mm,	H.B	H.B	H.B	H.B	H.B	H.B	H.B	H.B	class
Electrical Properties									
Volume Resistivity	3.00E+12	4.00E+11	5.00E+11	1.00E+12	2.00E+12	3.00E+12	5.00E+12	7.00E+12	Ohm*cm
Surface Resistivity	2.00E+14	1.00E+14	3.00E+14	2.00E+14	2.00E+14	2.00E+14	3.00E+14	5.00E+14	ohm
Dielectric Strength	18	18	18	18	18	18	19	20	KV/mm
Other Properties									
Moisture, 24 hr	0.6	0.8	0.7	0.7	0.6	0.6	0.5	0.5	%
Mold Shrinkage	1.3	1.1	1.1	1.1	1.3	1.3	1.4	1.4	%
Similar grade to Hytrel	-	-	3078	-	4069/4068	-	-	-	-
Similar grade to Arnitel	-	EL150	EL250	-	-	EM400	-	-	-

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Grade TDS

TPEE Resin, TPC-ET

Grade	H45DLG	H55DMG	H55DLG	H63DMG	H63DLG	H72DMG	H82DMG	Unit	Method
Process	Injection	Injection Exrusion	Injection	Injection Exrusion	Injection	Injection Exrusion	Injection Exrusion		
Physical Properties									
Hardness	45	55	55	63	63	72	76	Shore D	ISO 868
Melt index (230°C/2.16 kg)	21	10	21	10	21	11	12	g/10min	ISO 1133
Density	1.15	1.19	1.19	1.22	1.22	1.26	1.28	g/cm3	ISO 1183
Mechical Properties									
Flexuralmodulus (23°C)	115	220	220	320	320	550	1200	MPa	ISO 178
Tensile stress at break (23°C)	27	36	36	40	40	42	46	MPa	ISO 527
Elongation at break (23°C)	720	590	600	480	480	370	290	%	ISO 527
Charpy impact strength, (23°C)	No Break	No Break	No Break	No Break	No Break	15	8	KJ/m2	ISO 179
Charpy impact strength, (-30°C)	No Break	No Break	No Break	18	18	9	4	KJ/m2	ISO 179
Thermal Properties									
Melting temperature,	190	202	202	211	211	218	222	°C	ISO 11357
Vicat softening temperature,,10N	155	180	180	195	195	205	210	°C	ISO 306
Flammability,1.60 mm,	H.B	H.B	H.B	H.B	H.B	H.B	H.B	class	UL 94
Electrical Properties									
Volume Resistivity	8.00E+12	2.00E+13	2.00E+13	5.00E+13	5.00E+13	8.00E+13	4.00E+14	Ohm*cm	IEC 60093
Surface Resistivity	1.00E+15	1.00E+15	1.00E+15	4.00E+15	4.00E+15	7.00E+15	9.00E+15	ohm	IEC 60093
Dielectric Strength	20	20	20	21	21	21	21	KV/mm	IEC 60243-1
Other Properties									
Moisture, 24 hr	0.4	0.4	0.4	0.3	0.3	0.3	0.3	%	ISO 62
Mold Shrinkage	1.5	1.6	1.6	1.6	1.6	1.7	1.7	%	ISO 294
Similar grade to Hytrel	4556	5556	5526	6356		7246	8238	-	-
Similar grade to Arnitel			EL550		EL630	EM740		-	-

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Grade TDS

TPEE compound, TPC-ET

Grade	H40DBT	H45DBT	H50DBT	H55DHT	H63DHT	H72DHT	Unit	Method
Process	Blow molding	Blow molding	Blow molding	Exrusion	Exrusion	Exrusion		
Physical Properties								
Hardness	40	45	52	55	63	72	Shore D	ISO 868
Melt index (230°C/2.16 kg)	1	1	0.5	3	3	5	g/10min	ISO 1133
Density	1.13	1.14	1.16	1.2	1.23	1.26	g/cm3	ISO 1183
Mechical Properties								
Flexuralmodulus (23°C)	70	85	170	220	320	590	MPa	ISO 178
Tensile stress at break (23°C)	22	24	30	38	42	44	MPa	ISO 527
Elongation at break (23°C)	350	350	350	460	340	310	%	ISO 527
Charpy impact strength, (23°C)	No Break	No Break	No Break	No Break	No Break	19	KJ/m2	ISO 179
Charpy impact strength, (-30°C)	No Break	No Break	No Break	No Break	28	12	KJ/m2	ISO 179
Thermal Properties								
Melting temperature,	202	208	202	202	211	219	°C	ISO 11357
Vicat softening temperature,,10N	140	155	165	180	195	205	°C	ISO 306
Flammability,1.60 mm,	H.B	H.B	H.B	H.B	H.B	H.B	class	UL 94
Electrical Properties								
Volume Resistivity	5.00E+12	8.00E+12	2.00E+13	2.00E+13	3.00E+13	1.00E+14	Ohm*cm	IEC 60093
Surface Resistivity	3.00E+14	2.00E+14	1.00E+15	1.00E+15	1.00E+15	7.00E+15	ohm	IEC 60093
Dielectric Strength	19	19	19	20	21	22	KV/mm	IEC 60243-1
Other Properties								
Moisture, 24 hr	0.5	0.5	0.4	0.4	0.4	0.3	%	ISO 62
Mold Shrinkage	1.4	1.4	1.3	1.6	1.6	1.7	%	ISO 294
Similar grade to Hytrel		HTR8341C	HTR4275BK316		HTR8241		-	-
Similar grade to Arnitel	EB463	EB464		EM550-H	EM630-H	EM740-H	-	-

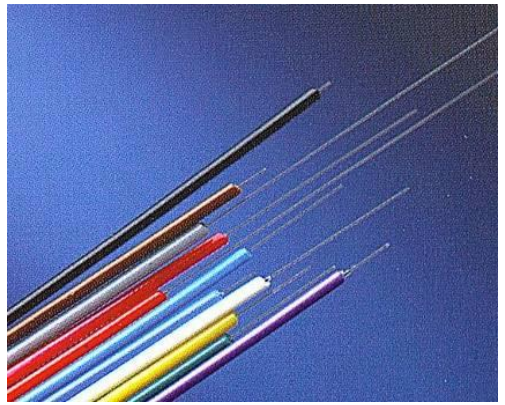
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TPEE Resin – H72DMG, Similar grade to Hytrel 7246

TPC-ET

Maker	Hetron Hetroflex	DuPont Hytrel
Grade	H72DMG	7246
Physical Properties		
Hardness	72	72
Melt index (230°C/2.16 kg)	11	11
Density	1.26	1.26
Mechical Properties		
Flexuralmodulus (23°C)	550	560
Tensile stress at break (23°C)	42	42
Elongation at break (23°C)	370	340
Charpy impact strength, (23°C)	15	15
Charpy impact strength, (-30°C)	9	9
Thermal Properties		
Melting temperature,	218	217
Vicat softening temperature,10N	205	206
Flammability,1.60 mm,	H.B	H.B
Other Properties		
Moisture, 24 hr	0.3	0..3
Mold Shrinkage	1.7	1.6





Extrusion

- tight tube for optical fiber
- Thin film electric wire
- Monofilament

Injection

- Automotive key cover box
- Injection parts

Medium viscosity for extrusion and injection

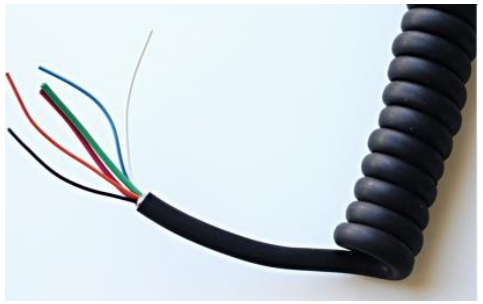
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TPEE Resin – H63DMG, Similar grade to Hytrel 6356

TPC-ET

Maker	Hetron Hetroflex	DuPont Hytrel
Grade	H63DMG	6356
Physical Properties		
Hardness	63	63
Melt index (230°C/2.16 kg)	9.7	10.2
Density	1.22	1.22
Mechical Properties		
Flexuralmodulus (23°C)	281	278
Tensile stress at break (23°C)	38.1	38
Elongation at break (23°C)	456	441
Charpy impact strength, (23°C)	No Break	No Break
Charpy impact strength, (-30°C)	partial Break	partial Break
Thermal Properties		
Melting temperature,	211	211
Vicat softening temperature,,10N	195	195
Flammability,1.60 mm,	H.B	H.B
Other Properties		
Moisture, 24 hr	0.3	0.3
Mold Shrinkage	1.6	1.6











Extrusion

- Thin film electric wire
- Monofilament

Injection

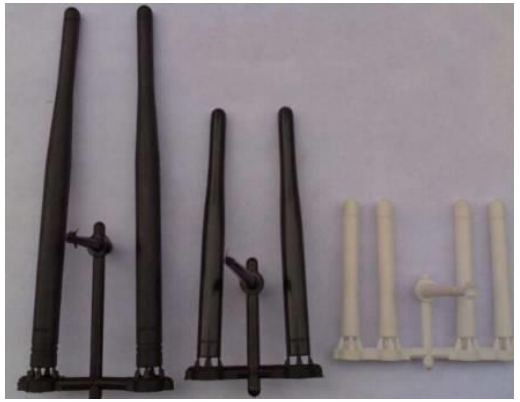
- Shock absorber
- ski boots belt
- Coupling
- Air springs, Durel

Medium viscosity for extrusion and injection

HETRON

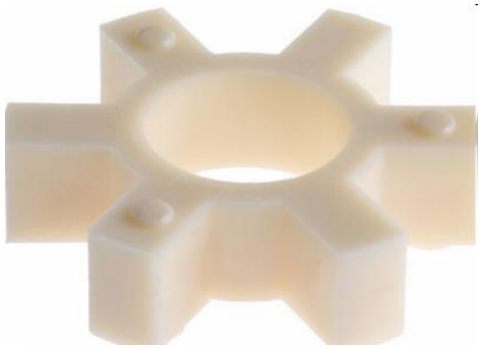
TPEE Resin – H63DLG, Similar grade to Arnitel EL630

Maker	Hetron Hetroflex	DSM Arnitel
Grade	H63DLG	EL630
Physical Properties		
Hardness	63	64
Melt index (230°C/2.16 kg)	21	28
Density	1.22	1.23
Mechical Properties		
Flexuralmodulus (23°C)	320	340
Tensile stress at break (23°C)	40	39
Elongation at break (23°C)	480	540
Charpy impact strength, (23°C)	No Break	No Break
Charpy impact strength, (-30°C)	18	12
Thermal Properties		
Melting temperature,	211	213
Vicat softening temperature,,10N	195	198
Flammability,1.60 mm,	H.B	H.B









Injection

- antenna
- Coupling
- Low noise Gears
- Many kinds of part
- glasses



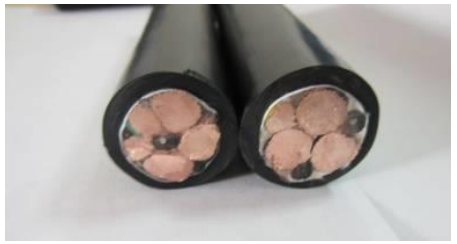
Low viscosity for injection

HETRON

TPEE Resin – H55DMG, Similar grade to Hytrel 5556

Maker	Hetron Hetroflex	DuPont Hytrel
Grade	H55DMG	5556
Physical Properties		
Hardness	55	55
Melt index (230°C/2.16 kg)	9.5	9.1
Density	1.19	1.19
Mechical Properties		
Flexuralmodulus (23°C)	192	187
Tensile stress at break (23°C)	35	33
Elongation at break (23°C)	530	550
Charpy impact strength, (23°C)	No Break	No Break
Charpy impact strength, (-30°C)	No Break	No Break
Thermal Properties		
Melting temperature,	202	203
Vicat softening temperature,,10N	180	180
Flammability,1.60 mm,	H.B	H.B
Other Properties		
Moisture, 24 hr	0.4	0.4
Mold Shrinkage	1.6	1.5





Extrusion

- electric wire cable jackets
- spring electric wire
- Tubing and hose

Injection

Medium viscosity for extrusion and injection

HETRON

TPEE Resin – H55DLG, Similar grade to Arnitel EL550 and Hytrel 5526

Maker	Hetron Hetroflex	DSM Arnitel	DuPont Hytrel
Grade	H55DLG	EL550	5526
Physical Properties			
Hardness	55	57	55
Melt index (230℃/2.16 kg)	21	31	19
Density	1.19	1.20	1.19
Mechical Properties			
Flexuralmodulus (23℃)	220	245	215
Tensile stress at break (23℃)	36	35	36
Elongation at break (23℃)	600	640	620
Charpy impact strength, (23℃)	No Break	No Break	No Break
Charpy impact strength, (-30℃)	No Break	No Break	No Break
Thermal Properties			
Melting temperature,	202	205	202
Vicat softening temperature,,10N	180	183	180
Flammability,1.60 mm	H.B	H.B	H.B









Injection

- antenna
- springs
- comb
- Eyelashes brush
- Many kinds of part

Compounding

- Engineering plastic
- Film modification

Low viscosity for injection

HETRON

TPEE Resin – H35DMG, Similar grade to Hytrel 4069
H35DLG, Similar grade to Arnitel EM400

Maker	Hetron Hetroflex	DuPont Hytrel	Hetron Hetroflex	DSM Arnitel
Grade	35DMG	4068	35DLG	EM400
Physical Properties				
Hardness	36	36	36	36
Melt index (230°C/2.16 kg)	11	11	32	32
Density	1.110	1.11	1.110	1.11
Mechical Properties				
Flexuralmodulus (23°C)	55	60	55	55
Tensile stress at break (23°C)	23	24	23	23
Elongation at break (23°C)	850	880	820	880
Charpy impact strength, (23°C)	No Break	No Break	No Break	No Break
Charpy impact strength, (-30°C)	No Break	No Break	No Break	No Break
Thermal Properties				
Melting temperature,	195	195	195	195
Vicat softening temperature,,10N	130	130	130	130
Flammability,1.60 mm	H.B	H.B	H.B	H.B

Extrusion

- Electric wire
- Cable jacket
- Hose jacket

Compounding

- Engineering plastic
- Film modification



HETRON

TPEE Resin – Railway pad

H45DLG , H40MG, H35DMG - injection

- Subway
- urban rail vehicle



HETRON

TPEE Resin - impact modifier

TPEE H90AMG- PBT, PC ,PVC etc… impact modifier
LM grade TPEE for PVC modify

formula	Test1	Test 2(TPEE)
PBT Resin	-	-
Impact modifier , Acrylic Ester-GMA	3	2
Impact modifier ,EBA	5	-
Impact modifier ,TPEE (H90AMG)	-	6
Tensile strength , MPa	47	48
Elongation at break , %	16.3	50.2
Flexural modulus , MPa	70	72
Impact strength, kJ/m2 , 23 ℃	9.1	9.4
Impact strength, kJ/m2 ,-40 ℃	5.6	7.1

TPEE show Better elongation and cold resistant

TPEE H90AMG with low melting point Only 160℃, can be compounded with PVC

HETRON

HetroFlexTPEE in Automobile





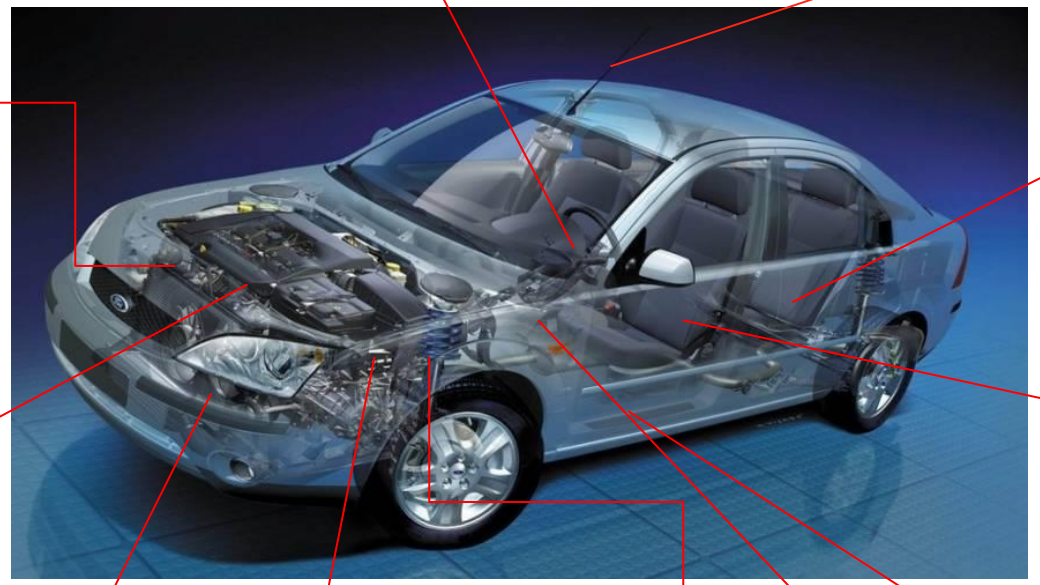
安全气囊盖板



天线户套



纤维面料





制动管路



进气管



车门锁/门栓



耐高温线材



波纹管



CVJ防尘套



排档杆套



档位器滑片



钥匙按扭

HETRON

TPEE Resin – SBCs compounding

Apply for TPE Compounder

LM grade TPEE

Properties/Grade	Unit	H25DMG	H28DMG	H28DFE	H33DLG	H35DLG	H90AMG
hardness Shore D	Scale D	25	28	28	33	36	36
hardness Shore A	Scale A	78	82	82	85	91	91
M.I (230°C/2.16 kg)	g/10min	16	16	35	22	32	16
Density	g/cm3	1.06	1.07	1.07	1.09	1.11	1.11
Flexural modulus	Mpa	20	30	30	40	55	55
Tensile strength	MPa	19	21	22	21	23	18
Elongation at break	%	960	940	840	860	850	750
Melting point	℃	165	172	172	185	195	160
Remark similar grade to			Hytrel 3078			Arnitel EM400	Low Tm

- 2K- Over molding to PC, PC/PBT, ABS , PMAA, PA
- wearable device

Increase resilience , Increase tear strength
Increase chemical strength
Increase heat resistant and better injection molding
Replace TPU in formula







HETRON

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04

New Development

- **HetroFlex H -LM series**
  (commerical available)
- **HetroFlex MV**
  (commerical available)
- **HetroFlex C**
  (commerical available on 2023Q3)

LM series grade Hetroflex TPEE

- **H97AMG**
- **H92AMG**
- **H91AMG**
- **H89AMG**
- **H88AMG**
- **H86AMG**
- **H75AMG**

HetroFlex

HetroFlex -LM series grade(1)

- PVC compounding
- SBCs compounding
- TPEE bonding as adhesion agents
- Physical foaming(N2 or CO2) process
- Low sharkage sheet or belt
- ABS or engineer plastics impact modifier
- Transparent properties modify



HetroFlex -LM series grade （2）

Properties	Unit	H97AMG	H92AMG	H91AMG	H89AMG	H88AMG	H86AMG	H75AMG
Shored A	A	97	92	91	89	88	86	75
Shored D	D	55	44	42	36	34	30	23
MI/230℃, 2.16KG	g/10min	15	17	15	17	17	17	17
Tensile strength	MPa	36	28	26	21	21	17	18
Tensile elongation	%	530	490	620	640	680	830	940
Tensile modulus	MPa	170	95	80	60	50	35	15
Flexual modulus	MPa	145	85	60	50	45	30	15
melting point(Tm)	℃	172	154	165	150	141	150	154
Density	g/cm3	1.23	1.19	1.15	1.15	1.15	1.11	1.07

similar to Hytrel 8997

similar to Hytrel 4056 or SK G140D/W

HetroFlex

MV series grade Hetroflex TPEE

HETRON TPEE

NEW MATERIAL(MV SERIES)

POLYESTERELASTOMER MEMBRANE

HetroFlex

Hetron

Polyester elastomer Breathable Membrane

Advantage

Polyester elastomer Membrane has excellent moisture permeability, waterproof ability, and durability

Polyester elastomer Membrane is an alternative fabric for outdoor products.

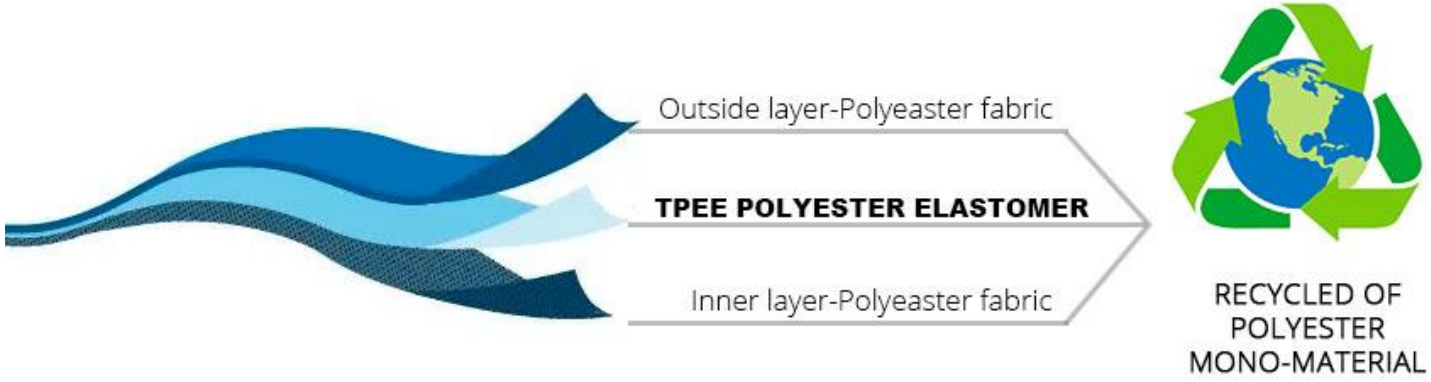


HETRON

Recycled of Polyester MONO-Material

MONO-material makes recycling possible and easier!

The use of TPEE film contributes to reducing environmental impact through its compatibility with polyester fabrics and ability to be integrated into the recycling system for streamlined recovery



HETRON

TPEE Breathable Membrane Application



Clothing



Outdoor Fabric



Construction Fabric



Home Textile

HETRON

Home Textile

The elasticity, durability, and ease of processing of TPEE make it one of the commonly used materials in home textile products.

TPEE finds wide-ranging applications in home textiles, such as bed sheets, bed skirts, waterproof mattress pads, outdoor curtains, cushions, tablecloths etc...









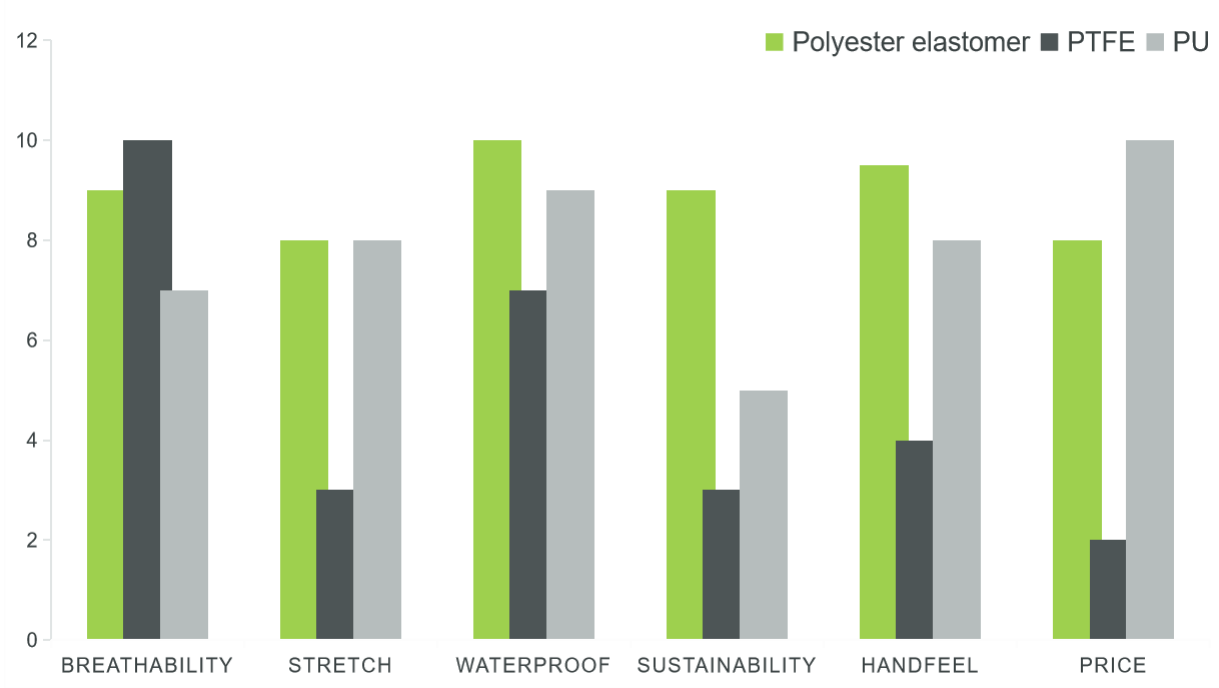
HETRON

Compare to PU&PTFE

Polyester elastomer is the optimal and most energy efficient choice that meets the future environmental trend

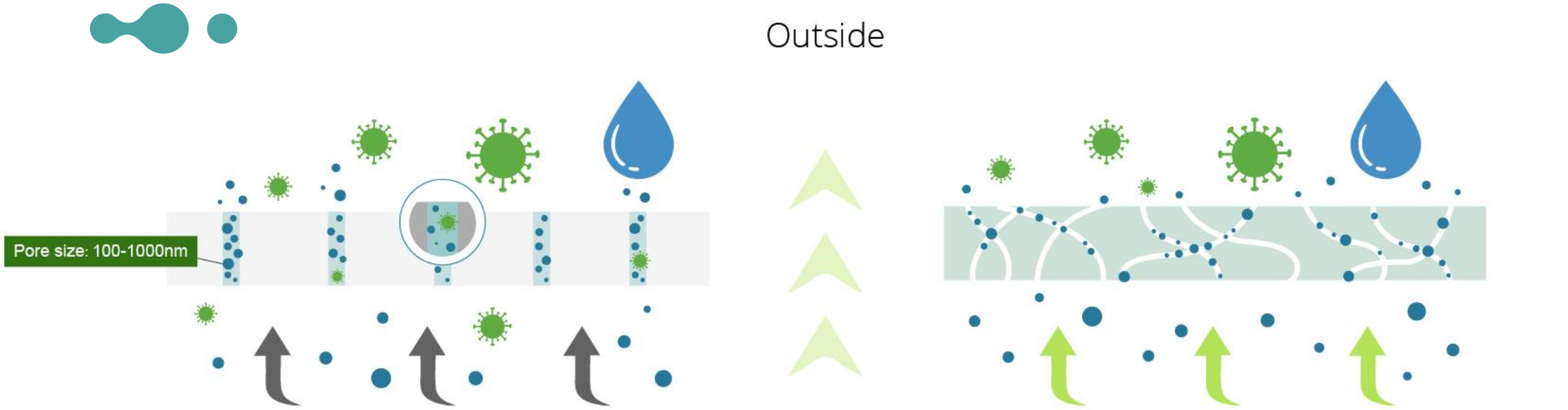
Polyester elastomer ’s advantage

- Highly breathable, High temperature resistance
- Flexible and strong
- 100% recyclable
- 100% waterproof performance under all circumstances
- Extrusion processing
- Does not rely on perforations to make garments breathable
- Eco-friendly
- Excellent skin touch feeling, non-stick



HETRON

TPEE Breathable Membrane Structure



PTFE Membrane
Porous membrane

TPEE Membrane
Non-Porous membrane

PTFE membranes have pore sizes ranging from 100-1000nm, allowing water vapor and bacteria to pass through without any antimicrobial properties.

TPEE film's non-porous nature prevents bacteria from passing through, providing innate antibacterial properties

HETRON

TPEE MV series properties

	Unit	Hetron MV410	Hetron MV380	Hetron MV250
Hardness(1S)	Shored D	43	39	27
Melting point	℃	186	185	173
Density	g/cm3	1.24	1.23	1.20
Tensile strength	MPa	33	29	18
Tensile elongation	%	820	890	1150
Tensile modulus	MPa	130	100	35
Flexual modulus	MPa	99	80	30
Tear strength	KN/mm	70	60	38
Water absorption Immersion	%	35	45	95

HETRON

TPEE Breathable Membrane Properties

TestI tem	Unit	MV410	MV380	MV250	Method
Water Vapor Transmission	g/m2.day	6,800	7,000	7,800	ASTM E96 BW 2000 Inverted Cup
		70,000	73,000	170,000	JIS L 1099 B1
Water-proof	mmH20	> 10,000	> 10,000	> 10,000	JISL1092B
Basicweight	g/m2t	19	19	19	ASTMD3776
Thickness	mm	0.015	0.015	0.015	ASTMD1777

C series grade Hetroflex TPEE

- **C63DG**

Polycarbonate Polyol as soft segement

HetroFlex

HetroFlex C series grade

Target to replacement current materials

HetroFlex C TPEE Replace FEP(Fluorinated Ethylene Propylene) or ETFE Insulated(SO 6722 class D) Wires

- 40% weight loss of FEP or ETFE
- Competitive and economic price to FEP or ETFE
- Total cost down more than 50% than FEP or ETFE
- Easier extrusion than FEP or ETFE
- Less screw corrosion than FEP or ETFE
- Easily overmoulded with polybutylene terephthalate (PBT) connectors.
- Environmentally friendly, Halogen Free Flame Retardant also available.



HetroFlex C TPEE Replace PA12 hose or tube

- Best heat aging properties in all TPEE , much higher heat aging resistant then PA11/12
- Excellent hydrolysis resistant properties
- Plasticizer free
- Excellent mechanical properties
- Very good resistance to greases, oils and chemical





HetroFlex C series grade

Maker	unit	Hetron	Arnitel	TOYOBO
Grade	unit	HetroFelx C63DG	CM622(TDS)	pelprene C2003 (TDS)
Melting index, 230*2.16KG	g/10min	8	9	6
Hardness Shored D(1S)	D	60	61	60
Tensile strength(TS) break	MPa	34	34	36
Tensile strength(TS), 5%	MPa	11	14	-
Tensile strength(TS), 10%	MPa	15	19	-
Tensile strength(TS), 50%	MPa	17	22	17
Tensile elongation(TE) at break	%	490	400	520
Tensile modulus	MPa	280	300	-
Flexual modulus	MPa	240	270	220
melting point(Tm)	C	208	208	207.0
Notched Charpy Impact Strength (23°C)	KJ/m2	N	N	N
Notched Charpy Impact Strength (-30°C)	KJ/m2	7	8	-
Density	g/cm3	1.26	1.27	1.25

05

Sustainable Materials development

- **HetroFlex Bio**
  (commerical available)
- **HetroFlex H-GRS grade**
  (commerical available at 2023 end of Q2)
- **HetroFlex from recycled PET(PCR) orPBT(PIR) (chemical Alcoholysis method)**
  (on the development)

Bio series grade Hetroflex TPEE

- **Bio 250MG**

Renewable

Oil supplies are reducing all the time. Plants can be grown again and again and that is why this product is sustainable

CO^2 footprint

With close analysis, the CO^2 footprint has been confirmed to be less than using petrochemicals



Waste biomass

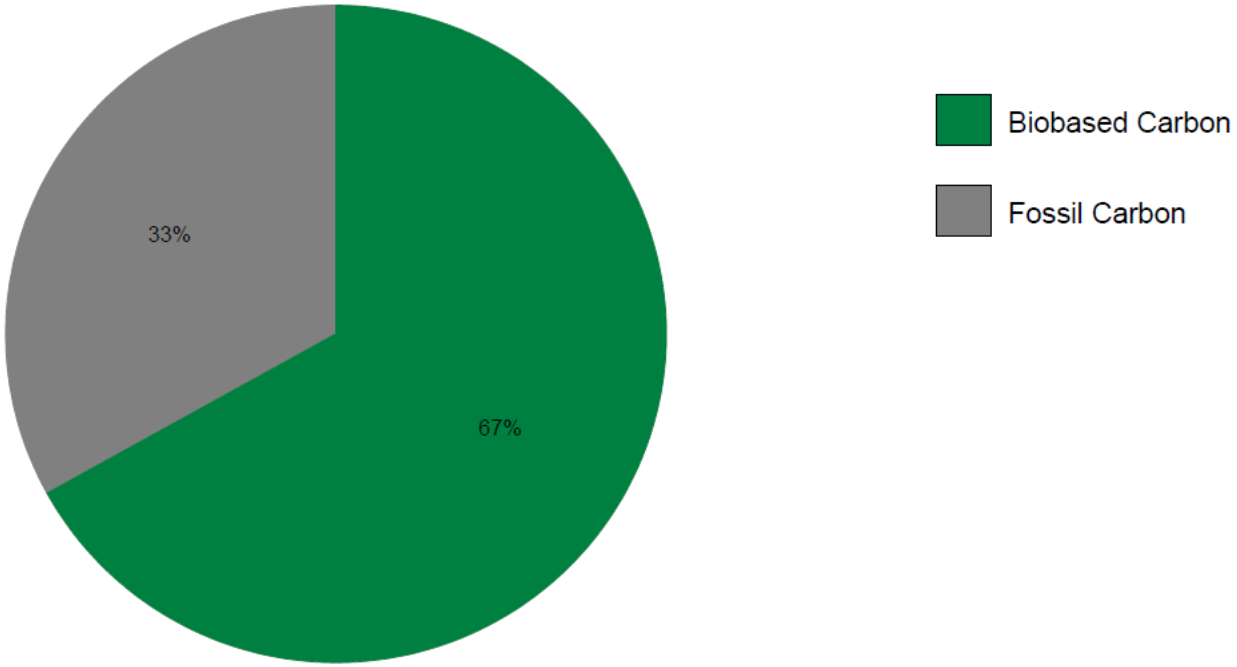
Food supplies are not jeopardised. Only the waste from the plant is utilised

Properties

Even though it is based on plant sourced chemicals, properties remian the same as standard

Bio mass Grade Hetroflex TPEE

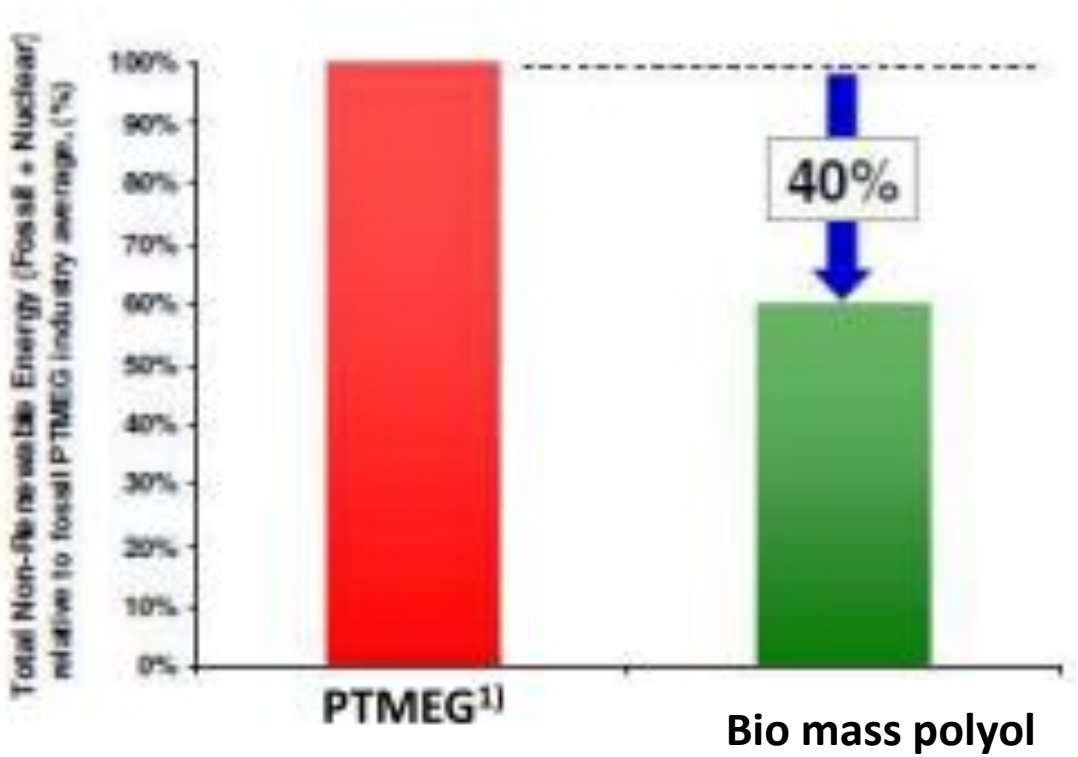
Laboratory Number	Beta-634373
Percent modern carbon (pMC)	67.22 +/- 0.2 pMC
Atmospheric adjustment factor (REF)	100.0; = pMC/1.000



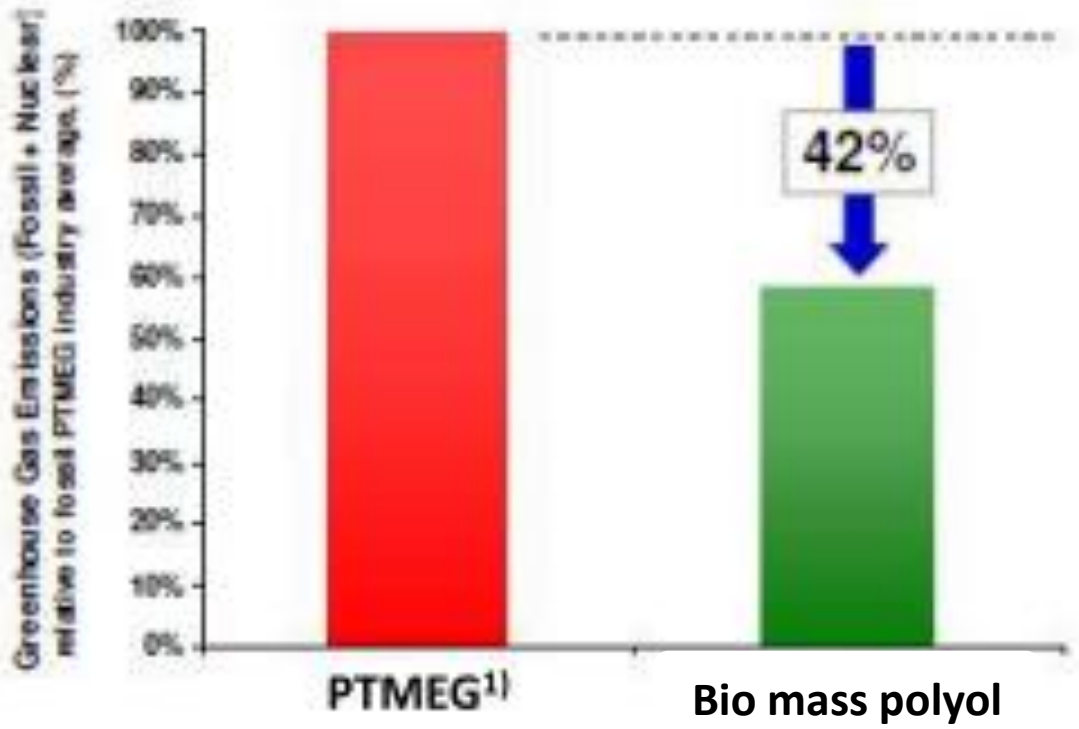
HetroFlex

Bio series grade Hetroflex TPEE

Greenhouse Gas Emissions



Fossil Energy



HetroFlex

Bio series grade Hetroflex TPEE

Properties/Grade	Unit	Bio250MG	H33DLG	H28DMG
Polyol type		Bio mass polyol	PTMEG from Chemical source	
bismass content	%	65	0	0
Shored A	A	82	86	82
Shored D	D	25	30	26
MI/230℃,2.16KG	g/10min	31	21	16
Tensile strength	MPa	21	21	19
Tensile elongation	%	1120	880	880
Tensile modulus	MPa	25	35	25
Flexual modulus	MPa	19	30	20
melting point(Tm)	℃	181	185	173
Density	g/cm3	1.115	1.09	1.07

GRS series grade Hetroflex TPEE

- **R28DMH**
- **R90AMG**

- **PIR**
- **physical melting recycling**

HetroFlex

Post-Industrial Recycled

60MT/yr **R28DMG**

20MT/yr **R90AMG**

20MT/yr **R89AMG**

Post-Industrial recycled materials





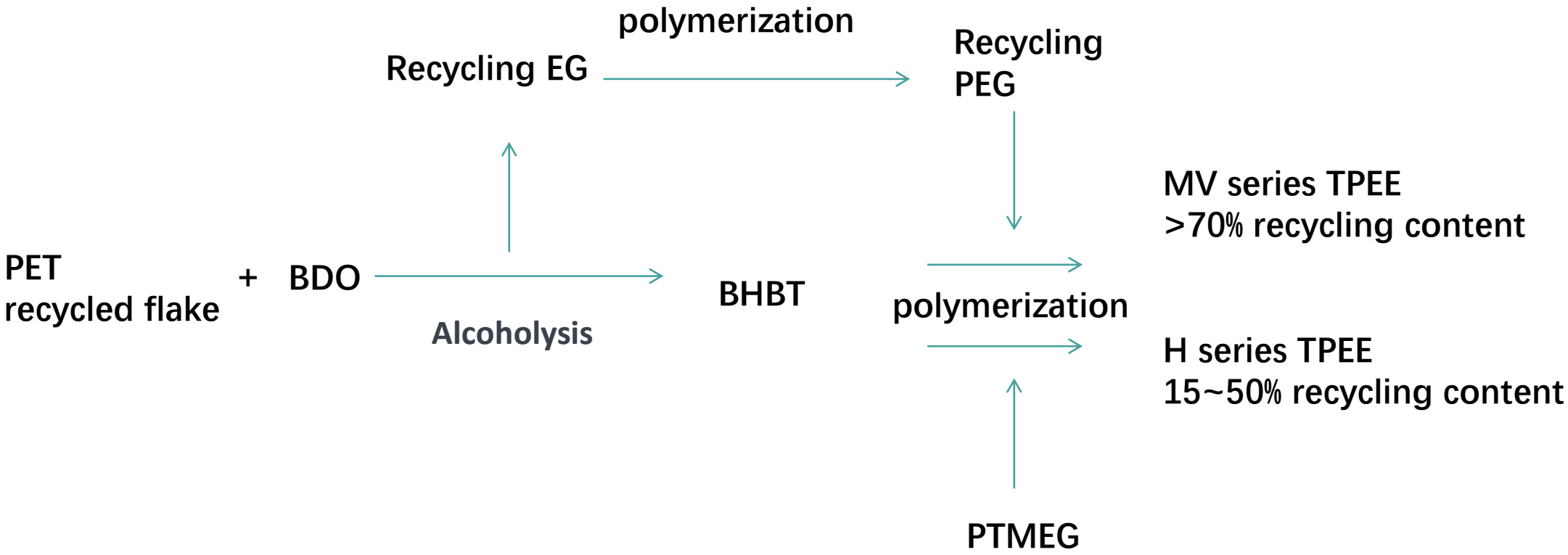


extrusion

filter

pelletizing

Chemical Recycled(PCR)



(on the development)

HETRON 和创

06

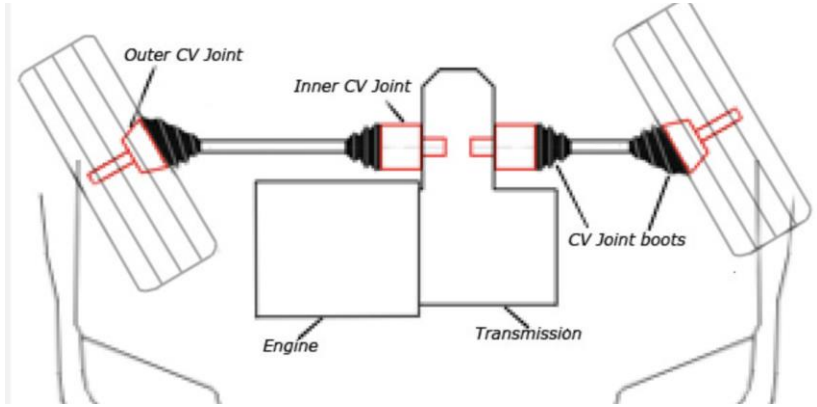
HetroFlex TPEE for CVJ Boots

TPEE compounding Grade –Blow molding















CVJ boots and Bellows

HETRON

HetroFlex TPEE for CVJ Boots

- HetroFlex have good experience in blow molding proces

- Currently shipment
  - CVJ Boots: 300mt/year (after market)
  - Bellows: Currently 600mt (Hyundai Kia, SMG, Gelly, Great wall, Tesla)

- CVJ Boots for new OEM maker: 4 approaching case (CN*1, EU*1, JP*2)

- Competitive price and Stable local supplement in Asia-Pacifica

TPEE compounding Grade –Blow molding

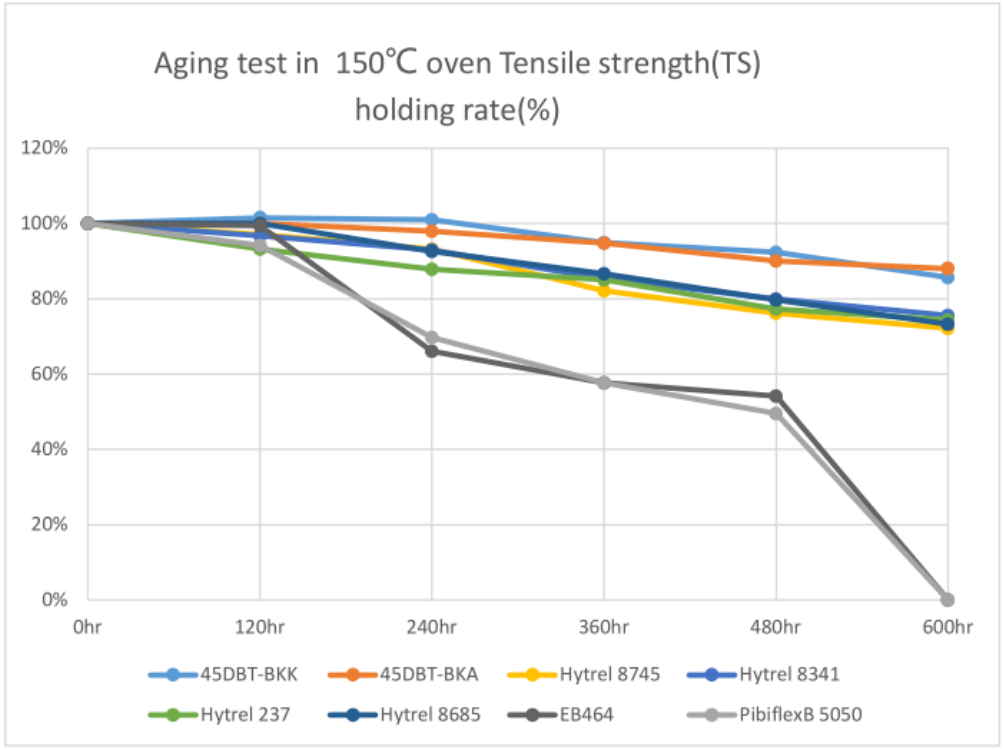
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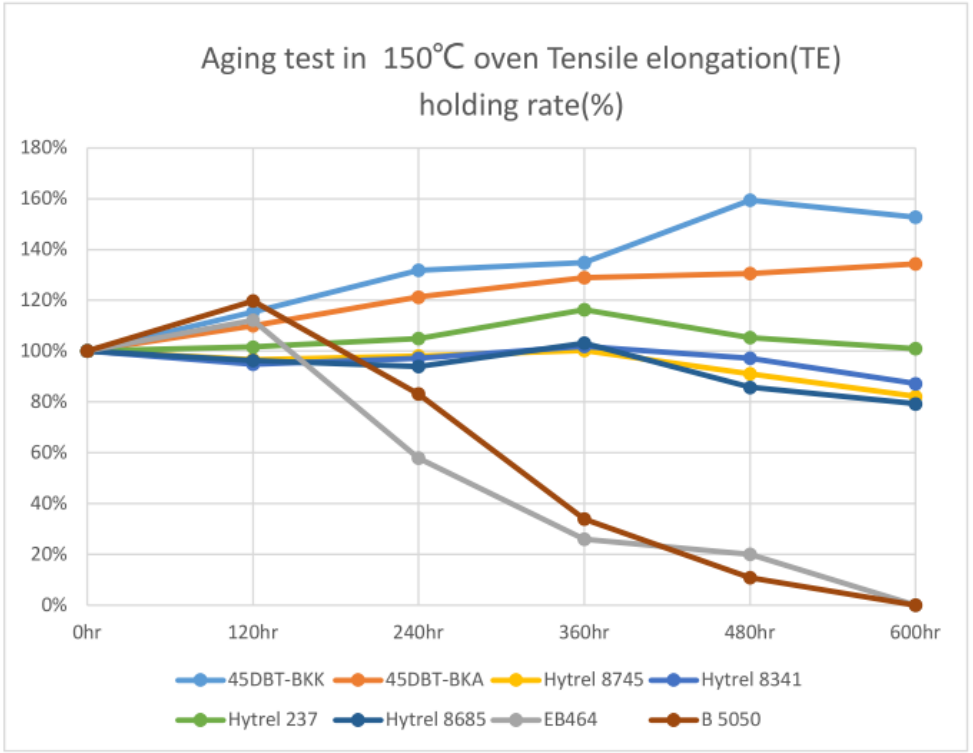
CVJ boots series grade Hetroflex TPEE

Maker	unit	Hetron		DuPont				DSM	celanese
NAME	unit	45DBT-BKK	45DBT-BKA	Hytrel 8745	Hytrel 8341	Hytrel 237	Hytrel 8685	EB464	PibiflexB 5050
Melting index, 230*2.16KG	g/10min	0.8	0.7	0.7	0.9	0.6	0.6	0.3	1.6
Melting index, 230*10KG	g/10min	10.6	9.2	8.4	11.1	6.3	7.4	3.9	14.1
hardness	Shored D	39	41	42	38	41	41	36	45
Tensile strength(TS) break	MPa	21	21	25	19	21	20	17	21
Tensile strength(TS), 5%		3.6	4	4	3.2	4	3.5	3.2	3.9
Tensile strength(TS), 10%		5.6	6	6.6	5.1	6.3	6.1	5.1	6
Tensile strength(TS), 50%		9.5	10.2	11.2	8.7	10.4	10.5	8.8	9.6
Tensile elongation(TE) at break	%	330	320	412	367	301	352	295	350
Tensile modulus	MPa	75	85	95	75	80	85	90	90
Flexual modulus	MPa	65	75	85	60	65	75	57	66
melting point(Tm)	℃	204	203	199	207	200	205	205	203
Density	g/cm3	1.138	1.138	1.139	1.132	1.145	1.148	1.139	1.141
Aging test in 150℃ oven Tensile strength(TS) holding rate(%)		45DBT-BKK	45DBT-BKA	Hytrel 8745	Hytrel 8341	Hytrel 237	Hytrel 8685	EB464	PibiflexB 5050
	0hr	100%	100%	100%	100%	100%	100%	100%	100%
	120hr	101.5%	100.0%	97.1%	96.7%	93.2%	100.0%	99.4%	94.2%
	240hr	101.0%	97.9%	93.2%	92.9%	87.9%	92.6%	66.1%	69.7%
	360hr	94.9%	94.8%	82.1%	85.3%	85.0%	86.6%	57.7%	57.7%
	480hr	92.3%	90.1%	76.1%	79.9%	77.3%	79.7%	54.2%	49.5%
	600hr	85.7%	88.0%	72.2%	75.5%	74.4%	73.3%	broken	broken
Aging test in 150℃ oven Tensile elongation(TE) holding rate(%)		45DBT-BKK	45DBT-BKA	Hytrel 8745	Hytrel 8341	Hytrel 237	Hytrel 8685	EB464	B 5050
	0hr	100%	100%	100%	100%	100%	100%	100%	100%
	120hr	115.5%	110.0%	96.7%	94.8%	101.7%	96.3%	112.2%	119.7%
	240hr	131.8%	121.3%	98.2%	97.3%	105.0%	94.0%	58.0%	83.1%
	360hr	134.8%	128.9%	100.3%	101.9%	116.3%	103.1%	26.1%	34.0%
	480hr	159.4%	130.6%	91.1%	97.3%	105.3%	85.8%	20.0%	10.9%
	600hr	152.7%	134.4%	82.2%	87.2%	101.0%	79.3%	broken	broken
Holding rate, 5w-40 oil test 120℃X72h	TS(%)	100.5%	103.1%	92.3%	91.8%	96.1%	101.5%	107%	99%
	TE(%)	106.4%	115.5%	91.4%	91.3%	100.7%	96.0%	106%	100%
Holding rate, IRM901 oil test 120℃X72h	TS(%)	96.4%	99.0%	90.2%	90.8%	97.1%	97.5%	108%	102%
	TE(%)	102.4%	101.0%	89.3%	88.0%	98.3%	93.5%	103%	98%
holding rate, solvent test antifreeze 120℃X72h	TS(%)	94.4%	91.1%	92.0%	91.3%	90.3%	93.1%	102%	101%
	TE(%)	114.8%	134.0%	95.8%	96.2%	113.3%	107.7%	106%	104%

TPEE compounding Grade –Blow molding

Hetroflex TPEE Aging test at 150℃





HETRON

Thank You!