ECOTRAN®
POLYPHENYLENE SULFIDE

Ecotran® Introduction _Base resin (unfilled)

HDC POLYALL

[Ecotran® Base resin grade portfolio]

▪ Ecotran® Unfilled grade

Property	Test Method	Injection molding				Fiber / Filament	
		N060	N200	J200	T066	F237	F374
Specific Gravity	ISO 1183	1.35	1.35	1.35	1.35	1.35	1.35
Melt Viscosity (Poise)	300℃,1/sec	700±200	2000±300	1200±300	1200±200	1750±250	5800±500
Melt Flow Index (g/10min)	316℃, 5kg	600~1000	300~400	450~650	350~550	150~250	70~110
Melt Temperature (℃)	ISO 3146C	280±3	280±3	280±3	280±3	280±3	280±3

* The information provided in this data sheet is based on HDC POLYALL knowledge and test method.
* Technical data except above properties can be offered to the customers upon the requests.

✓ **ECOTRAN® base resin grades are mainly sorted by their MV value (100~2,500 poise)**

[Injection molding grade]

▪ Injection molding grade Introduction

Grade	Description	Major Application	Recommendation
N010[1)]	MV 100	High Filler Grade Compounding	GF + MF 65%
N060[2)]	MV 600	High Filler Grade Compounding	GF + MF 65%
N200[2)]	MV 2,000	GF 40% Grade Compounding	GF 40% ~ 50%
N230	MV 2,300	High Viscosity Monofilament	
J200[2)]	MV 1,200	GF 40%, HF grade Compounding	GF40%, MF65%

1) N010 is mainly used for internal mixing purposes (Flowability).
2) N060/N200 and J200 grade : Major commercialized product

✓ **ECOTRAN® base resin grades are mainly used for general compounding grade (GF40, GFM65)**

[Injection molding grade]

▪ Compound property (references)

Type	Test Method	N200 + GF40	N200 + GF40 (coupling agent)	J200 + GF40	T grade + GF40
Tensile Strength (MPa)	ISO 527-1, -2	165~180	190~200	190~200	190 ~ 195
Tensile Elongation (%)	ISO 527-1, -2	1.30~1.45	1.55~1.65	1.55~1.65	1.8 ~1.9
Flexural Strength (MPa)	ISO 178	250~265	270~280	265~270	270 ~ 280
Charpy Impact Notched (KJ/㎡)	ISO 179/1eU	8.5~9.0	9.0~9.5	9.0~9.5	9.5 ~ 10
Charpy Impact Un-notched (KJ/㎡)	ISO 179	39~41	41~45	41~45	50 ~ 55
Weld Strength (MPa)	-	40~50	45~50	45~50	55 ~ 60
Spiral Test (1t)	-	15~16	12.0	12.0	12 ~ 13

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[Fiber / Filament grade]

▪ Grade Introduction

Grade	Fiber Strength	MV (poise, 300℃)	Application	Remarks
F374X	> 5.0 g/d	5,300~6,000	Monofilament	Producing @ twin-screw extruder
F234X	> 5.0 g/d	2,700~3,300	1.0~1.5de' strand S/F	
F237X	> 4.8 g/d	1,500~2,000	1.5~2.0de' strand S/F	

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▪ Fiber property of Ecotran®

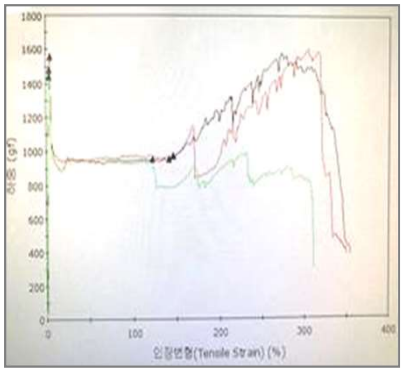
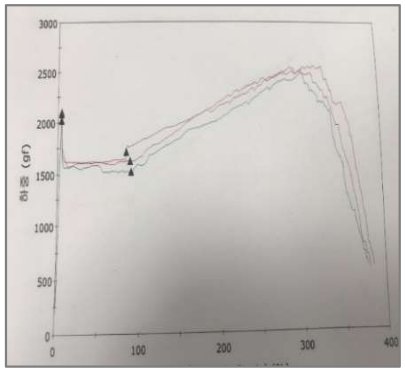
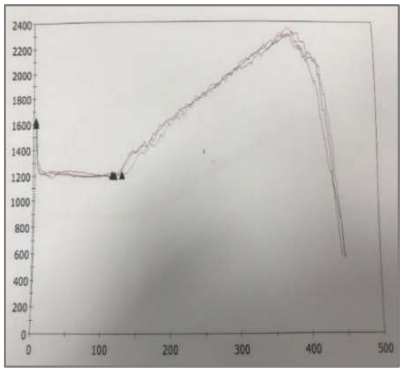
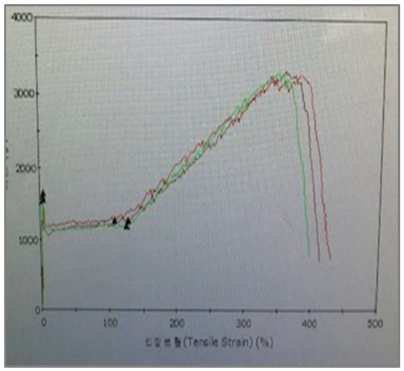
Application	Staple Fiber for Bag Filter	Market
Fiber thickness(de')	2.5(general grade) ~ 1.2(special grade)	H Company (Commercialized) H, J, U company (Under development)
Fiber strength (g/de')	4.2 ~5.3	

[Fiber / Filament grade]

▪ Undrawn yarn behavior (Quality Improvement)

✓ **Mechanical properties of ECOTRAN® is proved in fiber application.**

- Elongation and strength of fiber(undrawn yarn) has been improved since Year 2017.
- New Grade has been commercialized to the market since late 2018 year.

Sort	ECOTRAN			New Grade
	1st year (2017)	2nd year	3rd year	Since late 2018y
Strength	0.55 g/d	0.65 g/d	0.67 g/d	0.75 g/d
Elongation	100~280%	320 %	320~350 %	350 %
Stress Strain curve				

[Fiber / Filament grade]

▪ Value Proposition

✓ **Ecotran® Fiber grade can increase productivity of PPS Fiber makers.**

- Less yarn breakage during spinning, long pack life, and smooth yarn surface due to low Impurities of Ecotran®

	Conventional PPS	**Ecotran® Fiber Grade**	Remarks
Yarn Breakage	6~8 times / hr	**3~4 times / hr**	50% less than using competitors
Pack Life time	1.5day	**3 days**	2 times longer life time
Screw Load %	47 ~ 64	**45 ~ 46**	Stable
Production Qty` (Ton / Month)	A ton	**A + 40% or more up**	-

< Ash Test Results (after 800℃ heating) >

Conventional PPS
(Remains 0.3wt%)

Ecotran®

<Yarn Surface >

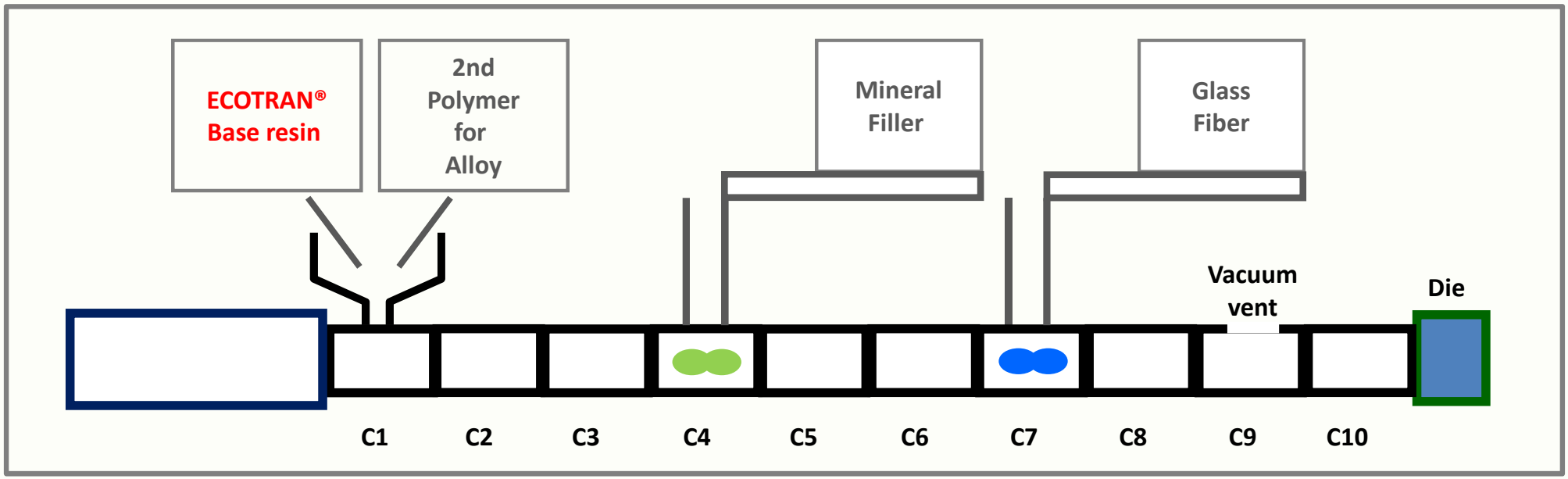
Conventional PPS

Ecotran®

[Processing guide _ Extrusion]

- Extrusion process condition

< Schematic of Typical twin screw extruder >



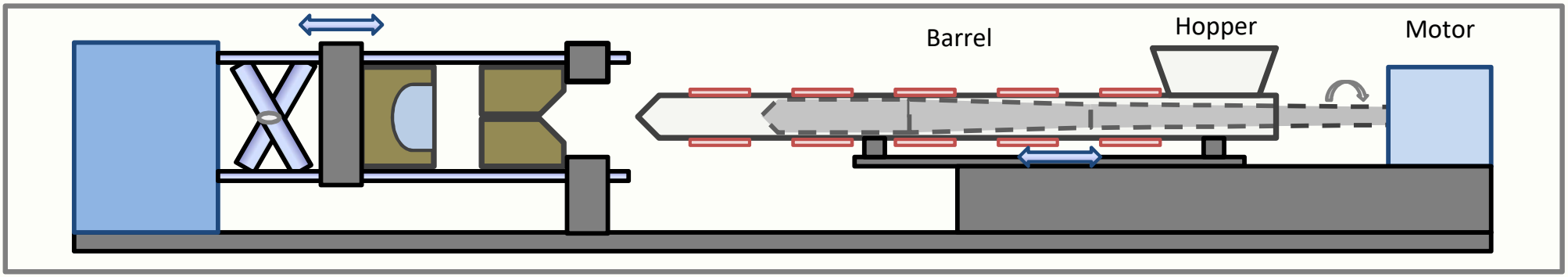
< Twin screw extrusion temperature profile for ECOTRAN® Compound >

ITEM	Unit	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	Die
PPS/GF	℃	275~330										300~330
PPS/GF/MF		280~330										300~330
Elastomer alloy		260~310										275~300

[Processing guide _ Injection molding]

- Injection molding process condition

< Schematic of Typical injection molding machine >

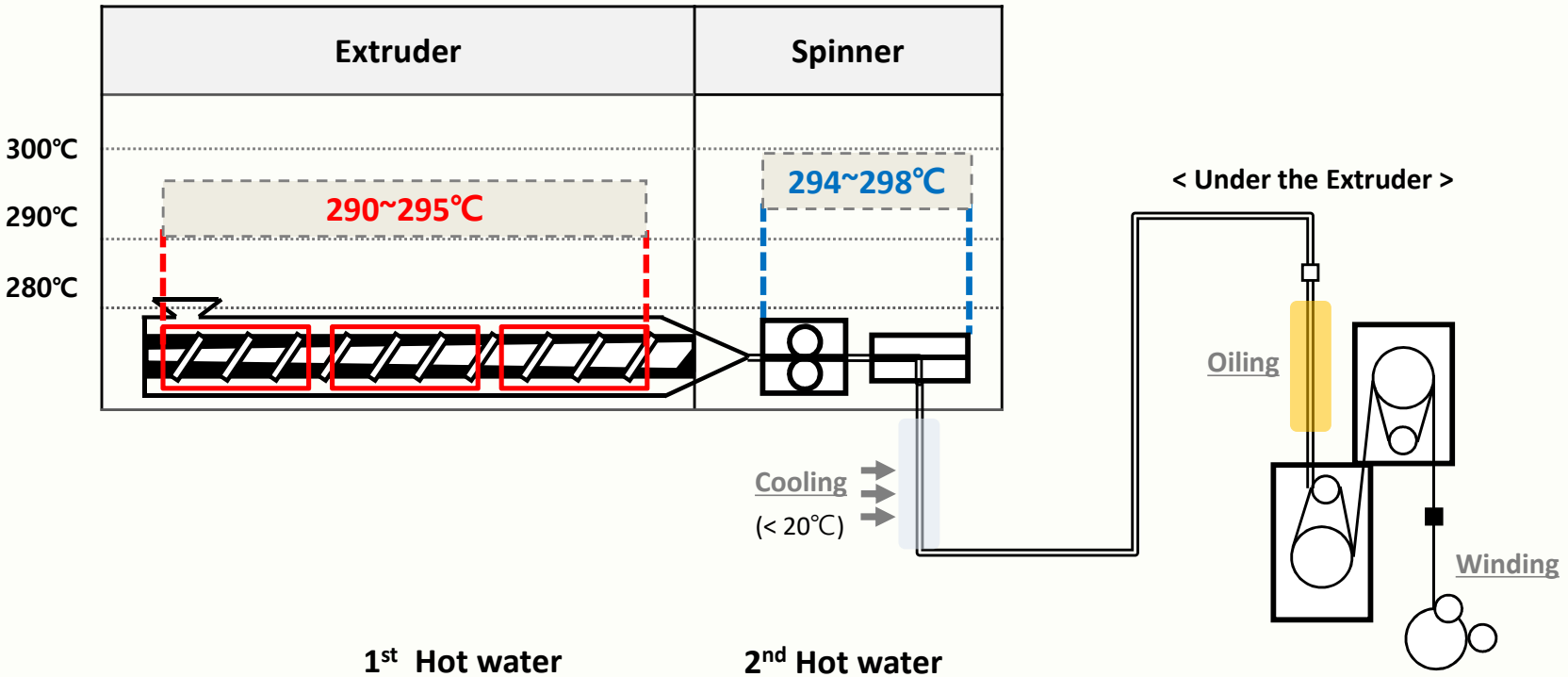


< Standard injection molding temperature profile for ECOTRAN® Compound >

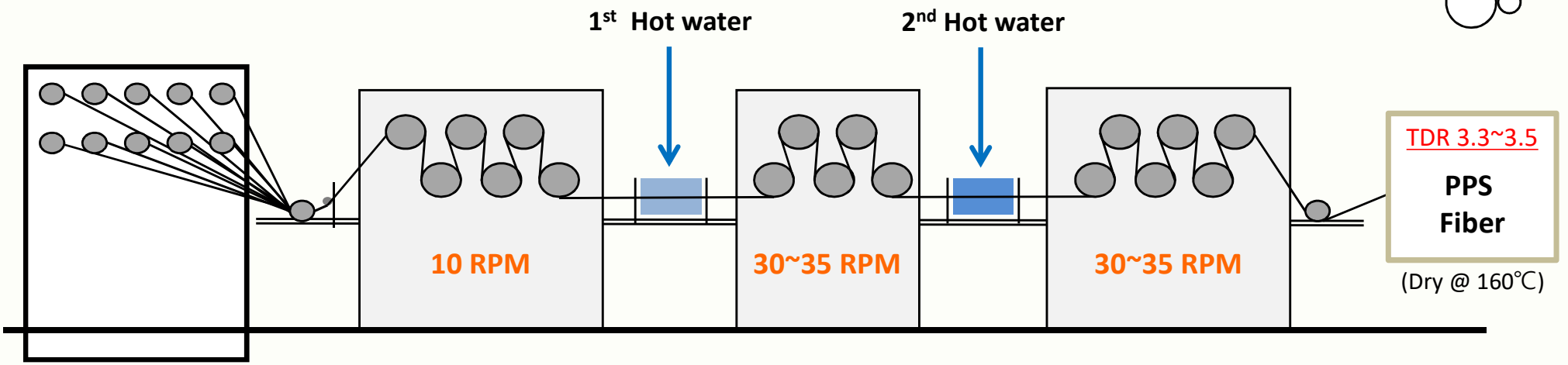
	Temperature (℃)				Injection Velocity (mm/s)	Holding Pressure (Bar)	Cooling Time (Sec)	Holding Pressure (Sec)	Remarks
	Mold	Nozzle	Middle	Front					
GF 40%	130~150	310~330	295~310	290~295	60~80	60→20	12~20	7~12	Injection Pressure (80~90) Max : 160bar
GFM 65%	130~150	310~330	295~310	290~295	60~80	60→20	12~20	7~12	
El. Alloy (unfilled)	80~120	305~320	290~305	280~290	30~60	50→20	15~25	7~15	
El. Alloy (GF30%)	130~150	305~320	290~305	280~290	50~70	50→20	15~25	7~15	

[Processing guide _ Fiber]

- Spinning Process



- Drawing Process



[Processing guide _ Monofilament]

▪ Extrusion & Drawing

• Recommended specification

- Extrusion Temp; below 300℃
- die hole size; 1.0~1.5ϕ
- Draw ratio: x4.0~4.5(90% @ 1st step)