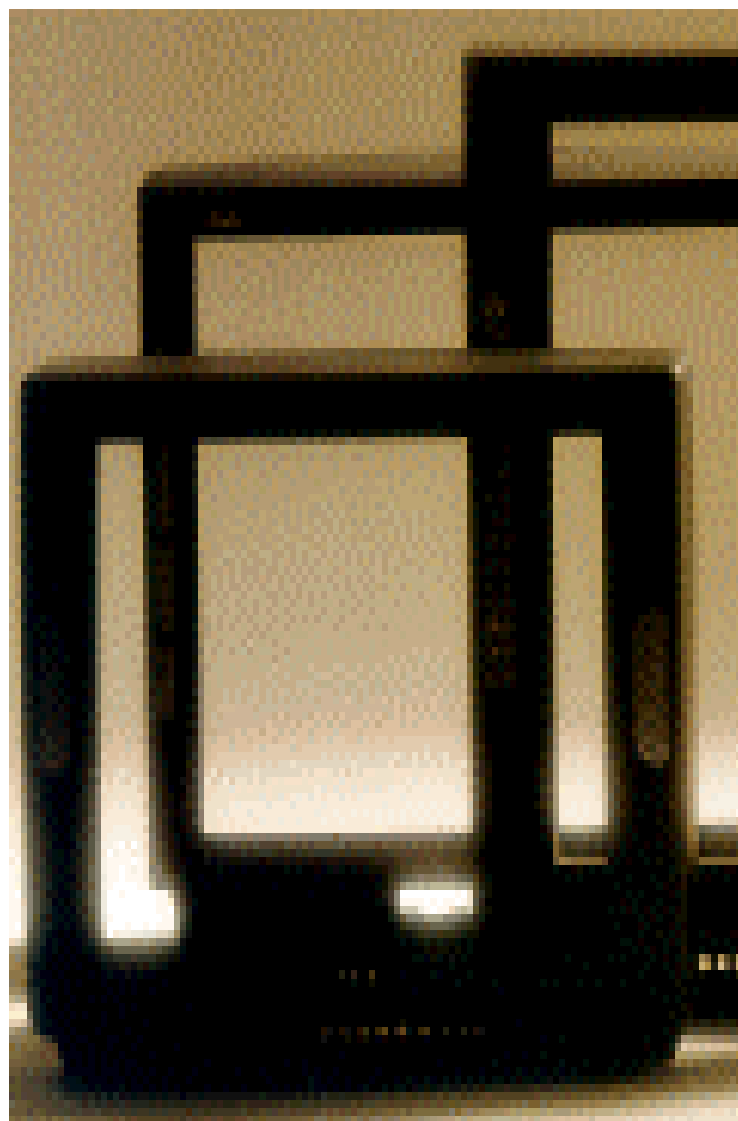




# Application Guide



SAMSUNG

***Flame Retardant  
HIPS***

# STAREX FR-HIPS



## Characteristics

### Variety of grades

The VE-, VL-, VH-series and the NH-series feature various grades that can satisfy various customers' requirements. The typical applications are large TV-housing, VCR-housing, printer housing, etc.

### Good Processability

Higher levels of productivity can be achieved with the good processability of Starex flame retardant HIPS.

## High Quality Control

Since Starex F.R.HIPS is produced at our very modern facilities, high level of quality is guaranteed.

## Well Balanced Properties

The properties of Starex F.R.HIPS are well balanced to satisfy the various design of the products.

## Classification of Starex FR-HIPS

PBDE		Non-PBDE (Non-DECA)			Non-halogen
<b>VH-1800 +</b> <b>VH-1806 +</b>	<b>VH-1820 +</b>	<b>VE-1872 +</b> <b>VE-1877 +</b>	<b>VE-1850 +</b> <b>VE-1870 +</b>	<b>VL-1823 +</b> <b>VH-1821 +</b>	<b>NH-1830 +</b>
<ul style="list-style-type: none"> <li>-Application to TV housing.</li> <li>-Well balanced Physical Properties</li> <li>-Easy Pcessability</li> <li>-Excellent Thermal Stability</li> <li>-UL V-0 Class Rating</li> <li>-VH--1806NS is Candidate for Paintless Housing</li> </ul>	<ul style="list-style-type: none"> <li>-Application to VTR, Copy M/C</li> <li>-High Modulus</li> <li>-Easy Processability</li> <li>-Excellent Thermal Stability</li> <li>-UL V-2 Class Rating</li> </ul>	<ul style="list-style-type: none"> <li>-Application to TV housing.</li> <li>-high Flow</li> <li>-UL V-0 Class Rating</li> <li>-VE-1872+ 1/10" V-0</li> <li>-VE-1877+ 1/16" V-0</li> </ul>	<ul style="list-style-type: none"> <li>-Application to OA M/C housing White TV(13")</li> <li>-Good UV Stability</li> <li>-VE-1850 UL 5V ClassRating</li> <li>-VE-1870 UL V-0 Class Rating</li> </ul>	<ul style="list-style-type: none"> <li>-Application to VCR, CopyM/C Audio</li> <li>-Low Density</li> <li>-UL V-2 Class Rating</li> <li>-Good UV Stability</li> </ul>	<ul style="list-style-type: none"> <li>-Application to TV</li> <li>-IEC 65 Rating</li> <li>-Easy Processability</li> <li>-For EU Market</li> </ul>

## Typical Processing Condition of Starex FR-HIPS

Items	Conditions
Drying Temperature	70 ~ 80 deg.C
Drying Time	More than 2 Hours
Processing Temperature	Max 240deg.C (180~270 for NH-series)
Mold Temperature	40 deg.C ~ 65 deg.C
Charging Speed(RPM)	60 ~ 90
Injection Pressure	700~1300 kgf/cm <sup>2</sup>
Back Pressure	10~15 kgf/cm <sup>2</sup>

## Properties of Starex FR-HIPS for C-TV

Item	Unit	Method ASTM	VH-1800 S	VH-1800 T	VH-1800EX	VH-1806NS
TS	kgf/cm <sup>2</sup>	D-638	240	260	240	240
TE	%	D-638	80	80	80	80
FS	kgf/cm <sup>2</sup>	D-790	300	350	340	340
FM	kgf/cm <sup>2</sup>	D-790	20,000	23,000	22,000	22,000
IZOD	1/8" kgf·cm/cm	D-256	10	14	11	11
VST	°C	D-1525	83	84	83	84
MFR	g/10 min.	D-1238	6.0	11.0	10.0	13.0
RHD	-	D-785	90	95	95	95
Density	-	D-792	1.15	1.15	1.15	1.15
Flammability	thickness	UL-94 IEC60065	V-0 (1/16") FV-0 (1/16")	V-0 (1/16")	V-0 (1/16")	V-0 (1/16")
Characteristics			Good Flow	High Flow, High Impact	High Flow, Excellent Appearance	High Flow, Excellent Appearance

## Properties of Starex FR-HIPS for C-TV

Item	Unit	Method ASTM	VE-1872 M	VE-1877	NH-1830	NH-1831	
TS	kgf/cm <sup>2</sup>	D-638	280	280	240	250	
TE	%	D-638	80	80	80	80	
FS	kgf/cm <sup>2</sup>	D-790	380	380	330	330	
FM	kgf/cm <sup>2</sup>	D-790	27,000	27,000	21,000	22,000	
IZOD	1/8"	kgf.cm/cm	D-256	9	9	10	11
VST	°C	D-1525	80	80	80	80	
MFR	g/10 min.	D-1238	15.0	15.0	12.0	16.0	
RHD	-	D-785	97	97	98	104	
Density	-	D-792	1.16	1.16	1.04	1.04	
Flammability	thickness	UL-94	V-0 (1/10")	V-0 (1/16")	BS415(1.9mm)	BS415(1.9mm)	
Characteristics			High Flow, Excellent Appearance, Non-PBDE	High Flow, Excellent Appearance, Non-PBDE	Non-Halogen, Low Density	Non-Halogen, Low Density, High Flow	

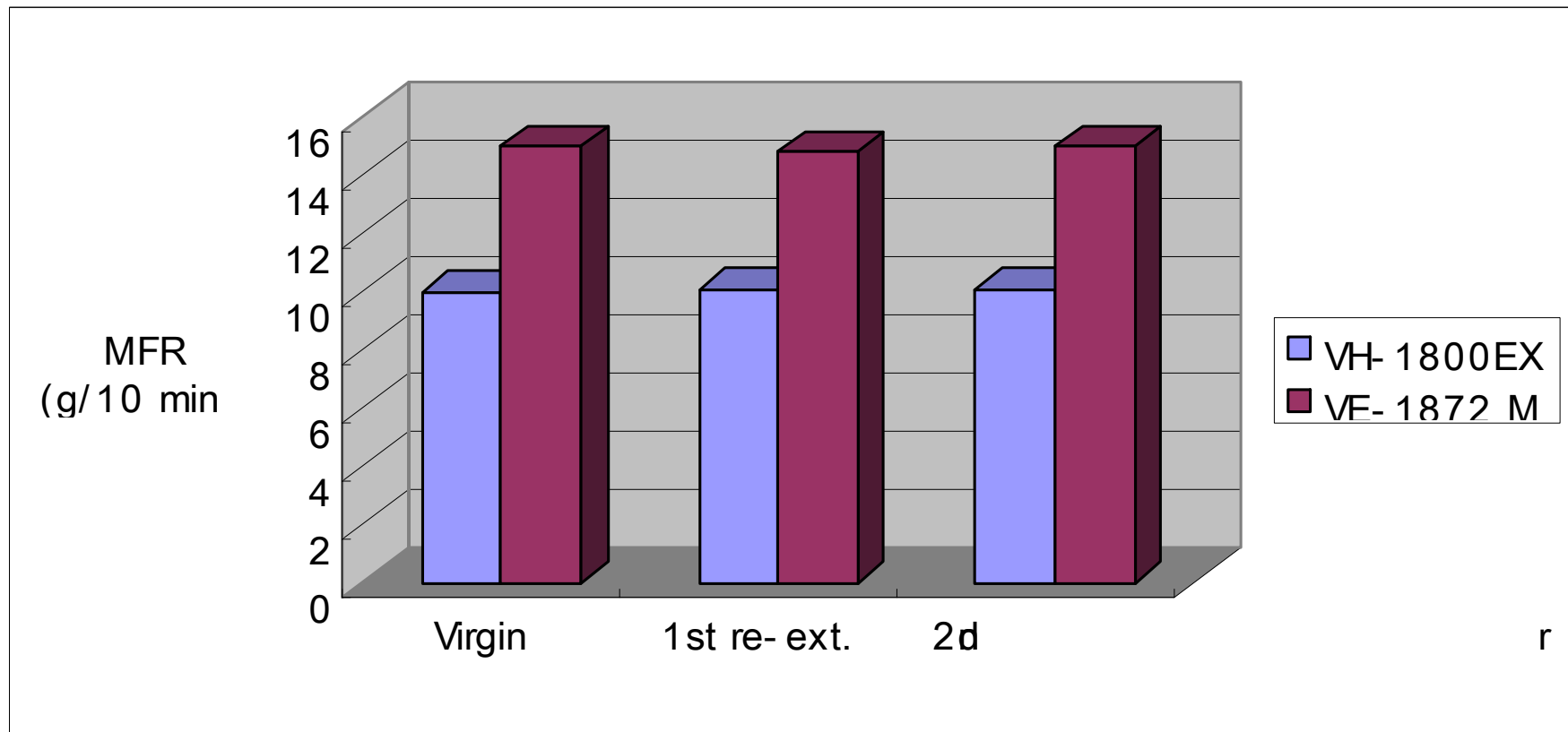
## Properties of Starex FR-HIPS for VCR

Item	Unit	Method ASTM	VH-1820 J	VH-1821 P	VL-1823	
TS	kgf/cm <sup>2</sup>	D-638	300	260	260	
TE	%	D-638	57	60	80	
FS	kgf/cm <sup>2</sup>	D-790	450	400	380	
FM	kgf/cm <sup>2</sup>	D-790	28,500	23,000	24,000	
IZOD	1/8"	kgf.cm/cm	D-256	9	12	11
VST	°C	D-1525	88	89	84	
MFR	g/10 min.	D-1238	7.0	6.0	11.0	
RHD	-	D-785	110	100	95	
Density	-	D-792	1.13	1.07	1.07	
Flammability	thickness	UL-94	V-2	V-2	V-2	
Characteristics			High VST, High TS PBDE	Low Density, Non PBDE, High VST, High Impact	Low Density, Non PBDE, Good Thermal Stability, Good UV Stability	

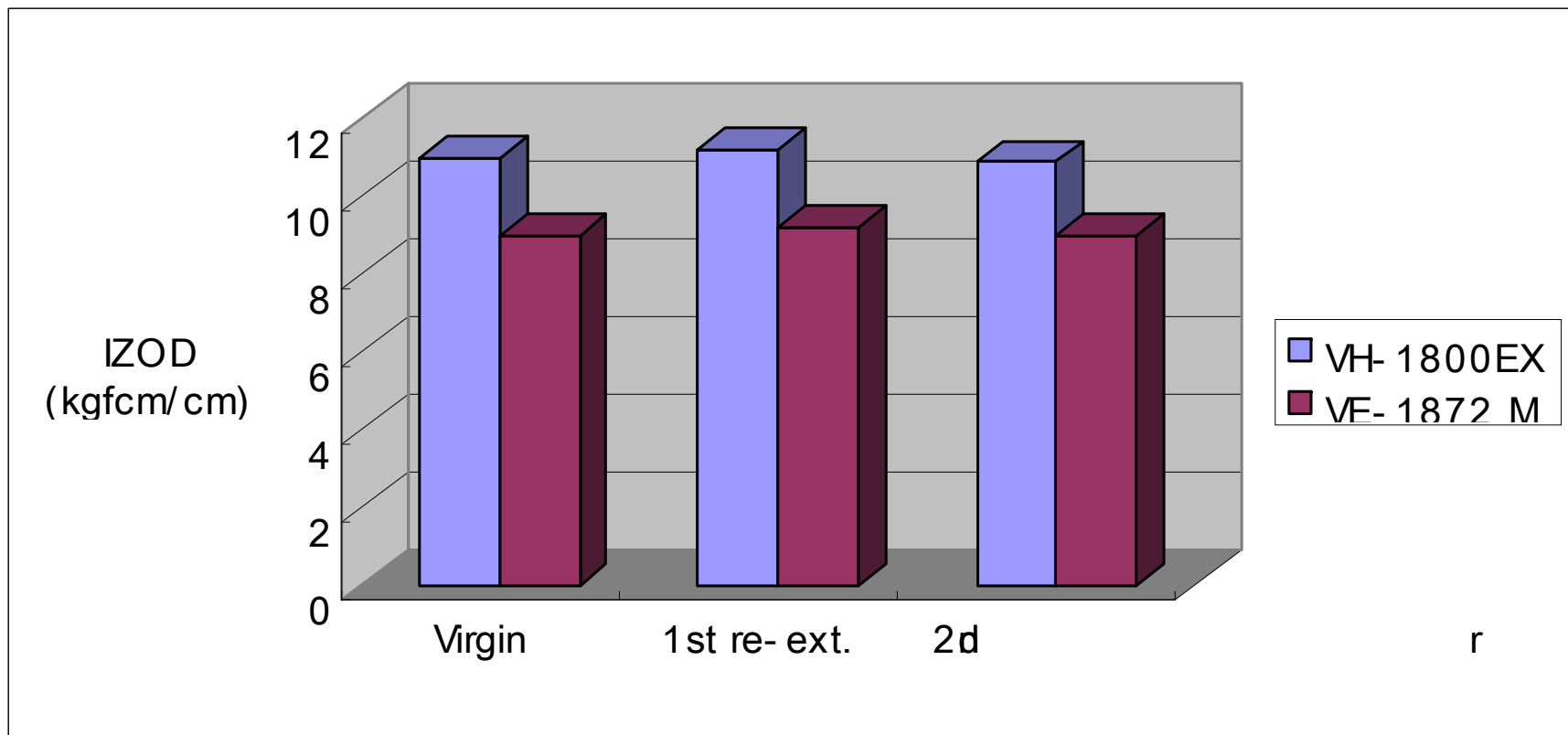
## Properties of Starex FR-HIPS for OA Equipment

Item	Unit	Method ASTM	VE-1870 E	VE-1870	VE-1850
TS	kgf/cm <sup>2</sup>	D-638	250	250	220
TE	%	D-638	80	80	80
FS	kgf/cm <sup>2</sup>	D-790	330	330	320
FM	kgf/cm <sup>2</sup>	D-790	23,000	23,000	22,000
IZOD	1/8"	kgf.cm/cm	D-256	10	10
VST	°C	D-1525	83	83	84
MFR	g/10 min.	D-1238	8.0	8.0	6.0
RHD	-	D-785	95	95	95
Density	-	D-792	1.18	1.18	1.18
Flammability	thickness	UL-94	V-0 (1/16")	V-0 (1/16")	V-0 (1/16") 5VB (1/10") 5VA (1/8")
UV Resistance	ΔE	D-4459	< 10	< 5	< 5
Characteristics			Good UV Resistance	High UV Resistance	High UV Resistance

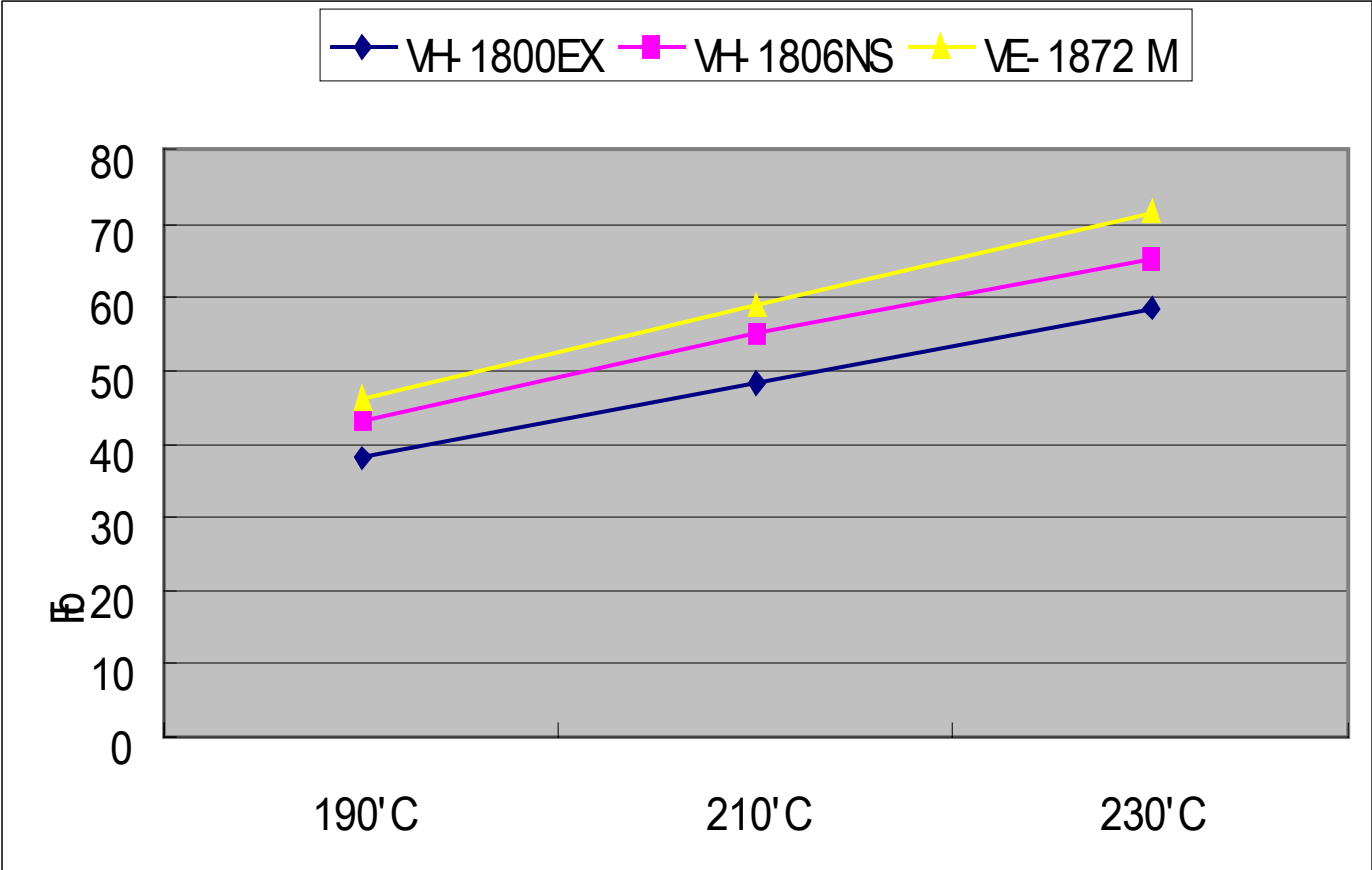
## MFR Variations After Re-extrusion of Starex FR-HIPS



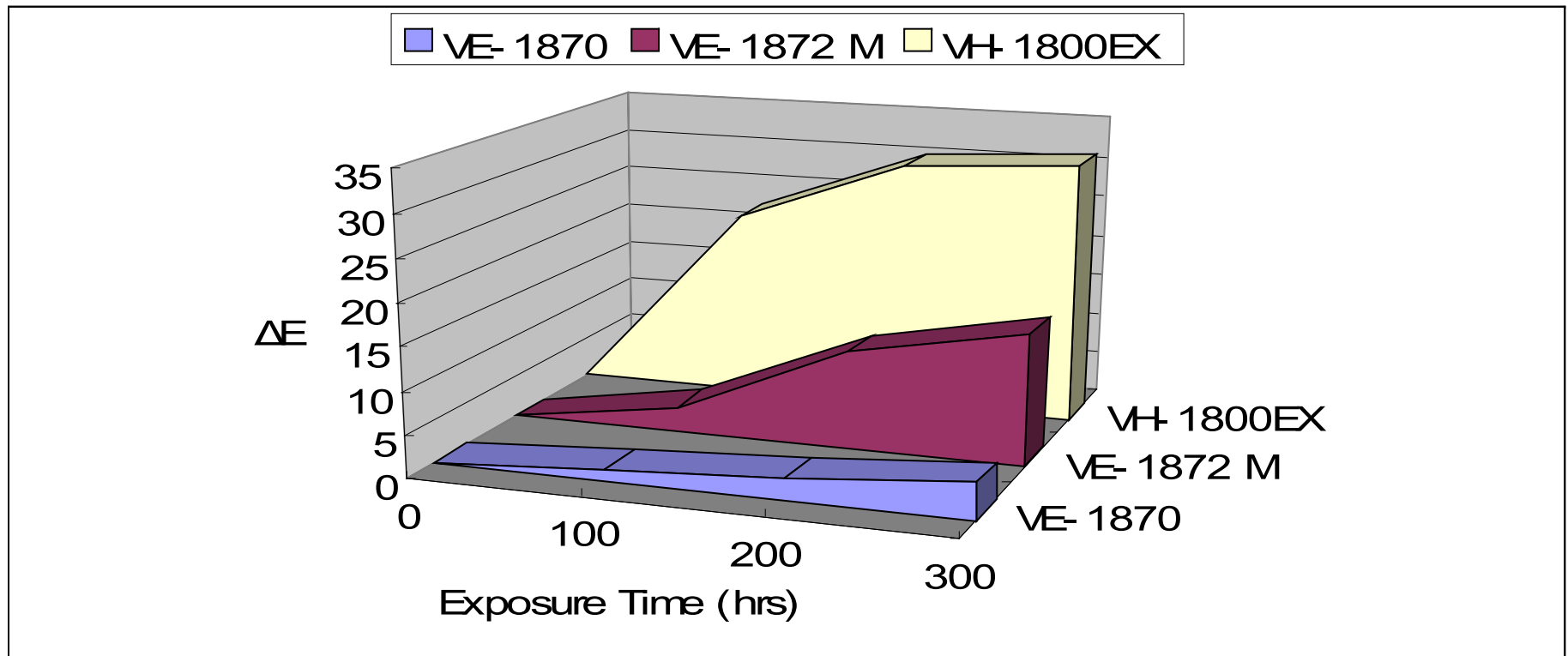
## Izod Impact Variations After Re-extrusion FR-HIPS



# Spiral Flow of Starex FR-HIPS



## UV Resistance of Starex FR-HIPS

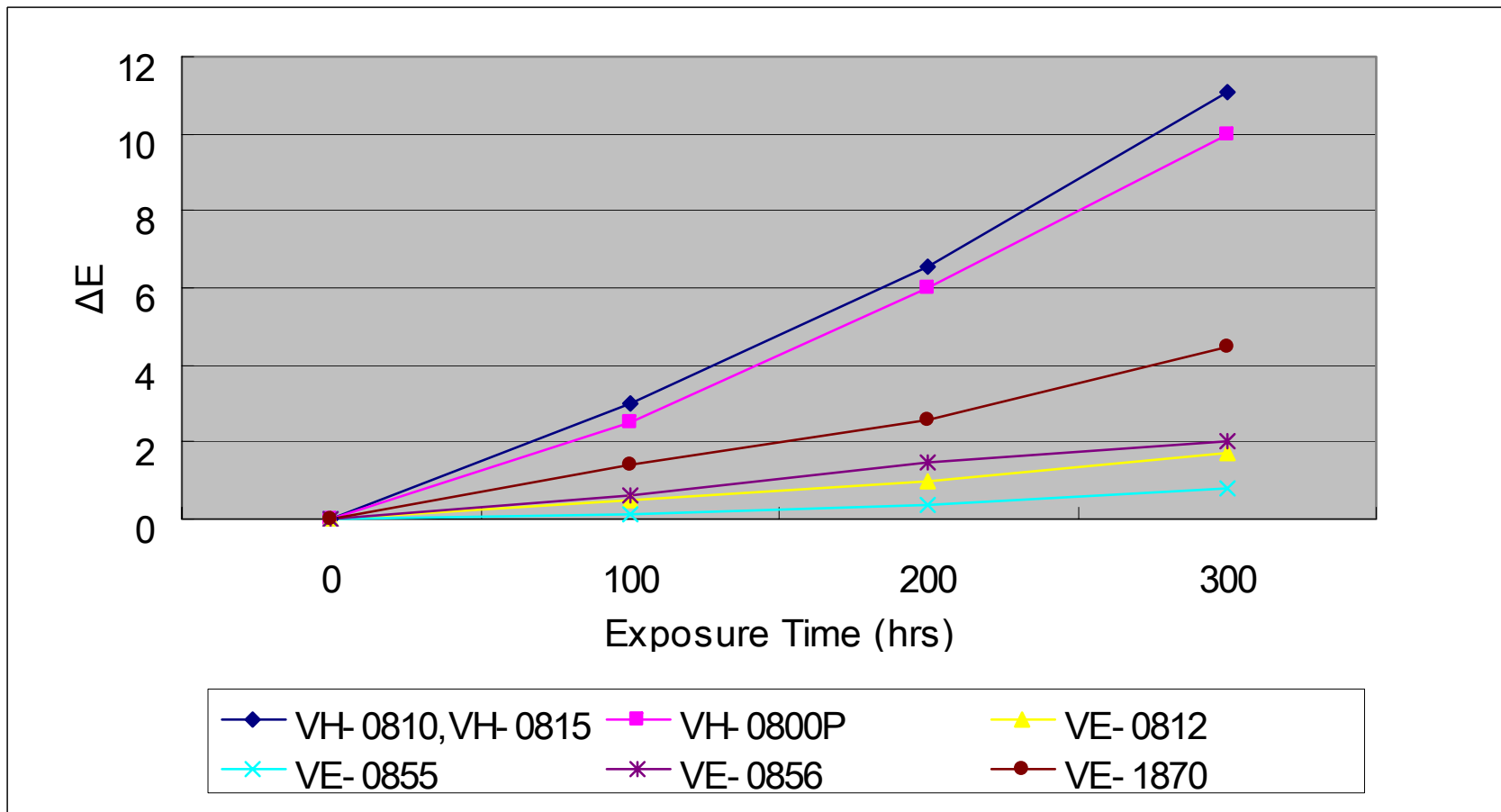


VE-1870 : UV Resistance F.R HIPS (Non-PBDE, for OA Husing)

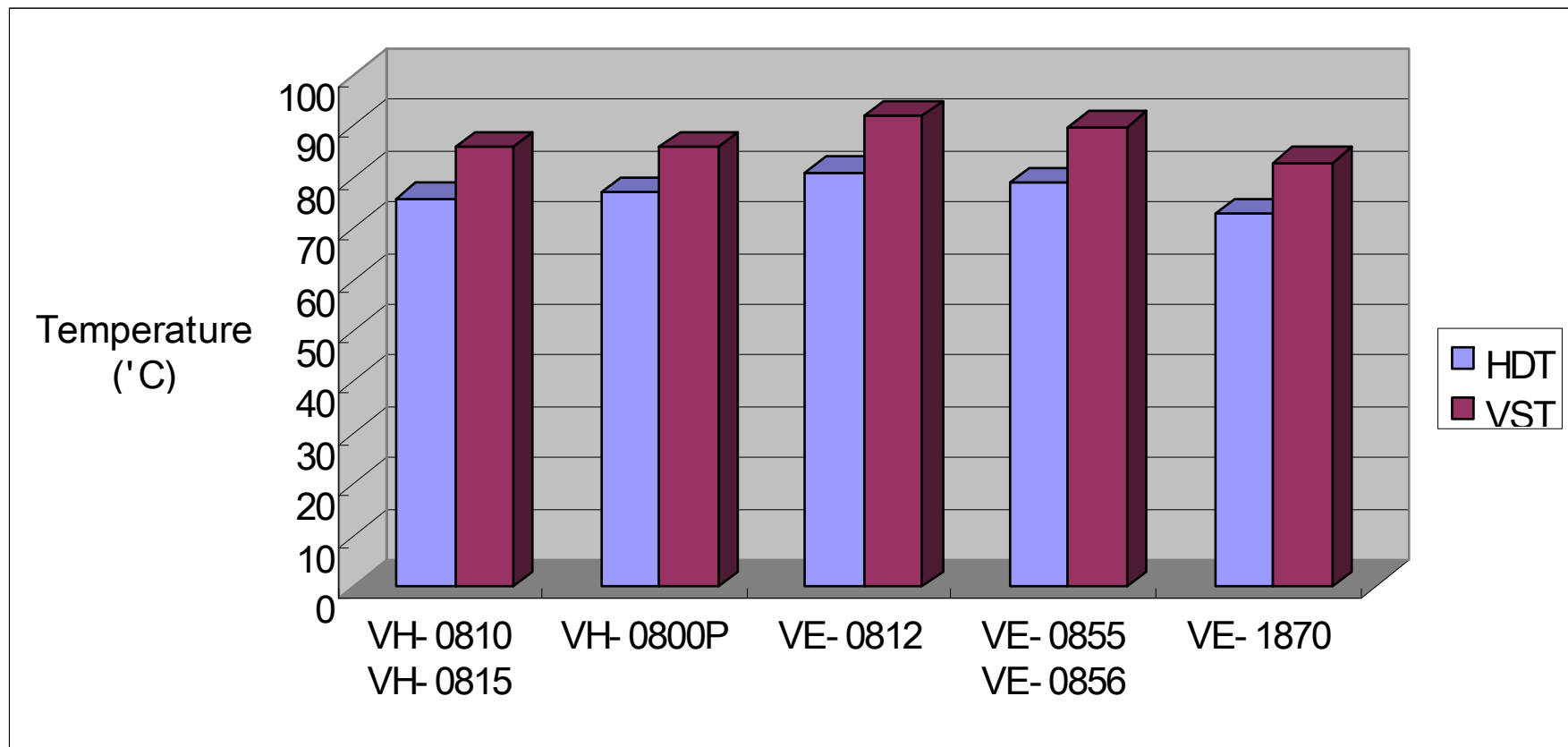
VE-1872 M: General F.R HIPS (Non-PBDE, for TV Husing)

VH-1800EX : General F.R HIPS (PBDE for TV Husing)

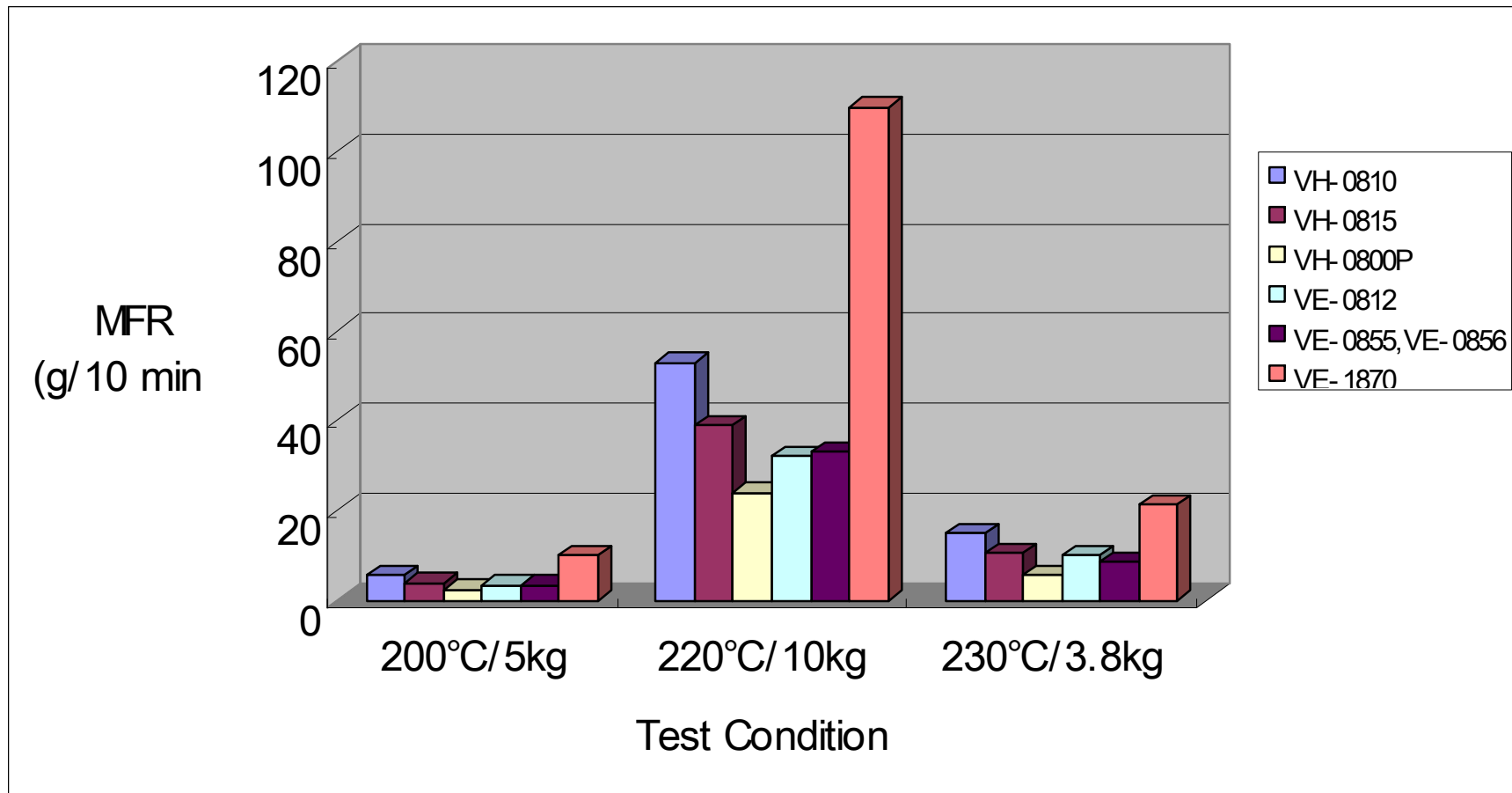
## UV Resistance of Starex FR-HIPS & FR-ABS



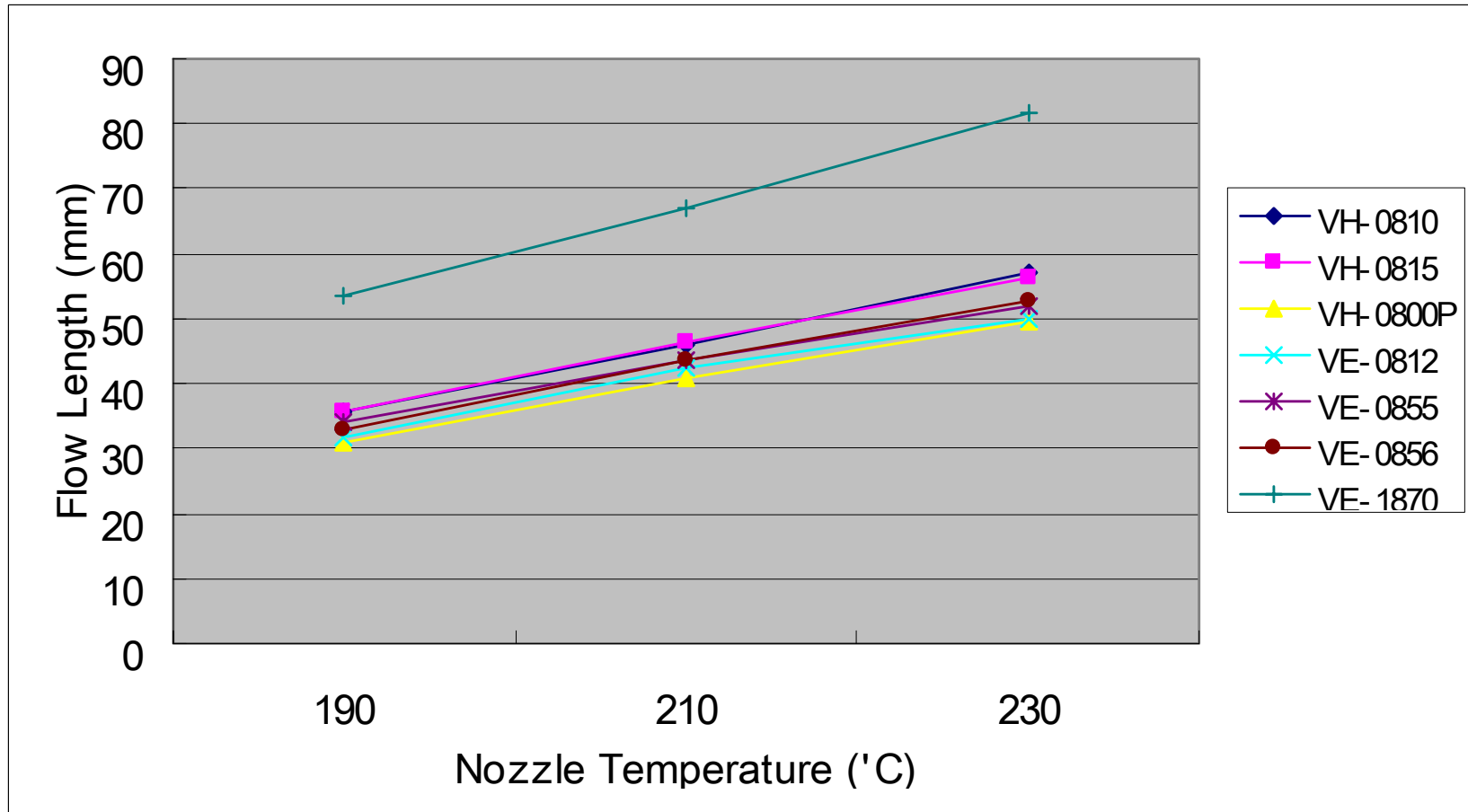
## Thermal Properties of Starex FR-HIPS & FR-ABS



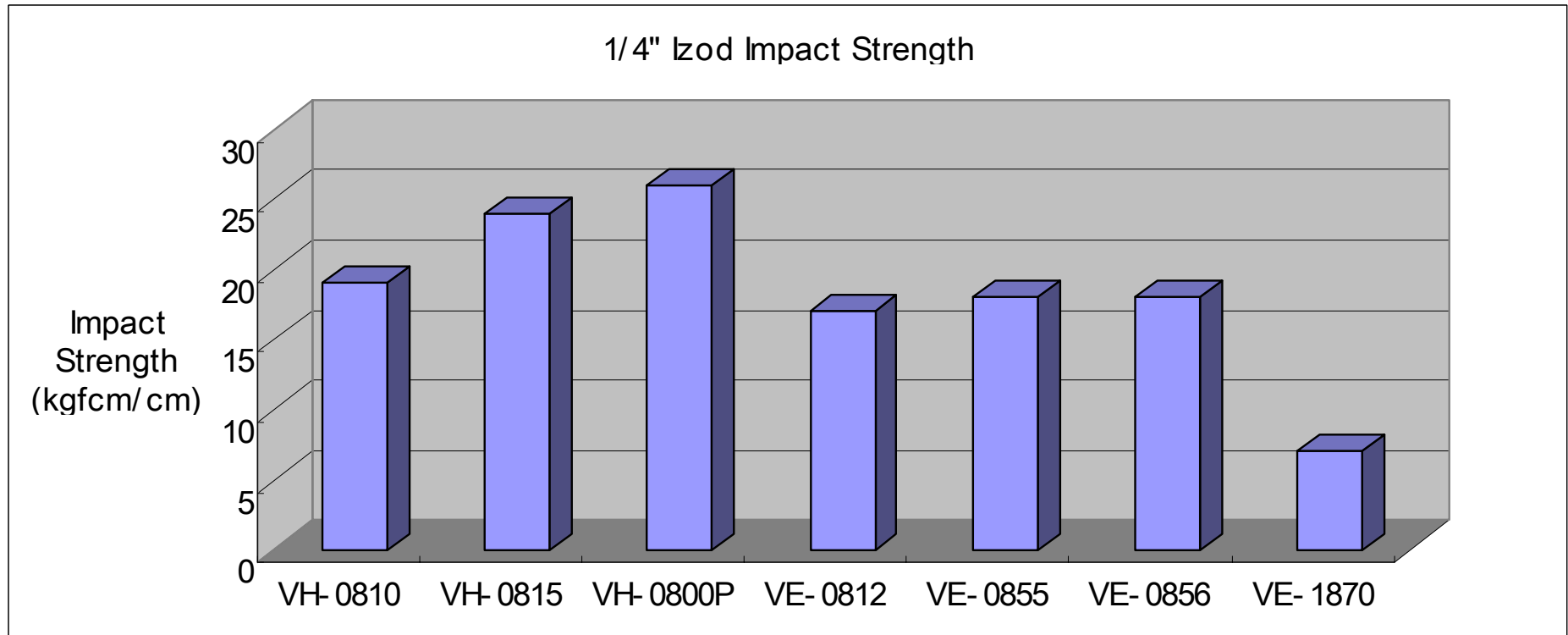
## MFR of Starex FR-HIPS & FR-ABS



## Spiral Flow of Starex FR-HIPS & FR-ABS



## Izod Impact of Starex FR-HIPS & FR-ABS



## Trouble-Shooting (How to decrease the gas generation)

Molding machine	Large first stage capacity & low compression ratio of screw
Nozzle	Open nozzle(diameter should be larger than that for general HIPS)
Dead space	The resin staying in the dead space can be changed as the black spots or burn streaks
Mold materials	Anticorrosion steels,such as chrome-nickel and copper alloys
Gas vent	The installation of gas vent on the weld part of the last filling area is effective for eliminating weld line
Gate and Runner	Cross section areas of gate and runner need to be widened
Mold cleaning	Periodically, at least once a day, wipe the parting surface of mold with a tissue and cleaning agents
After molding	Perform molding of more than 10 shots with general HIPS or GPPS and then clean the mold