

Bottle Cap

HDPE/LDPE



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Contents

I. Introduction

1. Purpose

II. Major Application

1. Classification
2. Grades for caps & closures
3. Application

III. Technology

IV. Processing

1. Injection molding
2. CCM(Continuous compression molding)



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Purpose



Organoleptic



Recycle



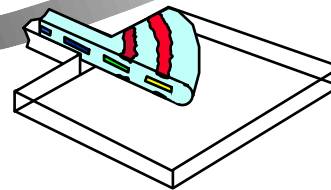
Gas permeability



ESCR



Opening Torque



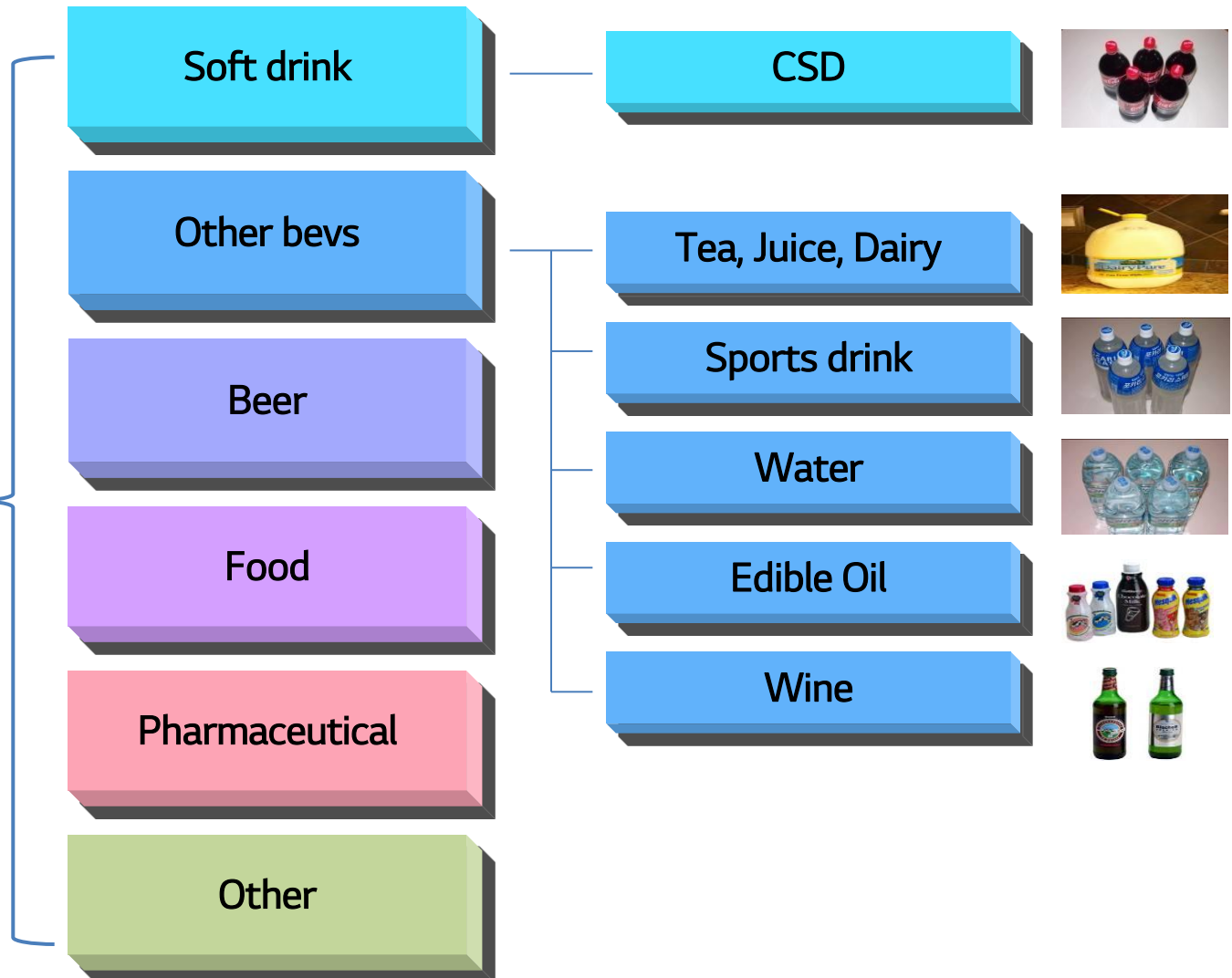
Easy processing

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Classification



Caps & closures



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Grades for caps & closures

Typical applications & products	Properties	MFR 190°C/2.16kg (g/10min)	Density (g/m ³)	Slip Additive	ESCR (Hr)
	Test Method	ASTM D1238	ASTM D792	Contain	ASTM D1693 condition B
Light weight cap for Carbonated soft drinks (CSD) - high ESCR	ME1000 (S2)	0.9	0.952	S2-Type A (2000ppm)	50
CSD and water requiring high pressure	ME2500 (S/S2)	2.0	0.952	S - Type A (1000ppm) S2-Type A (2000ppm)	15
Sports/water cap (for CCM process)	ME3500	3.75	0.952	-	12
Slightly carbonated drinks (Juices/ Edible Oil) Still mineral water	ME5000	4.75	0.952	-	8
Still mineral water Large caps & closure	ME8000	8.0	0.957	-	-
	ME9180	18.0	0.958	-	-
Cap Liners, Soft lid(LDPE)	MB9205	25	0.915	-	-

- LG has various bottle cap grades for customers.
- LG Tech center has extensive research and development for cap technology.

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- HDPE ME2500S and ME1000S2 are for CSD cap.
- They have good ESCR property and excellent processing performance.
- High CSD contains over 5g/L CO₂.

Grade	ME2500S	ME1000S2
Melt Index (2.16kg, g/10min)	2.0	0.9
Density (g/cm ³)	0.952	0.952
Slip Agent	Yes	Yes
Application	CSD, Water with gas	
Requirement	<ul style="list-style-type: none"> • ESCR • Easy processing 	



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- HDPE ME2500S and ME1000S2 are for hot fill & aseptic drinks cap.
- ME5000 is used for sports drink cap (>38mm)
- Beverage filling process

Grade	ME2500S	ME1000S2	ME3500
Melt Index (2.16kg, g/10min)	2.0	0.9	3.75
Density (g/cm ³)	0.952	0.952	0.952
Slip Agent	Yes	Yes	No
Application	Tea, Milk coffee, Sports drink		
Requirement	<ul style="list-style-type: none"> • Heat resistance • ESCR & Easy processing 		



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➤ Beverage filling process

System	Characteristics	Application
Hot-filling	95~98°C/1min. Sterilization → Filling 88~90°C at PET	Juice, Sports drink
Cold-filling	Filling at 1~26°C → Hot filling destroy carbonation	CSD
Aseptic filling	One of cold filling system High temp. short time sterilization	Tea drink, Milk coffee



Hot-filling system



Cold-filling system



Aseptic filling system

- Water cap grade has easy processing and excellent organoleptic property.
- These grades provide the high quality odor & taste to end-user.

Grade	ME2500	ME3500	ME8000
Melt Index (2.16kg, g/10min)	2.0	3.75	8.0
Density (g/cm ³)	0.952	0.952	0.957
Application	Spring/Still/Mineral water		
Requirement	<ul style="list-style-type: none"> • Organoleptic property • Easy processing 		



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- LDPE MB9205 is for edible oil, soy sauce, and cap linear.
- It has excellent processing performance and can be applied to lids of all size.

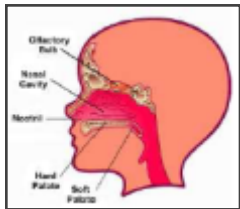
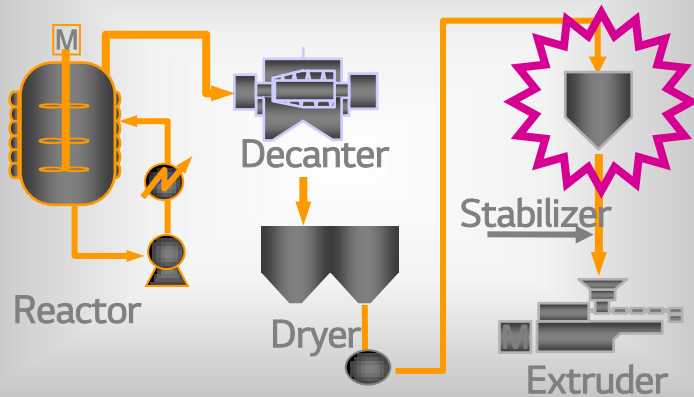
Grade	MB9205
Melt Index (2.16kg, g/10min)	25
Density (g/cm ³)	0.915
Application	Edible oil, Soy sauce, Cap linear
Requirement	<ul style="list-style-type: none"> • Organoleptic property • Easy processing



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- LG B/C grade has an excellent organoleptic property.
 - LG process can remove the small molecule hydrocarbon including off-taste.
 - Provide the high quality odor & taste to end-user.

Process & post-treatment



Typical levels of organoleptic detection 5 ppb or less
→ 10,000 times less than food approval specification limits

Electronic Nose



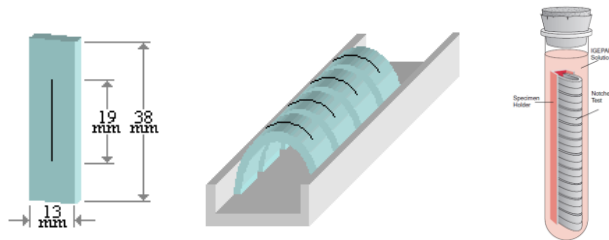
- Model
 - Alpha SOFT 2004

Panel Test



- LG's own testing method
 - Panel of 5 experts

- ESCR : Environmental Stress-Cracking Resistance
- ESCR test can evaluate crack properties of HDPE under surfactant.
 - High ESCR grade ME1000 shows a excellent resistance to slow cracking
- Slow crack occurs when low stress applied continuously.
 - This crack is generated from breakage of tie molecules which is between lamellas.



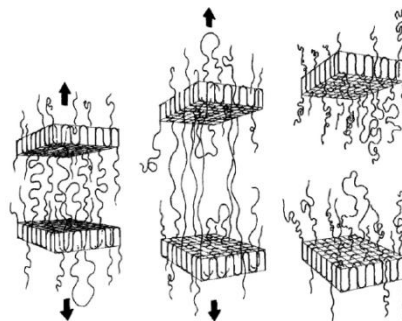
Test Condition

Temperature : 50°C
Solution : IGEPAL 10%

Specimen and holder for ESCR test



ESCR test



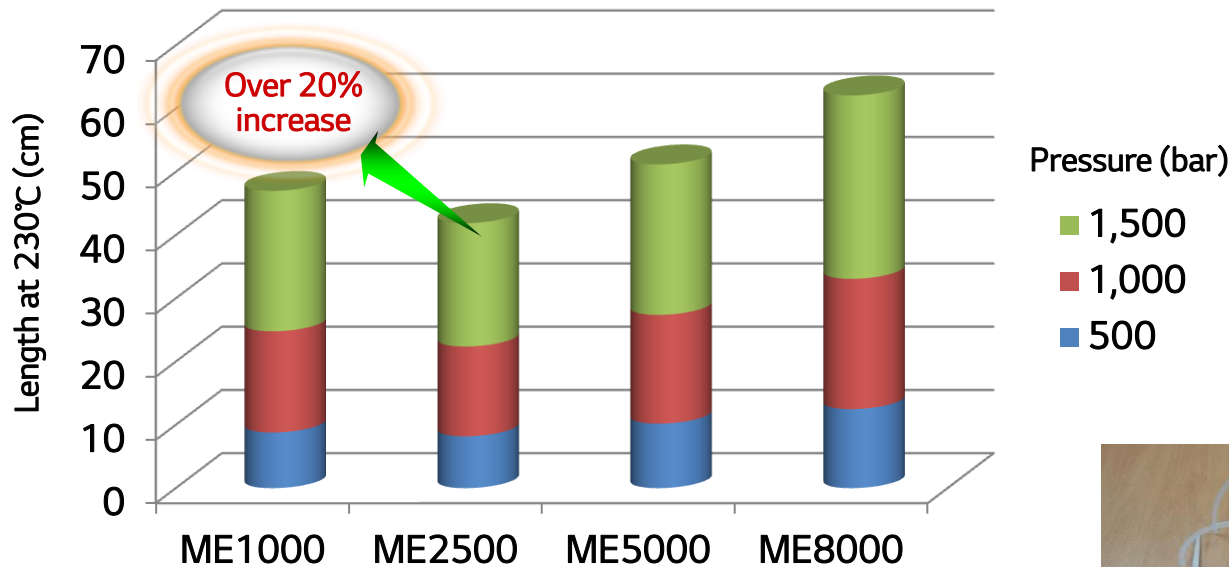
Breakage of tie molecules

Grade	ESCR, F50(hr)
ME1000(S2)	50
ME2500(S,S2)	15
ME3500	12
ME5000	8
ME8000	4

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- LG B/C grade has good processing performance in the processing zone.
 - Reduce cost/error-rate, Increase the productivity
- ME1000(Bi-modal process) has excellent processing performance specially.
 - The molecular weight distribution of ME1000 is very broad.
 - The low molecular weight polymer lowers the viscosity in broad MWD.

➤ Spiral Flow Test



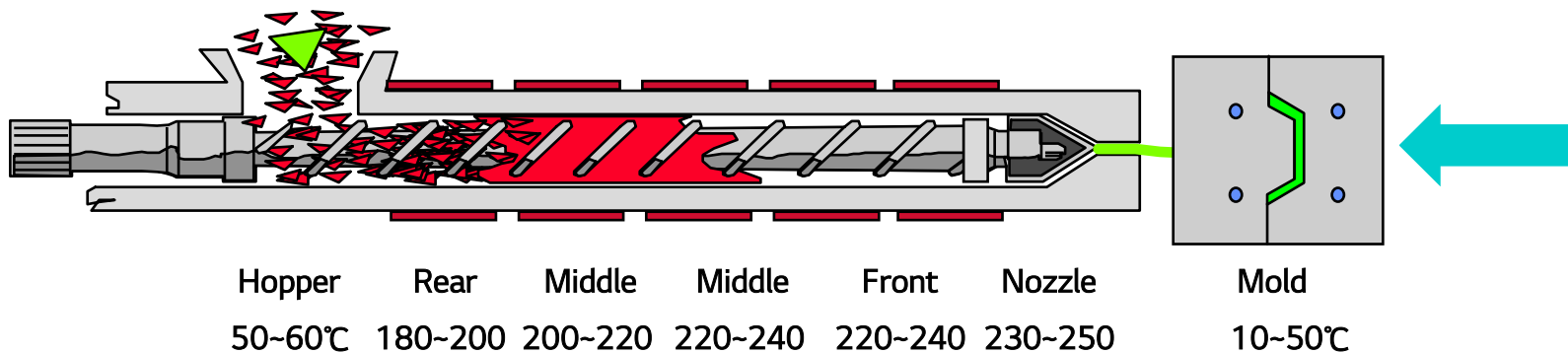
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➤ Processing condition : Injection molding

- Processing condition depends on machine and cavity generally.

- Material : ME1000
- Cap size : 28mm
- Cap weight : 2.5g/piece
- Cavity : 32ea
- Injection Speed : Maximum if possible
- Injection Pressure : Maximum if possible
- Holding Pressure : Half of the injection pressure
- Holding Time : Until the sprue solidified

◆ Temperature profile (°C)



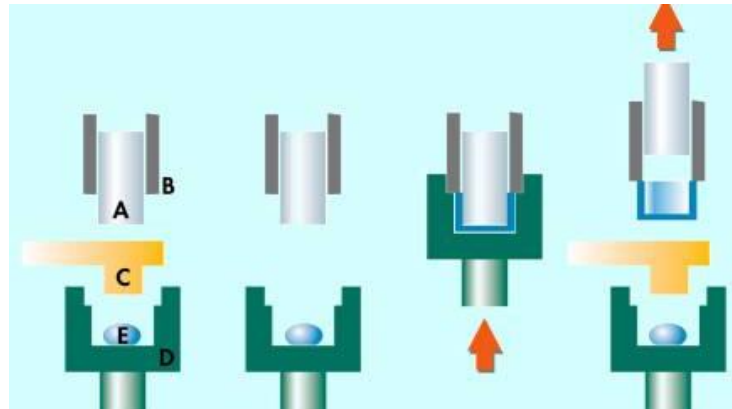
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➤ Processing condition : Continuous Compression Molding

- Processing Temperature : 160~185°C

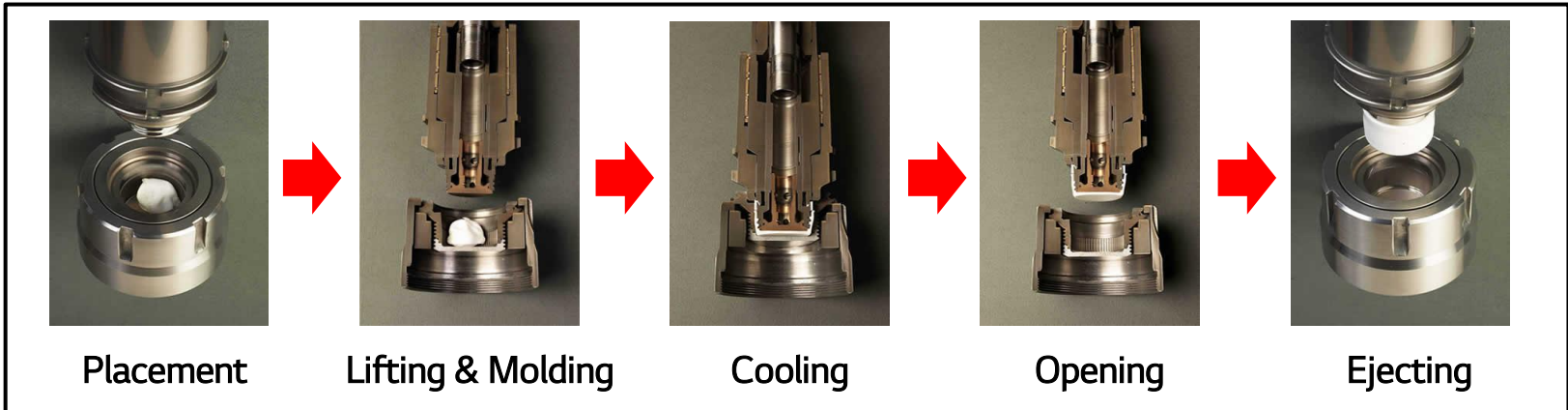


SACMI machine



A : Core
B : Stripper
C : Inserting device
D : Cavity
E : Material

◆ Molding process



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