

# LEAD REPLACEMENT

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AVC Sustainability Forum 2023

*Moving Forward to Vinyl Sustainability – The Episode of Additive System for W&C*

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## Sun Ace Group Company

- A Japanese origin **Polymer Additives & Speciality Chemical** manufacturer established in 1940
- Operating in 12 countries with 20 operations
- ISO9001, 14001, 45001 and FSSC 22000 certified company
- Sun Ace Singapore and Malaysia stearamides are RSPO Mass Balance (MB), HACCP and JCII, Halal and Kosher certified.

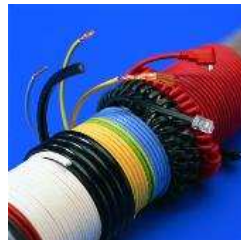
*RSPO: Roundtable on Sustainable Palm Oil*

*JCII: Japan Chemical Innovation and Inspection Institute*



## Product Portfolio

- **PVC Stabiliser (60%)**  
for PVC articles (Pipe, Fitting, Window, Cable, Sheet, Film, Packaging)
- **Metal Soap (28%)**  
for Polyolefin, Rubber, Paint, Cosmetic, Food, Medical, Pharmaceutical
- **Speciality Additives (12%)**  
Non-vinyl Additives, Rubber Additives, Chemicals for Semiconductor, Cattle Feed Additives, Agriculture and Coatings



# Topic

- Alternative
- Machine
- Process Condition
- Raw Material Affect
- Properties of Cable
- Data Input for Grade Recommendation

# Alternative

- Stabiliser system for Cable
  - Lead
  - Calcium Zinc
  - Liquid Mixed Metal (LMM)
  - Tin

# Machine

- Compounding Extruder
  - Required hard chrome on barrel, die head and tooling
- Wire Drawing

# Process Condition

- For compounding process
  - To keep the melt temperature at 170 – 175 °C
  - Barrel temperature can be lower than Pb system 3 – 5 °C

# Raw Material Affect

- ESBO can enhance the long term heat stability. However it may affect the color shade like more yellowing (depend on dosage).
- CPO can improve flame retardant however affect the smoke density.
- CPO also affect the reduction of Congo Red value.
- High Iron ( $\text{Fe}^{3+}$ ) from Calcium Carbonate will cause product turned pink.



# Properties of Cable

- CaZn also tends to lower the VR to certain extent as compared to Pb system.
- With good formulation, the mechanical properties and properties after aging can be similar to Pb system.
- Blooming
- Cable change color after long storage

# Properties of Cable

- Type of plasticizer and amount of its will affect the
  - Limiting Oxygen Index (LOI)
  - Smoke Density
  - Flammability Test eg. UL 94 Testing: V-0, V-1, V-2

# Data Inputs for Grade Recommendation

- Cable finishing
  - Insulation / Sheathing
  - Color: white / light / black or Transparent
- Standard reference
  - Working Temperature Rating
  - Aging Test requirement
- Special criteria requirement

# Typical Product Formulation

Chemicals	High Temp.	General Purpose	Transparent
PVC (K71)	100	100	100
Plasticiser	TOTM / Polymeric	DOP / DINP / DIDP	DOP
Stabiliser	6	5	2-3
CaCO <sub>3</sub>	30	30	0
ESBO	0 – 10	0 – 5	0 - 3

- ★ For better electrical properties, electrical clay is needed in the final formulation.
- ★ For Flame-retardant grades, Antimony Trioxide (Sb<sub>2</sub>O<sub>3</sub>), Aluminium Trihydrate (ATH) and others flame retardants is needed

# Q & A

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*Associate Members – Stabiliser Producers*



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