Application Guide: CPE & ACR

Applicable Audience: Manufacturers of PVC pipes, profiles, plates, pipe fittings and rigid PVC products

Purpose: To help production personnel quickly understand the performance differences, recommended dosages, compatibility principles and troubleshooting methods of CPE and ACR additives. Optimize formulas, reduce defective rates and stabilize production processes.

Preface

CPE (Chlorinated Polyethylene) and ACR (Acrylate Processing Aid) are the two most fundamental and widely used additives in rigid PVC systems. CPE focuses on **toughening, impact resistance and low-temperature resistance**, while ACR focuses on **plasticization promotion, surface improvement and processing stability**. The combination of CPE and ACR is currently the most cost-effective and mature formula in the PVC industry.

This guide is compiled based on universal industrial experience and our company's actual test data. It is professional, practical and easy to understand, suitable for formula engineers, technical operators and purchasing personnel.

1. Product Basic Introduction (Function & Difference)

1.1 CPE (Chlorinated Polyethylene) — Toughness Protector for Products

CPE is an impact modifier with flame retardancy, excellent weather resistance, low-temperature resistance, non-migration and non-precipitation characteristics.

Core Functions:

- Improve low-temperature impact strength to prevent cracking in cold weather;
- Enhance aging resistance and UV resistance, avoiding discoloration and pulverization for outdoor products;
- Improve filler compatibility to keep toughness under high calcium carbonate filling;
- Optimize flame retardancy and insulation performance for cables and pipes.

Limitations: Single use of CPE causes slow plasticization and poor surface gloss. It

must be used with ACR for better processing performance.

1.2 ACR (Acrylate Processing Aid) — Processing Accelerator for Production Line

ACR is a processing additive without toughening function, dedicated to optimizing processing technology and product appearance.

Core Functions:

- Accelerate PVC plasticization to reduce unplasticized raw materials and interlayers;
- Improve melt strength to avoid extrusion collapse and ensure uniform foaming;
- Optimize surface smoothness and gloss, reducing pockmarks, water lines and burrs;
- Stabilize torque and current, reduce equipment load and increase production speed.

2. Recommended Dosage for Main Industries (Universal Standard)

The following data is based on actual tests of our high-quality CPE and ACR products, applicable under conventional calcium carbonate filling, which can be directly applied to production formulas.

2.1 PVC Door & Window Profiles

Recommended Ratio: CPE 8-12 phr | ACR 1.5-2.5 phr

Instructions: Increase CPE to 10-12 phr for cold northern regions to guarantee low-temperature impact resistance. ACR ensures high surface gloss and no welding lines.

2.2 PVC Water Supply & Drainage Pipes, Fittings

Recommended Ratio: CPE 6-10 phr | ACR 1.0-2.0 phr

Instructions: Higher CPE dosage for pressure-resistant pipe fittings. Moderate ACR dosage to avoid matte and rough pipe surface.

2.3 PVC Decorative Boards, Foam Boards, Co-extruded Boards

Recommended Ratio: CPE 5-8 phr | ACR 2.0-3.5 phr

Instructions: Increase ACR dosage for better flatness and gloss. Appropriately increase CPE under high calcium filling to prevent brittleness.

2.4 PVC Cables & Modified Rubber Products

Recommended Ratio: CPE 15-30 phr (adjust according to hardness), low ACR dosage

Instructions: Focus on oil resistance, flame retardancy, insulation and low-temperature performance. Mainly modified by CPE to ensure flexibility and toughness.

2.5 Transparent & High-end Injection Products

Recommended Ratio: CPE 4-6 phr | ACR 2.5-4.0 phr

Instructions: Strictly control impurities and precipitation. Use transparent-grade ACR to improve product permeability.

3. Compatibility Principles & Cost-saving Skills

3.1 Disadvantages of Using CPE Alone

Excessive CPE leads to slow plasticization, foggy surface, poor gloss, high equipment load and unstable extrusion. A small amount of ACR can effectively improve melt fluidity and processing performance.

3.2 Disadvantages of Using ACR Alone

ACR has no toughening effect. Products become brittle with poor impact resistance, which are easy to crack at low temperature and fail national standard tests.

3.3 Golden Compatibility Principle

CPE for toughness, ACR for surface; More CPE for cold resistance, More ACR for high gloss.

Universal ratio for rigid PVC: **CPE : ACR ≈ 4:1 ~ 5:1** for the best cost performance and stable processing.

4. Common Production Problems & Solutions

Abnormal Phenomenon	Main Causes	Solutions
Low-temperature cracking & drop hammer test failure	Insufficient CPE dosage or low-grade CPE	Increase CPE dosage and adopt high-chlorine cold-resistant grade
Matte surface, pockmarks	Insufficient ACR and	Increase ACR dosage

and rough lines	incomplete plasticization	and moderately raise processing temperature
Unstable discharging & current fluctuation	Insufficient melt strength & poor dispersion	Add ACR to improve melting uniformity
Surface whitening and precipitation after storage	High impurity content of low-quality additives	Replace with high-purity CPE & ACR, reduce low-melting auxiliary materials
Brittleness under high calcium filling	Excessive filler & insufficient toughness	Moderately increase CPE proportion

5. Storage, Feeding & Precautions

5.1 Storage Requirements

- Store in dry and ventilated warehouse to avoid moisture and caking;
- Stacking height shall not exceed 8 layers to prevent heavy compression;
- Shelf life: 12 months under dry environment.

5.2 Recommended Feeding Sequence

PVC Resin → Stabilizer → CPE → ACR → Calcium Carbonate → Lubricant. Add additives in the middle and later mixing stage for better dispersion and anti-agglomeration effect.

5.3 Usage Prohibitions

- Keep away from strong acid and strong oxidants;
- Sieve damp materials before feeding;
- Do not mix additives from different manufacturers to avoid compatibility problems.

6. Our Technical Support & Service

We specialize in the production of high-stability CPE and ACR additives. Our products feature low impurity, excellent dispersion and wide compatibility with extrusion and injection molding production lines. Free services for all cooperative customers:

- Free sample testing to match existing formulas;

- One-to-one formula optimization to reduce production cost;
- On-site technical guidance to solve cracking, matte surface and precipitation problems;
- Adequate inventory and stable supply without delivery delay.

Conclusion

Reasonable compatibility of CPE and ACR is the most effective way for PVC manufacturers to control costs, stabilize quality and reduce defective products. This is a universal industrial manual. For customized formulas and personalized process debugging, please contact our technical team for free professional support.

For samples, technical consultation and formula customization, feel free to contact us.

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