



MOCOM

❖ Alcolor® & ❖ Alperform® Guideline Masterbatch

MOCOM offers a wide range of color and functional masterbatches under the brands Alcolor®, Alcolor® Function and Alperform® for use in a broad range of engineering plastics.

The following guideline is intended to provide customers a first important assistance concerning the handling and processing of masterbatches.

Pre-drying

Information on pre-drying and the drying conditions can be found on the technical data sheet of the respective masterbatch. Adequate pre-drying of the masterbatch should always be carried out if

- it is required by the information given on the technical data sheet of the masterbatch.
- pre-drying is recommended for the used base polymer itself.

- moisture-sensitive base polymers (e.g., PC) are used into which the masterbatch should be added.
- there are high demands for the surface quality of the end product or if visible parts with 1A surface quality should be produced.

Dosage

Basically, dosage recommendations can be found on the technical data sheet of the respective masterbatch. The addition is made in 100 %, i.e., the dosage values should be understood in such a way that with the recommended masterbatch quantity the total balance is 100 %. In general, the dosage data are always guide values. Depending on the part, wall thickness, color intensity, desired functionality and the concentration in the masterbatch, the optimum dosage quantity may vary. If you have any questions about the appropriate dosage, please contact the Technical Service Center of MOCOM or your contact person at our distribution partners.

Accurate dosage is essential in order to achieve a uniform concentration of the masterbatch in the end product and to avoid quality deviations during production and in the end product. For this reason, the masterbatch should be added using gravimetric feeding systems. Volumetric feeding or even manual premixing (so-called dryblending) are less recommended. Particularly in the case of manual premixing (so-called dryblending), many potential errors can occur, which then lead to an unsatisfactory results. When using volumetric feeding systems, the feeder must be calibrated again for each masterbatch in order to ensure the desired dosing rate.

Furthermore, the minimum possible dosage of the masterbatch should be taken into account. This quantity depends on the additive concentration in the masterbatch and the available feeding and machine technology. Note: Very low feeding rates can result in high processing challenges with regard to constant dosing and effective mixing of the masterbatch with the base polymer.

Guidance for color masterbatch dosage

The dosage indicated on the technical data sheet of the color masterbatch always refers to the wall thickness in which the color was originally developed. Note: Lower wall thicknesses usually require higher masterbatch dosages in order to achieve the same color level. This means depending on the application and the base polymer, lower dosages may be required for thicker parts while higher dosages may be necessary for thinner parts compared to the values given in the technical data sheet. If the color tone is changed considerably when the dosage is lowered, the concentration of the colorants in the masterbatch will probably fall below the limit, causing them to change their coloring properties. In this case, a revision of the color masterbatch is necessary, considering the individual wall thickness of the part.

Guidance for masterbatch selection

The selection of a suitable masterbatch depends on many factors. In addition to the application or the final part and the desired functionality, the processing technology (e.g., injection molding or extrusion), the base polymer to be modified and its processing parameters play a key role. These points will be discussed in more detail below.

Processing technology used

The flowability plays an important role for the processing technology. The viscosity of the masterbatch used should ideally match the viscosity of the base polymer and must be aligned with the requirements of the processing technology.

- **Injection molding:** The masterbatch used should have a rather high flowability (medium to high MFR).
- **Extrusion:** The masterbatch used should have a rather low flowability (low MFR).

If the flowability of the masterbatch and the base polymer is too different, inconsistencies can occur in the end product, for example with regard to the color.

Base polymer used

If possible, the masterbatch should have the same carrier polymer as the base polymer to be colored or modified. This guarantees high compatibility, good processability, low influence on the final properties of the base polymer, and high quality of the end product, for example with regard to the surface finish. The need for identical or at least similar carrier systems applies particularly for high-quality applications and engineering plastics. Information on the recommended combinations for masterbatch and base polymer can be found on the technical data sheet of the respective masterbatch.

The following exemplary combinations of masterbatch carrier polymer and base polymer have been successfully used in various applications.

Masterbatch carrier	Base polymer
PE or EVA	• Polyolefins (e.g., PE, PP) • TPE (e.g., TPS, TPO, TPV) • Limited use in PA, TPU
SAN	• SAN, ASA, ABS, PC/ABS • TPU (mainly harder grades)
PC	• PC, PC/ABS
PA6	• PA6, PA6.6

Processing parameters used

In order to achieve a high-quality result, the processing parameters of the base polymer and the masterbatch should be adjusted to each other. Important processing parameters that must be considered are the following.

- **Processing temperature:** The thermal stability of the masterbatch and its additives or pigments must be able to withstand the processing temperature of the base polymer. This is especially important for the colorants in a color masterbatch. The temperature stability of the colorant can be found on the technical data sheet of the respective color masterbatch.
- **Melting behavior:** This parameter is closely linked to the processing temperature. The masterbatch used should melt at similar temperatures like the base polymer. Melting too early or too late should be avoided.
- **Required shearing during processing:** Shear-sensitive masterbatches should not be used in base polymers, which require relatively high shear for processing.

Mixing and homogenization of the masterbatch

For high-quality results in the end product, e.g., with regard to coloring, not only accurate dosage but also effective mixing and homogenization of the masterbatch and the base polymer are required. For this purpose, suitable machine technology should be used, and appropriate processing parameters should be selected. Some important parameters that are useful for effective mixing and homogenization of the masterbatch with the base polymer are discussed below.

- **Back pressure (injection molding) / fill level of the screw (extrusion):** Increased back pressure in injection molding or an increased fill level of the screw during extrusion can promote homogenization of masterbatch and base polymer.
- **Temperature control:** The temperature control should allow effective melting of the base polymer and the masterbatch. Furthermore, the processing temperature should be selected in a way that significant differences in viscosity between the base polymer and the masterbatch can be avoided or eliminated.
- **Mesh screen packs (extrusion):** The use of a breaker plate with screen inserts in front of the die can additionally promote the homogenization of the masterbatch and the base polymer.
- **Mixing nozzles and static mixers:** The use of mixing nozzles or static mixers in injection molding and extrusion are usually very effective in homogenizing the masterbatch and base polymer. In parallel, the melt temperature of the polymer melt is also homogenized, resulting in a more uniform flow behavior of the melt.
- **Mixing screw and mixing elements:** The use of a mixing screw or distributive mixing elements at the screw tip can also improve the mixing and homogenization of the masterbatch and the base polymer. Figure 1 shows typical screw elements for distributive mixing: "Pineapple" mixing element, "Saxton" mixing element or "Pin" mixing element.

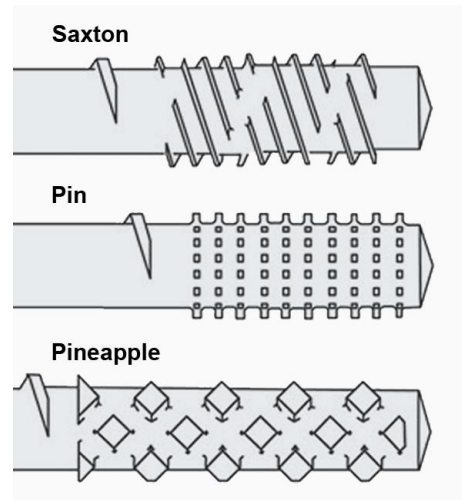


Figure 1: Possible distributive mixing screw elements for optimized homogenization of masterbatch and base polymer (Source: J. Vlachopoulos, N. D. Polychronopoulos: Understanding Rheology and Technology of Polymer Extrusion. 2019, POLYDYNAMICS INC.).

Cleaning

If there are no separate instructions for cleaning on the technical data sheet of the respective masterbatch, the standard guidelines for machine cleaning generally apply. It is recommended to clean the machine before and after each production campaign. For this purpose, the use of special cleaning compounds with a very low flowability (low MFR) is recommended. If necessary, the machine has to be cleaned mechanically. When selecting a cleaning compound, it is important to ensure that it is compatible with the base polymer and the masterbatch. It can be helpful to discuss the correct cleaning compound selection with specialists from the supplier.

Storage of the masterbatch

Information about the storage of the masterbatch can be found on the respective technical data sheet. As a general rule, the masterbatch should be stored in a dry, cool place and protected from light. Opened bags should be stored tightly closed and fully utilized as soon as possible.

MOCOM Compounds GmbH & Co. KG

Mühlenhagen 35 | 20539 Hamburg

T +49 40 78105-720 | sales@mocom.eu

T +49 40 78105-710 | technical@mocom.eu

www.mocom.eu

Any information given on the chemical and physical characteristics of our products, including, without limitation, technical advice on applications, whether verbally, in writing or by testing the product, is given to the best of our knowledge and in good faith and does not exempt the buyer from carrying out their own investigations and tests in order to ascertain the product's specific suitability for the purpose intended. The buyer is solely responsible for confirming the suitability of the product for a particular application, its utilization and processing and must observe any applicable laws and government regulations.
NO EXPRESS OR IMPLIED RECOMMENDATION OR WARRANTY IS GIVEN WITH REGARD TO THE SUITABILITY OF THE PRODUCT FOR A PARTICULAR APPLICATION, SUCH AS, BUT NOT LIMITED TO, SAFETY-CRITICAL COMPONENTS OR SYSTEMS.