Kombiplast KP. Gentle compounding and pelletizing of PVC, cable, and shear-sensitive compounds.

coperion
confidence through partnership

Quality is our benchmark. This is the only way for you to get exactly what you expect for the processing of PVC, cable, and shear-sensitive compounds: a compounding system that achieves the highest product quality and maximum economic efficiency.

Coperion specializes in the design and implementation of complete plants for the compounding of heat and shear-sensitive plastics – from material handling and feeding, to dryblend production, compounding, and pellet cooling, to storage and filling. Our two-stage Kombiplast KP processing system consisting of a ZSK twin screw extruder and an ES-A single screw discharge is the heart of these compounding plants. It boasts outstanding mixing behavior, excellent technical flexibility, and good compression and venting capabilities. The Kombiplast KP processes hot and cold dry blend as well as individually fed components. The result are highest product qualities at maximum throughput rates for a very broad range of applications.

AREAS OF APPLICATION FOR THE KOMBIPLAST KP

Plasticized PVC
- PVC cables: insulation, sheathing, and bedding compounds
- Material for shoes and shoe soles (also PVC-P with blowing agent)
- Material for the extrusion of profiles and hoses (also in the medical field)
- Injection molding compounds
- Film and sheets for flooring

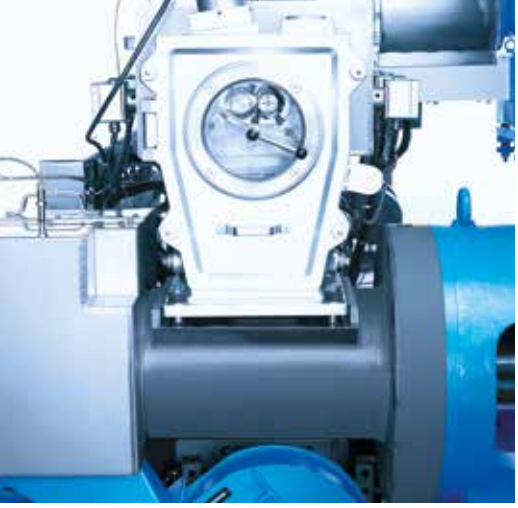
Rigid PVC
- Extruded profiles for use indoors and outdoors
- Injection molding grades for fittings, etc.
- Blow molding grades for hollow bodies such as bottles, containers, etc.
- Alloys
- Films (calender feeding)

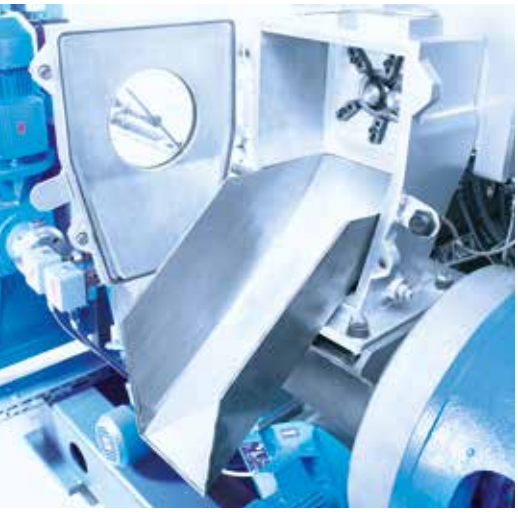
Special compounds
- Halogen-free, self-extinguishing recipes for cables (HFFR)
- Compounds for elastomer based low, medium, and high tension cable
- Cross-linkable PE (incorporating peroxide)

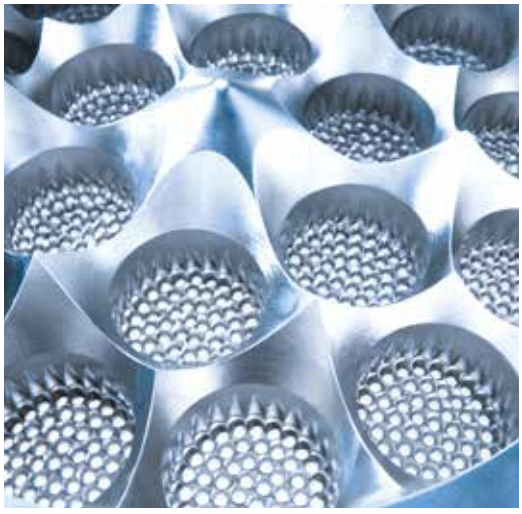
HOSES

PIPE FITTINGS

CABLES







› TRANSITION CHUTE
› START-UP CHUTE

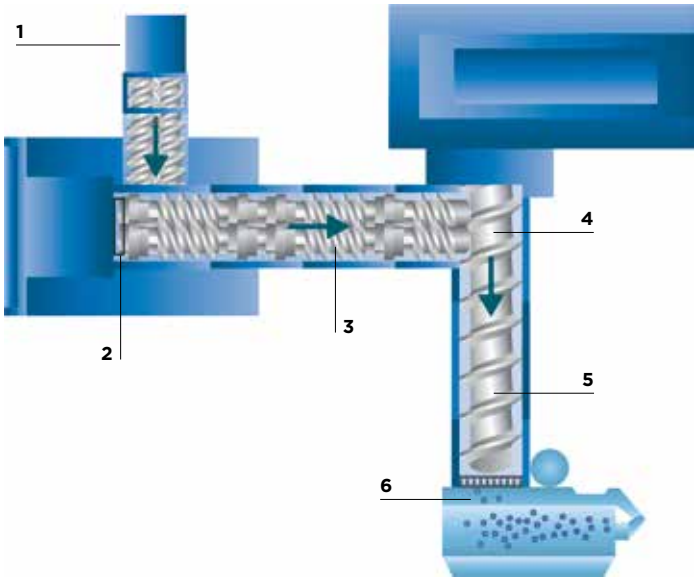
› ES-A SINGLE SCREW DISCHARGE
› NEST EGR DIE PLATE

› FULL EGR DIE PLATE
› TRANSITION CHUTE ZSK/ES-A WITH PARTLY REMOVED SCREWS

PROCESS STEPS OF THE KOMBIPLAST PLANTS IN DETAIL

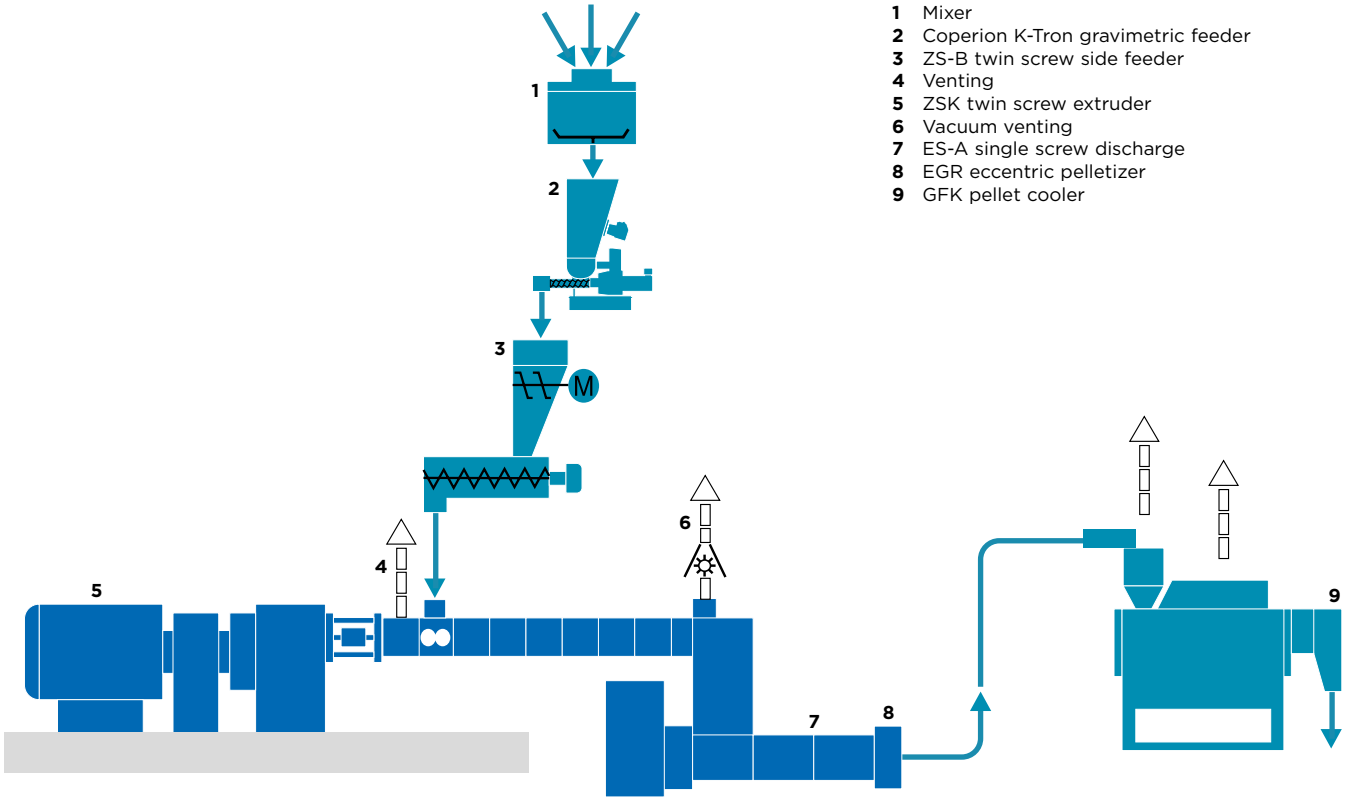
› Feeding of the raw material (dry blend or single components) through a ZS-B twin screw side feeder equipped with cooled barrel and stirred hopper. ZS-B can be used as volumetric feeder by variable drive.
› Compression, mixing, and gelling of the premix in the ZSK twin screw extruder with the option of adding pigments (solid or liquid) directly to the process section.
› Start-up diverter to discharge start-up and shut-down product.
› Venting of the compounded mass by atmospheric pressure or vacuum.
› Compression and gentle pressure build-up for pelletizing using the ES-A single screw discharge. The screw is temper capable; its housing is heated electrically and cooled with water.
› Discharge of the product by the electrically heated die plate. The die plate is attached to the flange of the ES-A cylinder and can be removed quickly and easily for cleaning. The distance between the ES-A screw and the die plate can be adjusted.
› Dry blend pelletizing by EGR eccentric pelletizer. The ergonomically designed knife blade has infinitely variable speed control. The knives on the two- or multiple-arm knife blade are easily adjusted. The pelletizer hood is made of quiet cast aluminum and can be equipped with a water spraying unit on request.
› The hot pellets are conveyed from the pelletizer to the cooling unit in air. In special cases, conveyance can be achieved by water/air or water.
› The pellets are cooled in a fluidized bed. The volume and distribution of the air are adjustable. Inspection windows and doors allow good control as well as easy and fast cleaning of the cooling chamber in the case of product changes. The fluidized bed can be equipped with an air heater to dry the surface of the pellets.

HORIZONTAL SECTION OF THE TWO-STAGE KOMBIPLAST KP



1 ZS-B twin screw side feeder
2 Venting
3 ZSK twin screw extruder
4 Vacuum venting
5 ES-A single screw discharge
6 EGR eccentric pelletizer

SCHEMATIC DESIGN OF A KOMBIPLAST KP PLANT



1 Mixer
2 Coperion K-Tron gravimetric feeder
3 ZS-B twin screw side feeder
4 Venting
5 ZSK twin screw extruder
6 Vacuum venting
7 ES-A single screw discharge
8 EGR eccentric pelletizer
9 GFK pellet cooler

ADVANTAGES OF THE KOMBIPLAST KP AT A GLANCE

Good infeed behavior even with poorly flowing powders and hot pre-mix from fast mixers	Very uniform shearing, homogenization, and pelletizing of the product recipes
Very gentle operation and short residence time for maximum product quality	Highest flexibility for product changes and machine modifications, resulting in a wide range of applications
Exact temperature control	Effective devolatilization of volatile components
Low specific energy requirement	Very wide range of material solutions
High economic efficiency of the processing plant	Intensive process support
Flexible control solutions	High reliability and proven machine technology
Easy cleaning for fast product change in the case of different batch sizes	Comprehensive after-sales service by worldwide Coperion service network

NEW KNIFE ROTOR FOR EGR

A new type of knife rotor of Coperion's eccentric pelletizing systems EGR makes it possible to produce extremely low-dust PVC pellets. Rotating directly on the die plate, the rotor permits particularly smooth and gentle cutting of temperature and shear-sensitive plastics. This greatly improves the quality and further processability of the pellets produced.

› KOMBIPLAST KP 58 Mc^{18}/150

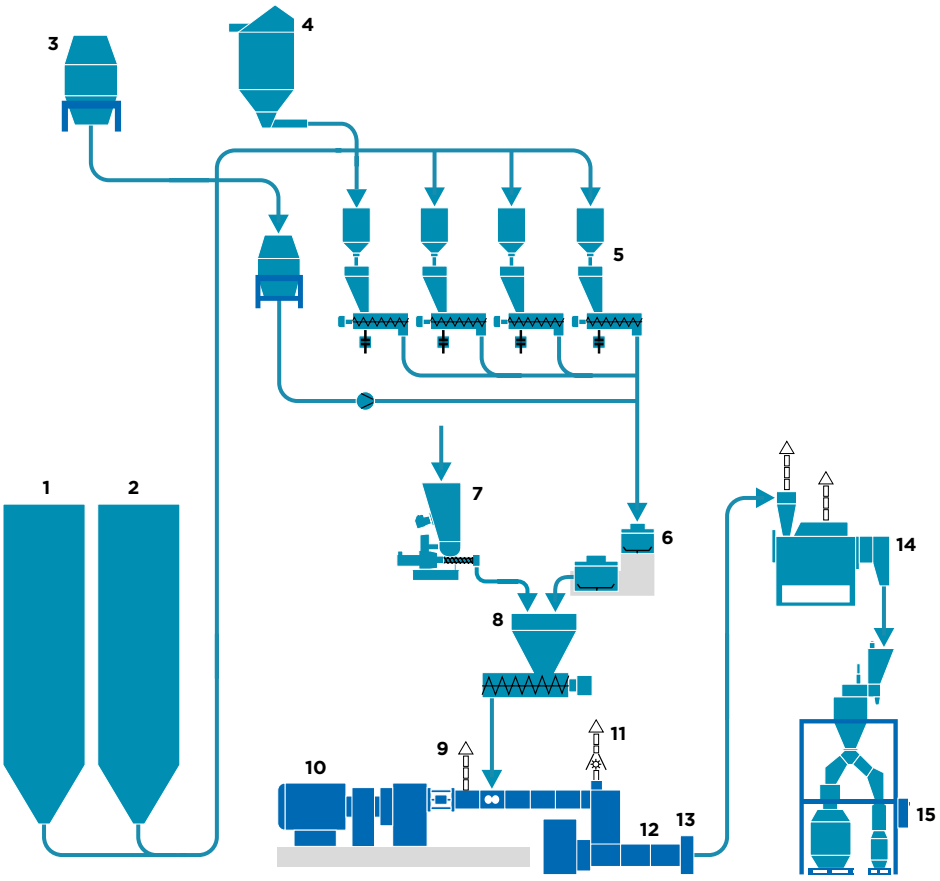
Processing of cable compounds. In the production of cable compounds, quality is the real deciding factor.

Because of its good mixing properties, the reproducibility of the process, product purity, and the great flexibility of the recipes, many producers in the cable industry rely on the continuous processing of the Kombiplast KP. For high accuracy feeding of all ingredients feeders of Coperion K-Tron are used. The special Kombiplast hybrid version can process either PVC or halogenfree flame-retardant compounds (HFFR) economically. The Kombiplast hybrid differs from a pure PVC plant in particular by an extended process section of the ZSK Mv PLUS twin screw extruder and by the use of a second ZS-B twin screw side feeder.

AREAS OF APPLICATION

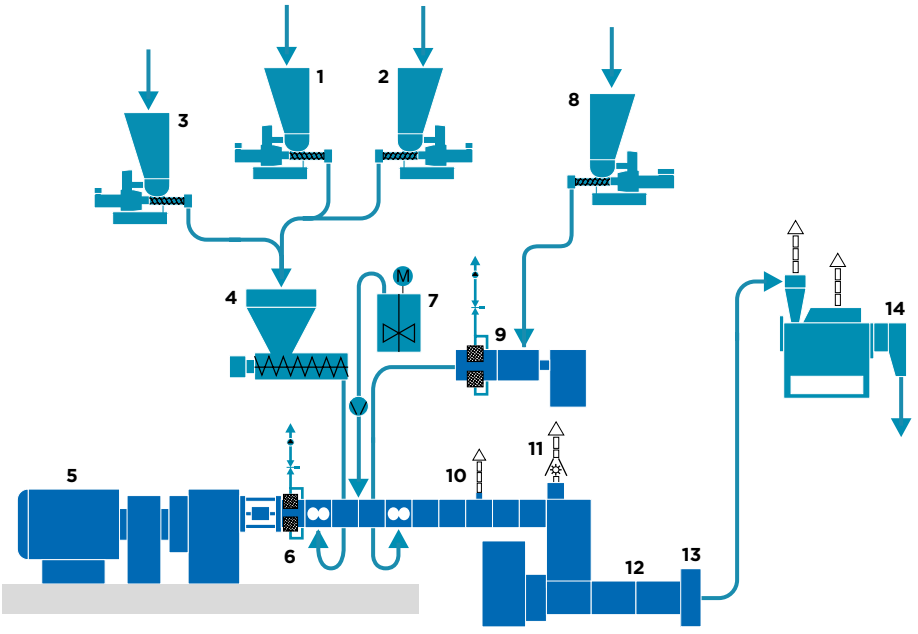
- Temperature and shear-sensitive products like cable insulations and sheaths
- XLPE by silane crosslinking such as Sioplas
- Reactive compounding, highly filled, flame-retardant compounds, semiconductor compounds, and special products that contain alloys and blends

TYPICAL SET-UP FOR THE COMPOUNDING OF PVC



1 PVC silo
2 Filler silo
3 Plasticizer
4 Bag dump station
5 Weighing equipment and feeder
6 Mixer
7 Coperion K-Tron gravimetric feeder
8 ZS-B twin screw side feeder
9 Venting
10 ZSK twin screw extruder
11 Vacuum venting
12 ES-A single screw discharge
13 EGR eccentric pelletizer
14 GFK pellet cooler
15 Bulk bag/bag filling station

TYPICAL SET-UP FOR THE COMPOUNDING OF HIGHLY FILLED, FLAME-RETARDANT CABLE MATERIALS (HFFR)



1 EVA/PE
2 Additives
3 ATH
4 ZS-B twin screw side feeder
5 ZSK twin screw extruder
6 Feed Enhancement Technology FET
7 Silane/peroxide
8 ATH
9 ZS-B twin screw side feeder with Feed Enhancement Technology FET
10 Venting
11 Vacuum venting
12 ES-A single screw discharge
13 EGR eccentric pelletizer
13 GFK pellet cooler

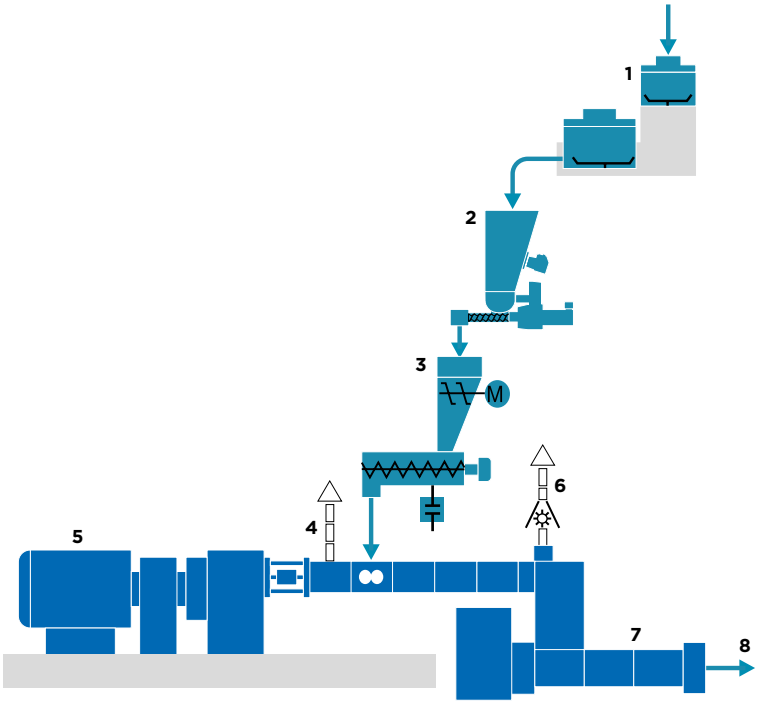
Processing of PVC for calender feeding. Outstanding mixing, gelling, and venting properties make the Kombiplast KP the ideal processing plant for films.

The Kombiplast KP is optimally suited for compounding PVC for films of the widest range of widths and thicknesses. It provides economic, flexible, and reliable feeding of calenders. By using high accuracy feeders of Coperion K-Tron the throughput rates of the Kombiplast KP can be varied easily as required by the process. The plant also features very good mixing, gelling, and venting properties that ensure a very homogeneous, blister-free product quality.

ADVANTAGES OF THE KOMBIPLAST KP FOR THE PRODUCTION OF FILMS

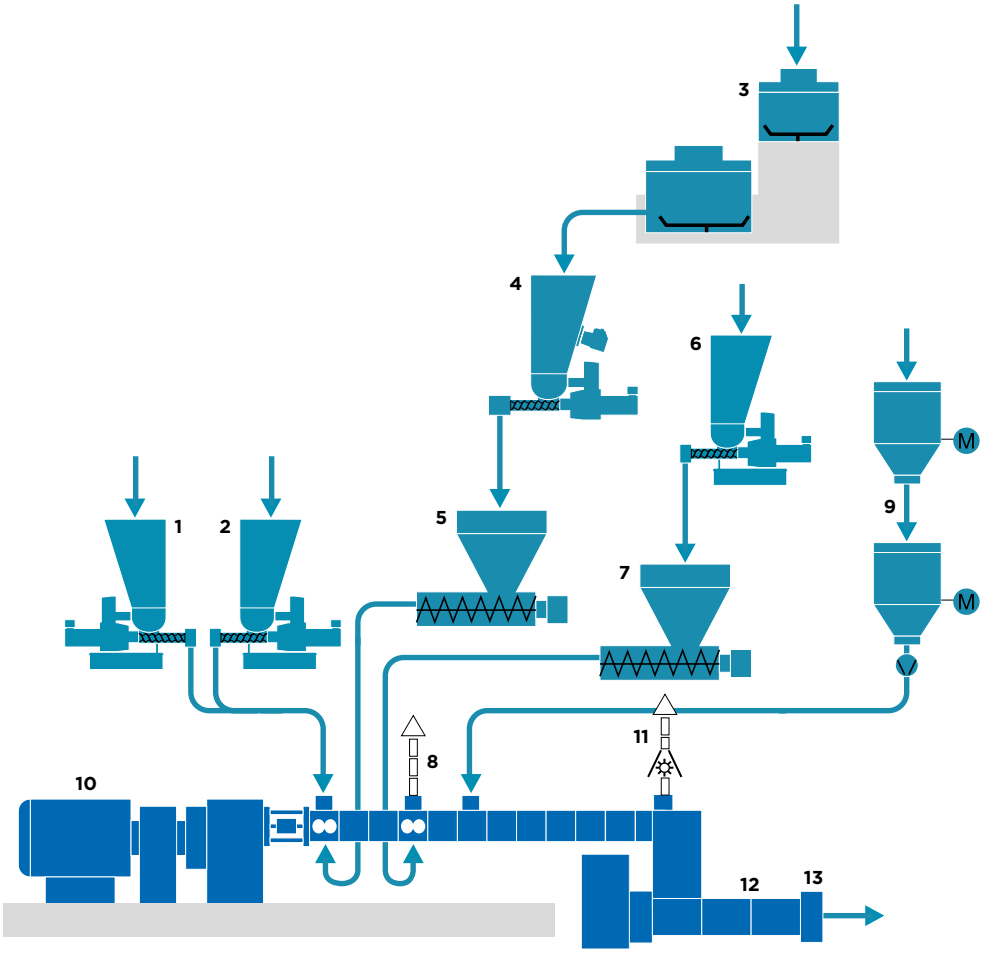
- Moderate shearing rates without peaks
- Ideal for heat and shear-sensitive products
- Fast reaction times due to predominantly mechanical energy consumption, tempering mainly for surface conditioning
- Short residence time for uniformly low thermal load
- Optimal venting due to frequent surface renewal
- Outstanding distributive and dispersive mixing due to the high number of shearing cycles
- Temperature measurement and injection of liquids directly into the melt possible at any point

TYPICAL SET-UP FOR CALENDER FEEDING WITH PVC



1 PVC mixer
2 Coperion K-Tron gravimetric feeder
3 ZS-B twin screw side feeder
4 Venting
5 ZSK twin screw extruder
6 Vacuum venting
7 ES-A single screw discharge
8 Discharge unit (nozzle) to the calender

TYPICAL SET-UP FOR CALENDER FEEDING WITH PVC AND POLYOLEFIN



1 Polymer
2 Additive
3 Alternative: Premix
4 Coperion K-Tron gravimetric feeder
5 ZS-B twin screw side feeder
6 Fillers
7 ZS-B twin screw side feeder
8 Venting
9 Liquid feeder
10 ZSK twin screw extruder
11 Vacuum venting
12 ES-A single screw discharge
13 Discharge unit

Processing of PVC for flooring. Whether multi-layer or monolayer design – Kombiplast KP ensures first-class product quality for floor coverings.

Thanks to the excellent product quality that it delivers, the Kombiplast KP is ideally suited for the compounding of PVC for flooring. The system structure differs depending on whether the flooring is composed of multiple layers (base layer, decorative layer, top layer, e.g. luxury vinyl tiles) or a single layer (forms its own pattern).

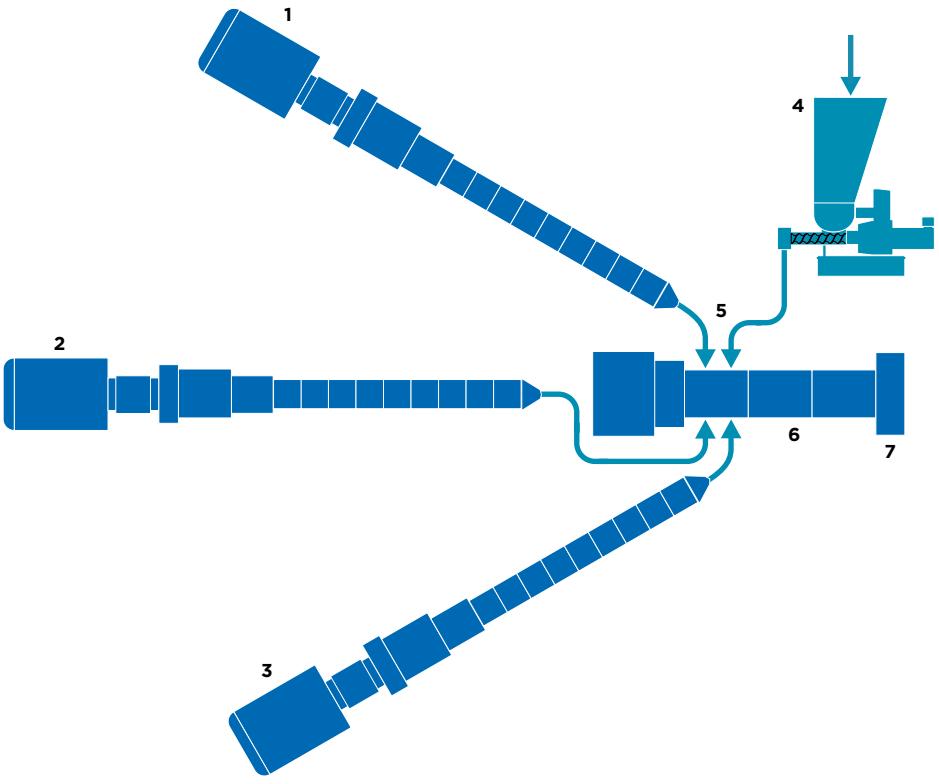
FLOORING COMPOSED OF MULTIPLE LAYERS

The individual layers are compounded separately, calendered, and then bonded with an intermediate layer containing glass fibers. Next, the flooring surface is pressed. The typical system set-up is the one for calender feeding with PVC (see page 9).

MONOLAYER FLOORING

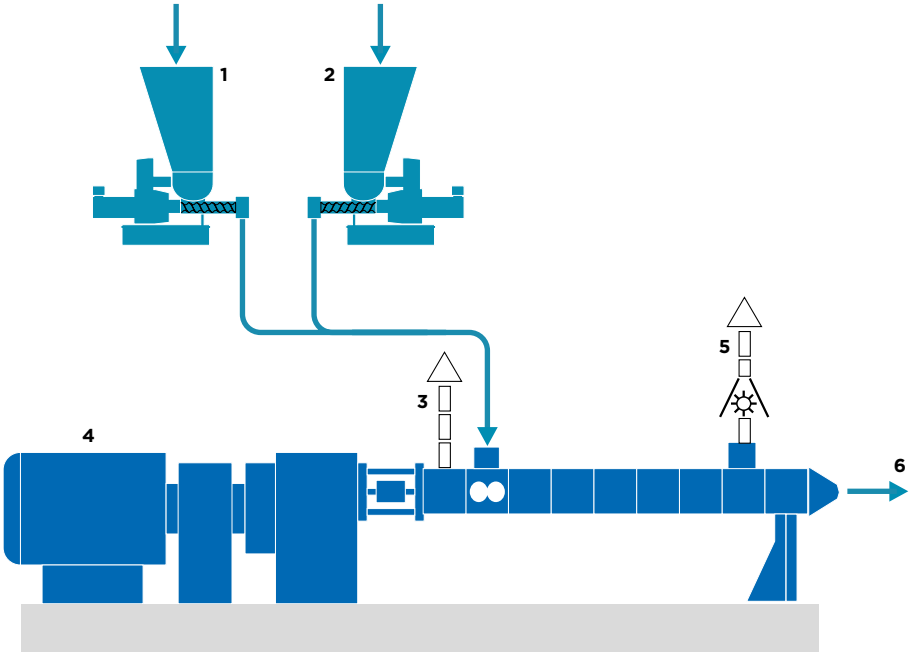
Several – usually three – ZSK twin screw extruders are used to compound strands of different colors. The ZSKs consist of nine barrels each into which the dry blend and dye are fed gravimetrically by feeders of Coperion K-Tron. The colored strands of the ES-A single screw discharge are fed by conveyor belts. The strands only mix together slightly in the ES-A and produce pellets that form their own pattern from the basic colors and shades. Color accents can be provided by adding decorative pellets to the feed hopper of the ES-A. Then a belt press is used to work the pellets into a continuous floor covering and press its surface.

TYPICAL SET-UP FOR THE PRODUCTION OF MONOLAYER FLOORING



1 ZSK twin screw extruder
2 ZSK twin screw extruder
3 ZSK twin screw extruder
4 Addition of decorative pellets
5 Feed hopper of the ES-A single screw discharge
6 ES-A single screw discharge
7 EGR eccentric pelletizer

TYPICAL SET-UP OF THE ZSK TWIN SCREW EXTRUDERS



1 Dry blend
2 Pigment
3 Venting
4 ZSK twin screw extruder
5 Vacuum venting
6 Strand die

TECHNICAL DATA

Kombiplast with ZSK Mv PLUS

Kombiplast ZSK/ES-A	Max. torque per shaft [Nm]	Max. specific torque Md/a³ [Nm/cm³]	Screw speed [min⁻¹]	Max. motor power N [kW]	Screw diameter [mm]
27 Mv PLUS/60	100/260	10.6	600/115	13/3	27/60
34 Mv PLUS/100	205/1,200	11.3	600/100	27/13	34/100
43 Mv PLUS/150	420/4,050	11.3	600/75	55/33	43/150
54 Mv PLUS/150	815/4,050	11.3	600/75	108/33	54/150
62 Mv PLUS/200	1,250/9,600	11.3	600/75	165/79	62/200
76 Mv PLUS/250	2,275/18,750	11.3	600/60	300/124	76/250
98 Mv PLUS/300	5,000/32,390	11.3	400/50	440/178	98/300
125 Mv PLUS/350	10,300/51,470	11.3	400/50	906/283	125/350

Throughput rates for Kombiplast with ZSK Mv PLUS

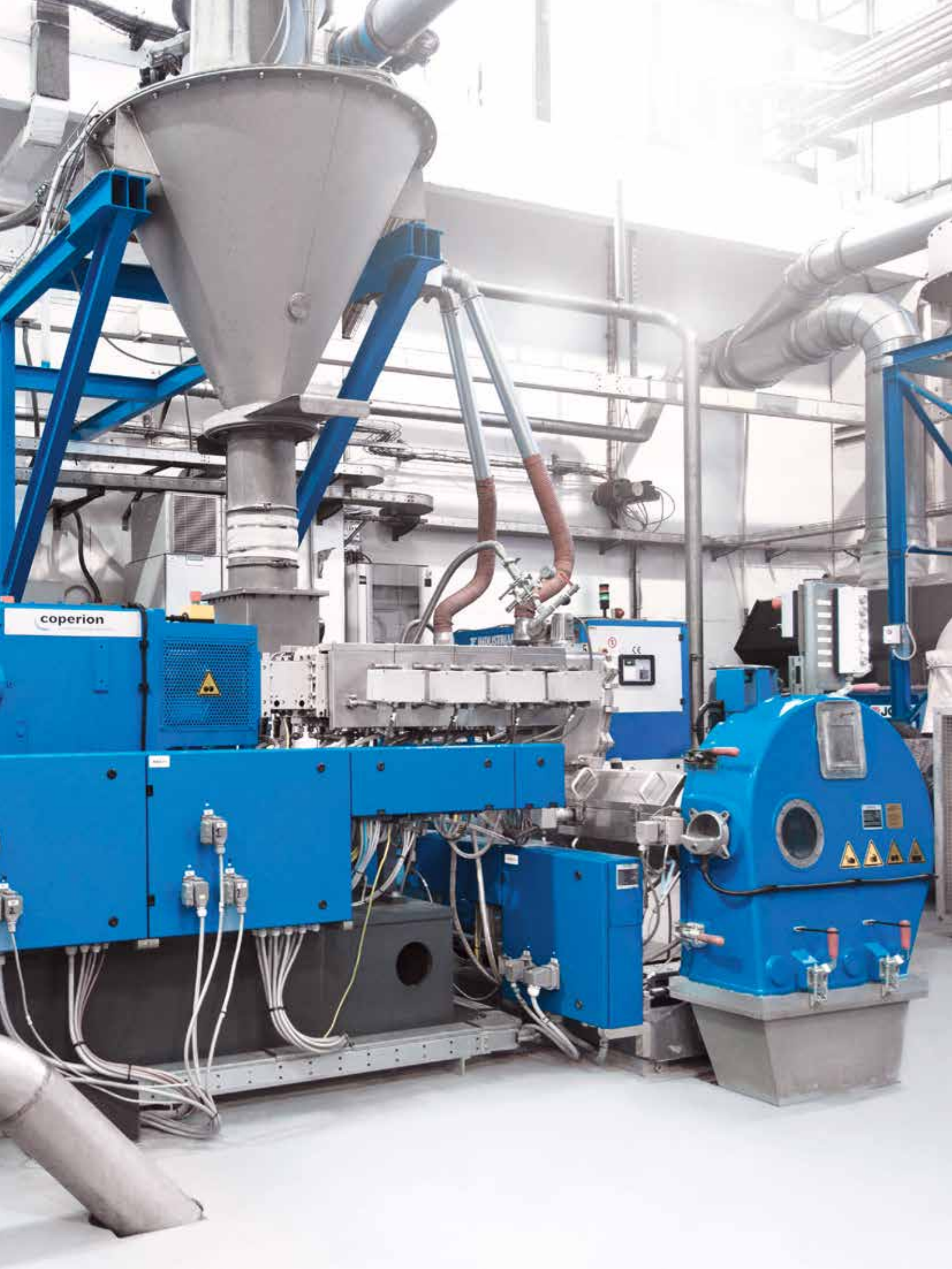
Kombiplast ZSK/ES-A	PVC-P [kg/h]	PVC-U [kg/h]	HFFR [kg/h]
27 Mv PLUS/60	150	100	80
34 Mv PLUS/100	600	250	125
43 Mv PLUS/150	900	500	250
54 Mv PLUS/150	1,500	900	500
62 Mv PLUS/200	2,700	1,400	750
76 Mv PLUS/250	4,400	2,300	1,200
98 Mv PLUS/300	6,600	3,600	2,800
125 Mv PLUS/350	13,500	7,000	5,800

Kombiplast with ZSK Mc¹⁸

Kombiplast ZSK/ES-A	Max. torque per shaft [Nm]	Max. specific torque Md/a³ [Nm/cm³]	Screw speed [min⁻¹]	Max. motor power N [kW]	Screw diameter [mm]
26 Mc¹⁸/60	140/260	15	600/115	18/3	25/60
32 Mc¹⁸/100	315/1,200	18	600/100	42/13	32/100
45 Mc¹⁸/100	930/1,200	18	600/100	123/13	45/100
58 Mc¹⁸/150	2,000/4,050	18	600/75	264/33	58/150
70 Mc¹⁸/200	3,500/9,600	18	600/75	462/79	70/200
92 Mc¹⁸/250	7,500/18,750	17	600/60	990/124	92/250
92 Mc¹⁸/300	7,500/32,390	17	600/50	990/178	92/300
119 Mc¹⁸/300	15,300/32,390	17	400/50	1,346/178	118/300
133 Mc PLUS/350	20,000/51,470	15	400/50	1,759/283	133/350

Throughput rates for Kombiplast with ZSK Mc¹⁸

Kombiplast ZSK/ES-A	PVC-P [kg/h]	PVC-U [kg/h]	HFFR [kg/h]
26 Mc¹⁸/60	150	100	60
32 Mc¹⁸/100	500	250	200
45 Mc¹⁸/100	900	500	400
58 Mc¹⁸/150	1,500	900	600
70 Mc¹⁸/200	2,700	1,400	1,000
92 Mc¹⁸/250	5,500	3,000	2,500
92 Mc¹⁸/300	6,800	3,500	2,500
119 Mc¹⁸/300	8,300	4,000	5,000
133 Mc PLUS/350	13,500	7,000	5,500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