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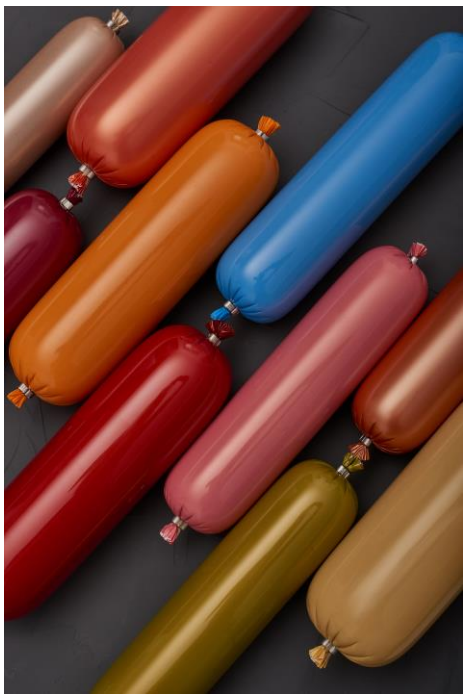
Casings AMIFLEX

AMIFLEX T/ Tc/ M/E/Perfect

Process Operating Manual



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1. APPLICATION

The present Process Operating Manual describes the process of production of cooked sausage and ham products, and also spreads and liver sausages with the use of the **AMIFLEX T, AMIFLEX Tc, AMIFLEX M, AMIFLEX E** and **AMIFLEX Perfect** casings.

AMIFLEX T, AMIFLEX Tc, AMIFLEX M, AMIFLEX E and **AMIFLEX Perfect** are five-layer casings made of polyamide, polyolefin, and an adhesive (modified polyethylene) permitted for use in the food industry.

The **AMIFLEX T, AMIFLEX Tc, AMIFLEX M, AMIFLEX E** and **AMIFLEX Perfect** casings and intended for production, transportation, storage and sale of:

- traditional cooked sausage and ham products;
- blood and liver sausages, and spreads;
- souse, aspic, and jellied products;
- processed cheeses;
- animal cooking fats, margarines, sour milk products (cream, country cheese);
- frozen products (sausage and meat batter, ice-cream, dough);
- other food products.

The distinctive feature of the **AMIFLEX Tc** casing is improved sliceability and spiral peelability, achieved by special biaxial orientation in the process of extrusion. This makes it possible to cut the sausage chubs in this casing at any angle and with any thickness of the slice, without any ragged edges or longitudinal ruptures of the casing that affect the appearance of the product.

The **AMIFLEX E** and **AMIFLEX Perfect** casing is intended for the production of cooked sausage and ham products subjected to thermal processing, and then peeled, sliced, and packed before being sold. The distinctive features of this casing are:

- high caliber accuracy, which ensures a steady size of the chubs during the molding and after thermal processing along the whole length to guarantee the same size of the slices and the fixed weight of the retail packaging;
- preferential longitudinal rupture of the casing to ensure its fast and complete peeling off the product in one move.

The **AMIFLEX Perfect** casing has enhanced mechanical characteristics which provide for products' resistance to deformation

during thermal processing and an option of vertical boiling of the chubs up to 10 kg weight.

The **AMIFLEX T** and **AMIFLEX M** casings are intended for retail sale of products in the form of chubs.

The recommended shelf life of cooked sausages in the **AMIFLEX T**, **AMIFLEX Tc** and **AMIFLEX M** casings is up to 60 days at a storage temperature from 0 to 6 °C and air relative humidity not more than 75%.

The shelf life of liver sausages in the **AMIFLEX T** and **AMIFLEX Tc** casings is up to 15 days from completion of the technological process at a temperature of 4 ±2 °C.

2. ADVANTAGES

2.1. Casing advantages

2.1. Mechanical strength of the casing makes it possible to mold the chubs with the use of high-capacity automatic or semi-automatic clippers to ensure stability of the shape and fixed weight of the chubs at high rates of molding.

2.2. Elasticity of the casing in combination with its heat shrinkage capacity provides for a smooth surface of the chubs.

2.3. Low permeability to oxygen and water vapor is ensured by a carefully selected combination of polymers, which provides for the following advantageous properties of the **AMIFLEX T, AMIFLEX Tc, AMIFLEX M, AMIFLEX E** and **AMIFLEX Perfect** casings:

- zero losses during the thermal processing and storage of meat and sausage products;
- microbiological stability of the products during storage;
- retardation of the oxidation processes leading to rancidification of fats and changes in the natural color of the meat product;
- excellent selling appearance (no wrinkles) of the finished products throughout the shelf life.

2.4. Physiological safety: the **AMIFLEX T, AMIFLEX Tc, AMIFLEX M, AMIFLEX E** and **AMIFLEX Perfect** casings are impervious to microbiological degradation, because the materials used for their production are inert to the action of bacteria and mold fungi. This facilitates storage of the casing and improves the hygienic characteristics of both the casing itself, and of the sausage production.

3. ASSORTMENT OF PRODUCTS

Casing calibers, mm

AMIFLEX T	29 - 200
AMIFLEX Tc	35 - 120
AMIFLEX M	35 - 120
AMIFLEX E	40 – 150
AMIFLEX Perfect	40-120

Colors of the **AMIFLEX T, Tc, M, E, Perfect** casing: according to the Color Catalogue.

The **AMIFLEX T, AMIFLEX Tc, and AMIFLEX M** casings can be used for single- or double-sided printing in a single color, multicolor or full color, with the use of UV-hardened inks or volatile solvents-based inks.

The casing can be supplied in:

- rolls;
- shirred sticks;
- R2U shirred sticks (ready-to-use casing).

4. CASING USE TECHNOLOGY

4.1. Storage and transportation of casing

4.1.1. The casing must be stored in the original packing in dry, clean, and cool rooms (at a temperature from 5 to 35°C and air relative humidity not more than 80%) conforming to the sanitary-hygienic standards for the meat processing industry.

4.1.2. It is recommended to open the manufacturer's packing just immediately before use of the casing.

4.1.3. During storage and transportation, the casing should not be exposed to high temperature or direct sunlight.

4.1.4. If the casing was stored at a temperature below 0°C, then prior to use hold it at room temperature for not less than 24 hours

4.1.5. Never drop the boxes with casings or subject them to impacts.

4.1.6. Throughout the entire technological cycle, it is necessary to ensure that the shell is not injured.

4.2. Preparation of the casing for use

To impart elasticity to the casing and provide for uniform stuffing of **AMIFLEX T, Tc, M, E** and **Perfect** the casing must be soaked in potable water at a temperature of 20 – 25 °C.

Water must penetrate the tube and wet both the outer and the inner surface of the casing.

Unshirred casings must be cut into sections of required length before soaking. Keep the spool vertical throughout the unwinding to avoid damaging the ends.

Soak shirred casings without removing the net.

Casing soaking time:

- not less than 30 minutes for casings cut into lengths;
- not less than 60 minutes for shirred casings.

If too much casing was soaked, remove it from water, drain the excessive water and leave the wet casing away from any sources of heat or air draft. On the next day, soak the casing again before processing.

Never soak the casing in hot water, because this may start a process of uncontrolled longitudinal and transverse shrinkage leading to reduction of the length and caliber of the casing.

The R2U (ready-to-use) casing does not require pre-soaking and may be processed immediately. The opened manufacturer's packing must be tightly closed to preserve the properties of the casing.

4.3. Preparation of the stuffing

During thermal processing the sausage batter inside the **AMIFLEX T, Tc, M, E** and **Perfect** casings does not lose moisture, therefore the calculation of the amount of water added to the batter at the stage of cutting shall be made on the basis of the moisture resistance properties of the casing.

In the development of new recipes, determine the quantity of the added moisture with regard to the moisture-retaining properties of the additives (emulsifiers, stabilizers, gelling agents, plant proteins, etc.), the raw meat quality, and the technical condition of the equipment, paying special attention to optimal binding of proteins, fats, and water.

All technological measures aimed at increased binding of water (raising of the yield) lead to raising of the pressure in the batter during the thermal processing. Batter with an elevated percentage of meat substitutes tends to swell more. In order to preserve the ability of the batter to bind significant amounts of water and to prevent rupture of the casing during the thermal processing, it is

recommended to introduce all water-binding additives into the cutter not in a dry form, but in the form of jellies or emulsions.

The batter for hams, spreads, and liver sausages must be prepared in accordance with the regulatory documentation applicable to these products.

4.4. Molding of sausage products

The **AMIFLEX T, Tc, M, E** and **Perfect** casings are designed for stuffing and clipping on automatic or semi-automatic equipment, but they can also be manually tied.

Never puncture the chubs (perforate the casing). The casing will rupture, if punctured.

To provide for a good appearance of the finished products, increased holding capacity of the casing, and reduction of the risk of water and fat pockets, the **AMIFLEX T, M** and **E** casings should be filled with sausage emulsion with 10% overstuffing, while the overstuffing of the **AMIFLEX Tc** casing relative to the nominal caliber varies from 12 to 16% depending on the production conditions, the overstuffing of the **AMIFLEX Perfect** casing is 4-6%.

During the molding it should be borne in mind that the difference between the nominal caliber of the casing and the stuffed caliber depends not only on the properties of the casing, but also on the emulsion consistence and temperature, the stuffing pressure, and the conditions of cooling after thermal processing. Thus, if the emulsion has a good binding or swelling capacity, it is recommended to reduce the casing overstuffing relative to the nominal caliber to avoid rupture of the casing during thermal processing.

If spreads are made by the hot method, when the emulsion is liquid and its temperature exceeds 40°C, the overstuffing relative to the nominal caliber should be increased to 15 – 18%.

When sausage or ham products are stuffed into the **AMIFLEX E** and **Perfect** casing, the recommended length of the chubs should be at least 1 m to reduce the product waste during the slicing.

When using shirred casings, make sure that the stuffing horn diameter is appropriate for the inner diameter of the shirred stick: the stick must freely fit the stuffing horn, and the difference between the inner diameter of the stick and the outer diameter of the horn

must be as small as possible to mitigate any structural changes in the batter matrix.

Table 1

Diameter of the casing	Diameter of the shirring tube, mm	Recommended outer diameter of the stuffing horn, mm
29 - 31	21	18
32 – 34	24	18, 20
35 - 37	26	20, 22
38 - 44	28	22, 24
45 - 53	32	24, 28
54 - 69	40	28, 36
70 - 79	52	36, 48
80 - 87	61	48
88 - 99	71	60
100 - 130	81	60
131 - 150	96	60, 80
151 - 175	110	60, 80
176 - 190	138	85, 100
191 – 200	156	85, 100

The clip must securely hold the ends of the chub, without damaging the casing. Observe the recommendations of the clipping equipment manufacturer to ensure tightness of clipping. See the recommendations on selection of the clips for the **AMIFLEX T, Tc, M, E** and **Perfect** casings in Table 2.

Recommended clip types

Table 2

Gauge	POLY-CLIP		TIPPER TIE	TECHNOPACK		COMPO	CORUND
	Clip interval 12 interval 15 interval 18	Clip series S	Clip interval 12 interval 15 interval 18	Clip series E	Clip series G	Clip series B, BP	Clip
29-50	12-6-4×1.25 15-7-5×1.5 18-7-5×1.75	625 628 735	12/6-4×1.25 15/7-5×1.5 18/7-5×1.75	210 410	175	B 1, BP 2	XE210 2,5x13,6x14
55 – 60	15-7-5×1.5 15-8-5×1.75 18-7-5×1.75	628 632 735	15/7-5×1.5 15/8-5×1.75 18/7-5×1.75	210 410	175 370	B 2, BP 2	XE 210 XE 220 2,5x13,6x14
65-70	15-8-5×1.5 18-7-5×1.5 18-9-5×2.0	628 632 735	15/8-5×1.5 18/7-5×1.5 18/9-5×2.0	210 220 410	175 370	B 2, BP 2	XE 220 2,5x13,6x14 2,5x13,6x15
75-80	15-8-5×1.5 15-9-5×1.5 18-9-5×2.0	632 638 735 844	15/8-5×1.5 15/9-5×1.5 18/9-5×2.0	220 410 420	175 200 370	B 2, BP 2 B 3, BP 3	XE 220 2,5x13,6x15 2,5x13,6x16

85-100	15-9-5×1.5 15-10-5×2.0 18-9-5×2.0 18-10-5×2.5	740 844	15/9-5×1.5 15/10-5×2.0 18/9-5×2.0 18/10-5×2.5	220 420	200 370 390	-	XE 220 2,5x13,6x15 2,5x13,6x16
105-120	15-10-5×2.0 15-11-5×2.0 18-10-5×2.5 18-11-5×2.0	740 744 844	15/10-5×2.0 15/11-5×2.0 18/10-5×2.5 18/11-5×2.0	220 230 420	200 225 370 390	-	-
125-140	15-11-5×2.0 18-10-5×2.5 18-11-5×2.0	844 848	15 /11-5×2.0 18/10-5×2.5 18/11-5×2.0	420 430	390 400	-	-
145-170	18-11-5×2.0 18-12-5×2.2	848 854	18 /11-5×2.0 18/12-5×2.5	430	400	-	-
175 - 200		844 848 854		420R 430R			

Note: POLY-CLIP FCA, TIPPER TIE TT1815, TT1512, SVF 1800 and COMPO CN-501 clippers use blocks, each of which corresponds to a certain clip type indicated in the Table. In order to determine whether the clip matches the block, see recommendations of the manufacturer and the technical description of the clipper.

4.5. Thermal processing

Thermal processing of sausages in the **AMIFLEX T, Tc, M, E** and **Perfect** casings consists in cooking and cooling. The stages of drying and roasting can be excluded from the technological process.

Sausage chubs in the **AMIFLEX E** casing with a significant length and a caliber up to 60mm can be cooked suspended, while the chubs of calibers over 60mm should be cooked lying down to ensure a uniform caliber through the entire length of the chub.

Thermal processing of sausages can be made in heat chambers of different types, and in stationary cauldrons.

4.5.1. Cooking

For the purposes of thermal processing in heat chambers, it is recommended to use either staged cooking, or delta cooking. In either case, cooking should start at a temperature of 50-55°C to trigger the coloring reactions. Higher starting temperatures may cause separation of the emulsion and color defects (grey rings).

Staged cooking consists in step-by-step raising of the temperature in the heat chamber, as the temperature in the center of the product reaches the temperature of the heating medium. The number of 'stages' is determined by the product diameter– the greater the caliber, the greater is the number of the stages. The first stages consist in heating at moderate temperatures – 50, 60, 70 °C to ensure slow coagulation of proteins and redistribution of heat throughout the volume. The last stage is bringing of the product to consumption readiness (72 °C in the chub core, during 10 - 15 minutes).

Delta cooking creates more favorable conditions for uniform heating of sausages. The difference between the chamber temperature and the product temperature at the beginning of the process is 15 – 20 °C, reducing to 5 - 8 °C by the end of the process. Delta cooking in production conditions requires a longer heating, but yields higher quality products. The duration of cooking depends on the consumption readiness point of the product (72 °C in the chub core, during 10 - 15 minutes).

The following is an example of thermal processing for 60mm caliber sausage chubs:

- 55°C in heat chamber at 100% humidity - 15 minutes.
- 65°C in heat chamber at 100% humidity - 15 minutes.
- 75°C in heat chamber at 100% humidity - 25 minutes, or until 60°C in chub core is reached.
- 80°C in heat chamber at 100% humidity, until 72°C in chub core is reached.

For cooking in cauldrons it is recommended to:

- load the chubs in the water at a temperature of 55 – 60 °C, in order to prevent the uncontrollable shrinkage and deformation of the chubs;
- keep the sausages underwater, and move them for uniform cooking;
- before loading of each new batch of sausages, reduce the water temperature in the cauldron to 60°C.

4.5.2. Cooling

Upon completion of the cooking process, the sausages must be immediately cooled. The first stage of cooling is spraying with cold water (time-delayed sprayers may be used) to bring the chub center

temperature down to 25 - 35° C. After spraying, the sausage must be air-dried before putting it into a cold store.

Cold air cooling is undesirable. Exclude any exposure of the finished products to air drafts until complete cooling of sausages, because this may cause wrinkles on the surface.

4.6. Maturing of sausages

Transportation and storage of sausage products manufactured with the use of the **AMIFLEX T, Tc** and **M** casings shall be in accordance with the regulatory documentation for these products.

Sausage chubs made in the **AMIFLEX E** and **Perfect** casing and peeled before packaging in vacuum or modified gas atmosphere must have a dry surface, and therefore should not be subjected to temperature drops that may cause the formation of condensate on their surface.

5. MANUFACTURER'S GUARANTEES

5.1. The Manufacturer guarantees conformity of the casing with the Specification requirements subject to compliance with the required conditions of transportation and storage at the user's warehouse, and preservation of the integrity of the original packing.

5.2. The shelf life of the casing without UV-printing is 3 years from manufacture subject to compliance with the required conditions of transportation and storage at the user's warehouse, and preservation of the integrity of the original packing.

5.3. The shelf life of the casing with UV-printing is 2 years from manufacture subject to compliance with the required conditions of transportation and storage at the user's warehouse, and preservation of the integrity of the original packing.

5.3. The shelf life of the R2U casing is 6 months from manufacture, subject to compliance with these specifications.

If the R2U casing, which is ready to use (it does not require any pre-soaking), has not been used within 6 months, it still can be processed in accordance with the requirements of this Process Operating Manual after the standard soaking procedure. In this case the shelf life is extended to the standard term (3 years from manufacture, subject to compliance with these specifications).

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