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AMIFLEX N CASING

Process Operating Manual

Address: 72 Onuchkina str., village of Lenin, Aksay district,
Rostov region, 346703 Russian Federation
Phones: Tel: +7 863 255-85-85 /
+7 863 261-85-80
Fax: +7 863 261-85-79
www.atlantis-pak.ru
export@atlantis-pak.ru

1. APPLICATION

The present Process Operating Manual describes the process of production of cooked sausages with the use of the **AMIFLEX N** casing**.**
The distinctive feature of the **AMIFLEX N** casing is that it can be easily stretched in the longitudinal and the transverse directions, which makes it possible to mold ball-shaped products.
AMIFLEX N is a five-layer casing made of polyamide, polyolefin, and an adhesive (modified polyethylene) permitted for use in the food industry. The quality of the raw materials used to manufacture the casing is confirmed by Russian and international quality certificates.
The **AMIFLEX N** casing can be used for production, transportation, storage and sale of:

- cooked sausage and ham products;
- blood and liver sausages, and spreads;
- souse, aspic, and jellied products;
- animal cooking fats;
- frozen products (minced sausage and meat);
- other food products.

The recommended shelf life for cooked sausages made in the **AMIFLEX N** casing is 60 days at a storage temperature from 0 to 6ºC, and relative humidity of the air not more than 75%.
The recommended shelf life for liver sausages made in the **AMIFLEX N** casing is 15 days from the end of the technological process at a storage temperature of 4±2ºC.

2. PROPERTIES AND ADVANTAGES

2.1. The **AMIFLEX N** casings can be used to expand the assortment of the manufactured products through diversification of the appearance of sausages; besides, the ball shape is associated by the consumers with the natural gut material, such as bladders.
2.2. Mechanical strength of the casings makes it possible to mold ball-shaped chubs with the use of high-capacity automatic and semi-automatic clippers at high production rates.
2.3. High elasticity of the casing in the longitudinal and the transverse directions facilitates the process of automatic molding of balls shapes, and ensures a significant overstuffing relative to the nominal caliber. This reduces the consumption of casing per ton of the finished products in comparison with the conventional types of multilayer casings.

2. 4. Low permeability to oxygen and water vapor is ensured by a carefully selected combination of polymers, and provides for the following advantageous properties of the **AMIFLEX N** casing:

- 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.

2.5. High heat resistance of polymers used for manufacturing significantly expands temperature scope of the casing usage in comparison with natural casings.

2.6. Physiological safety is due to the fact that the casing is impervious to microbiological degradation, because the materials used for its 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, and the sausage production.

3. ASSORTMENT OF THE PRODUCTS

AMIFLEX N is supplied in the following calibers: 35 – 80 mm.
Casing colors: white, clear, bronze, yellow, gold, gold 47, smoke 5, smoke 3, smoke, red, copper, dark gold 41, pink 1, ginger, black, light ginger, dark orange.
AMIFLEX N can be used for single- or double-sided marking (including imitation of the natural bung pattern). The number of colors varies from 1 to 6. CMYK printing is optional.
Printing is applied by the flexographic method; the inks are resistant to boiling, fats, and mechanical damage.
The casing can be supplied in:

- rolls;
- shirred sticks.

4. CASING USE TECHNOLOGY

4.1. Storage and transportation of the casing

4.1.1 The casing must be stored in its original packing in dry and clean rooms at a temperature from 5 ºC to 35 ºC, and air relative humidity not higher than 80%) complying with the sanitary and hygienic standards applicable to the meat processing industry.
4.1.2 It is recommended to open the manufacturer's packing immediately before processing of the casing.

4.1.3 During storage and transportation, the casing should not be exposed to high temperatures or direct sunlight.
4.1.4 If the casing was stored at a temperature below 0°C, then prior to use keep it at room temperature during at least 24 hours in the manufacturer's packing.
4.1.5 Never drop the cases containing the casing or subject them to impacts.
4.1.6 The casing must not be damaged throughout the technological cycle.
4.1.7 Transportation of the casing should be carried out at temperatures below +40 °C, exposure to direct sunlight is prohibited.

4.2. Preparation of the casing for use

In order to impart elasticity to the casing and provide for a uniform filling, the **AMIFLEX N** casing must be pre-soaked in potable water with a temperature of 20-25°C.
Water must penetrate inside the tube and wet 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 40 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 casing in the wet condition, away from any sources of heat or air draft. On the next day, soak the casing again before processing.

4.3. Composition of the emulsion

In the process of thermal processing, the sausage batter inside the **AMIFLEX N** casing 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.
For 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. This must be taken into account. In order to preserve the batter's ability to bind significant amounts of water and to prevent rupture of the casing during the thermal processing, it is recommended to introduce all additives into the cutter not in a dry form, but in the form of jellies or emulsions.
The batter for spreads, liver sausages, and hams must be prepared in accordance with the regulatory documentation applicable to these products.

4.4. Molding of sausages

In order to mold ball-shaped products, adjust the portion volume fed by the stuffer to match the desired weight of the product, and then proceed with adjustment of the pressure exerted on the casing by the brake ring to achieve the recommended overstuffing of the casing relative to the nominal caliber.
The **AMIFLEX N** casings should be filled with sausage batter with **50-65% overstuffing**, striving to keep the length and the diameter of the product equal. This will ensure a good appearance of the product, reduce the risk of water and fat pockets, and increase the holding capacity of the casing.
To achieve stable portioning and a fixed weight of the chubs when using high-capacity automatic stuffing and clipping equipment, the **AMIFLEX N** casings should be molded with **50% overstuffing**.

See Table 1 for the approximate molding parameters for the **AMIFLEX N** casing.

Table 1

Caliber of casing	Overstuffing of products, %	Diameter of products, mm	Length of products, mm	Weight of products, g
70	60	112	112	750
60	60	96	96	550
55	60	88	88	400
45	65	74	74	230
35	65	58	58	125

For clippers with automatic retraction of the brake unit, preset the brake unit retraction to the minimum value.
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 high binding or swelling ability, it is recommended to somewhat reduce the percentage of overstuffing relative to the nominal caliber.

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 not less than 65 %.

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

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 **AMIFLEX N** casings in Table 2.

Table 2

Recommended clip types for **AMIFLEX N** casings

Caliber	POLY-CLIP		TIPPER TIE	TECHNOPACK		COMPO	CORUND
	Clip interval 15 interval 18	Clip series S	Clip interval 15 interval 18	Clip series E	Clip series G	Clip series B, BP	
35- 40	15-7-5×1.5 18-7-5×1.75 15-8-5×1.75	625 628 735	15 /7-5×1.5 18 /7-5×1.75 15 /8-5×1.5	210 220 410	175 370	B 1, BP 1 B2, BP2	XE210 XE 220 2.5x13.6x14
45 - 50	15-7-5×1.5 15-8-5×1.75 18-7-5×1.5	628 735	15 /7-5×1.5 15 /8-5×1.5 18 /7-5×1.75	210 220 410	175 370	B 2, BP 2	XE 210 2.5x13.6x14
55 - 60	15-7-5×1.5 15-8-5×1.75 18-7-5×1.5	628 632 735	15 /7-5×1.5 15 /8-5×1.75 18 /7-5×1.75	210 220 410	175 370	B 2, BP 2	XE 220 2.5x13.6x14 2.5x13.6x15
65 - 70	15-8-5×1.5 18-7-5×1.5	628 632 735	15 /8-5×1.75 18 /7-5×1.75	220 410	175 370	B 2, BP 2	XE 220 2.5x13.6x15
75 - 80	15-9-5×1.75 18-9-5×2.0	632 638 735 844	15 /9-5×1.75 18 /9-5×2.0	220 410	175 200 370	-	-

The 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 N** casing consists in cooking and cooling. The stages of drying and roasting can be excluded from the technological process.
Thermal processing of sausages can be carried out in heat chambers of various types, and in stationary cauldrons.

4.5.1. Cooking

When processing in heat chambers, it is recommended to use either staged cooking, or delta cooking. In either case, start cooking at a temperature of 50 – 55 °C to trigger the coloring reactions. Higher starting temperatures may lead to stratification of the stuffed 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 'steps' is determined by the product diameter– the greater the caliber, the greater is the number of the steps. The first stages consist in heating at moderate temperatures – 50, 60, 70 °C to ensure slow coagulation of proteins and distribution of heat throughout the volume. The last stage is bringing of the product to consumption readiness (72 °C in the chub center 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 in 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 time required to achieve the consumption readiness of the product (72 °C in the chub center during 10 - 15 minutes).

When processing in cauldrons, it is recommended to:
- load the chubs in water at a temperature of 55 - 60 ºC to avoid uncontrollable shrinkage and deformation of the chubs;
- keep the sausages permanently submerged under water, and stir for uniform cooking;
- prior to loading of each new batch of sausages, reduce the water temperature in the cauldron to 60 ºC.

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 going into a cold store.
Cold air cooling is undesirable. Exclude any exposure of the finished products to air drafts until completely cooled, because this may cause wrinkles on the surface.

4.6. Transportation and storage of sausages

Transportation and storage of sausage products manufactured with the use of the **AMIFLEX N** casing shall be in accordance with the regulatory documentation for these products.

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 is 3 years from manufacture.

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