



CASINGS 

AMIFLEX T Ham

Process Operating Manual



1. APPLICATION

This Process Operating Manual describes the process of production, transportation, storage and sale of meat products (restructured Ham in casings) with shapes different from the traditional shape of sausage chubs, produced in press molds and packaged in the **AMIFLEX T Ham** casing.

AMIFLEX T Ham is a five-layer casing made of polyamide, polyolefin and adhesive (modified polyethylene) permitted for use in the food industry by the Russian Ministry of Health. The quality of the raw materials used for production of the **AMIFLEX T Ham** casing is confirmed by Russian and international quality certificates.

The **AMIFLEX T Ham** casing is made in accordance with Specifications TU 22.21.29-010-27147091-2000 (equivalent to TU 2290-010-27147091-2000)

The recommended shelf life of the cooked Ham packaged into the **AMIFLEX T Ham** casing is 60 days at the storage temperature from 0 to 6°C and the air relative humidity not higher than 75%.

The **AMIFLEX T Ham** casing has the following distinctive features that make it suitable for production of restructured Ham imitating whole-muscle products, using advanced equipment to achieve high yields, zero losses and long storage terms:

- enhanced adhesion of the casing to the forcemeat, achieved through special treatment of the inside surface of the casing with corona discharges;
- increased heat shrink ratio in the machine and transverse directions, and elasticity achieved through unique biaxial orientation.

2. PROPERTIES AND ADVANTAGES OF THE AMIFLEX® CASING, TYPE T HAM

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

2.2. High elasticity of the casing combined with **enhanced heat shrink ratio** makes it possible to accurately reproduce the



required shape and obtain products with a smooth surface without wrinkles or folds.

2.3. Greater adhesion to the forcemeat prevents separation of the casing from the product and, consequently, formation of fat-and-water pockets throughout the period of storage of the product.

2.4. Low permeability to oxygen and water vapor is ensured by a thoroughly selected combination of polymers and provides for the following advantages of the **AMIFLEX T Ham** 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 responsible for 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. Physiological safety - the **AMIFLEX T Ham** 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.

See the technical characteristics of the **AMIFLEX T Ham** casing in the Product Specification and in TU 22.21.29-010-27147091-2000.

3. ASSORTMENT OF PRODUCTS

Calibers of the **AMIFLEX T Ham** casing 60 – 200mm

Colors of the **AMIFLEX T Ham casing**: clear, white, bronze, brown, red 35, smoke, smoke 3, smoke 5, honey, light ginger, light gold, gold, gold 47, dark gold, pink, pink 1, pink 4, pink 12, black.

Casings of bespoke colors can be supplied to order.

The **AMIFLEX T Ham** casing is suitable for single- or double-sided single-color, multi-color or CMYK printing with the use of UV-cured inks or inks based on volatile solvents. Printing is made by flexography.



The casing can be supplied in:

- reels;
- sticks of shirred casing.

4. PROCESSING TECHNOLOGY

4.1. Storage and transportation of casing

4.1.1. The casing must be stored in the manufacturer's packing in dry, clean, and cool rooms (at a temperature from 5 to 35 °C, with the air relative humidity not exceeding 80%) compliant with the applicable sanitary and hygienic standards for the food industry.

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

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

4.1.4. If the casing was stored at a subzero temperature, then prior to use hold it at room temperature for not less than 24 hours without removal of the manufacturer's packing.

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

4.1.6. Throughout the technological cycle it is important to protect the casing from damages.

4.1.7. During transportation, the casing should not be exposed to temperatures exceeding 40 °C or direct sunlight.

4.2. Preparation for processing

Preparation of the casing for stuffing depends on the method of forming of the ham products:

- if forming is to be performed without overfilling of the casing relative to the nominal caliber, or with minimum overfilling, then pre-soaking is not required.

- if forming is to be performed with overfilling relative to the nominal caliber, then pre-soaking is required to impart elasticity to the casing.

The **AMIFLEX T Ham** casing should be soaked in potable water (SanPiN 2.1.4.559-96 'Potable Water. Hygienic Requirements for the Quality of Water in Centralized Potable Water Supply Systems. Quality Control') with a temperature of 20-25°C. Water must penetrate the tube and wet both the outside and the inside surface of the casing.



Unshirred casings should be cut into sections of required length before soaking. Keep the reel 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 shrinking with the resulting reduction of the length and caliber of the casing.

4.3. Preparation of forcemeat

The forcemeat is prepared in accordance with the relevant regulatory documents for the products (GOST, TU).

The **AMIFLEX T Ham** casing excludes any weight loss of the product in the course of thermal processing, therefore the selected ham production process should not allow for appearance of jell-like pockets during the cooking. As a rule, the filling brine for Ham produced in the **AMIFLEX T Ham** casing contains a large amount of moisture-binding additives, such as plant proteins, carrageenans, starch, and polyphosphates. The combination of such additives makes it possible to produce Ham with a yield of up to 200%.

4.4. Molding of Ham

After processing in the curing tumbler, the forcemeat is stuffed into the casing, put in the molds (mold frames or single-piece molds) and pressed.

The following guidelines apply to molding of ham products:

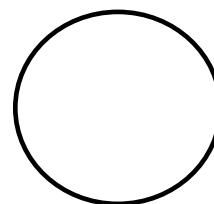
1. The main filling parameter is the weight, i.e. the quantity of the stuffing that goes into the mold of a certain size, and corresponds to the weight of the finished product.



2. The caliber of the casing used must be in conformity with the mold size. The cross-sectional perimeter of the mold must be equal to that of the finished product.



Cross section of the mold



Cross section of the casing

Example of calculation.

If the cross section of the mold is sized 10 × 10 cm, then the perimeter of such cross section will be 10 + 10 + 10 + 10 cm = 40 cm.

The cross-sectional perimeter of the casing is equal to $\pi \times D = 40$ cm (D – diameter of the casing, $\pi = 3.14$). $D = 40/\pi = 12.7$ cm = 127 mm.

Consequently, the casing required for this mold is the following:

- diameter 115 mm (stuffing with 10% overfilling);
- diameter 121 mm (stuffing with 5% overfilling);
- diameter 127 mm (loose stuffing without overfilling);

Loose stuffing is possible with the brake ring slackened, or with a small empty section of the casing 'pulled back' from the location of the second clip, prior to fastening of that clip. Distribution of the forcemeat throughout the volume of the casing facilitates loose stuffing (achieved, as a rule, by using special clippers).

Loose stuffing makes it possible to evenly distribute the product in the mold, filling all corners and cavities. After the thermal processing, the casing will accurately reproduce the shape of the metal mold – the corners will be sharp, the edges clear-cut, the chub ends not rounded, and this shape will be preserved throughout the shelf life of the product. No pre-soaking is required for this type of stuffing. The casing section length inside the mold must be about 10- 15 % longer than the mold. A section too short will result in a rounded shape of the chub ends, which is undesirable, especially when the ham is intended for slicing. A section too long may cause wrinkles.

Overfilling is expedient when the product will not be used for slicing, and the shape of the chub ends is not important.



In all forms of the molding process it is important to exclude any voids, where jelly may form and the cohesion of the product may deteriorate. To preserve the desired shape of the product, the pressing stage must be as effective as possible. This will make the product monolithic and solid, and prevent disintegration into separate pieces after cooling and during the slicing.

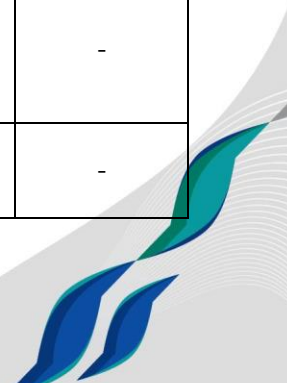
It is always necessary to take into account the technical characteristics of the clipping equipment, such as the maximum allowable diameter of the chub. It is very important to select the correct size of the clip. The clip used must securely hold the chub ends without damaging the casing. Observe the recommendations on the use of clips to ensure secure clipping (see Table 1).

Make sure there are no burrs on the equipment parts in contact with the casing. Never puncture the chubs (prick the casing). The casing will burst, if punctured.

Recommended clip types

Table 1

Caliber	POLY-CLIP		ALPINA	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
60-70	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	210 220 410	175 370	B 2, BP 2	XE 210 XE 220 2,5x13,6x14
75-80	15-8-5×1.5 18-7-5×1.75 18-9-5×2.0	632 735 844	15/8-5×1.5 18/7-5×1.5 18/9-5×2.0	220 410	175 200 370	B 2, BP 2 B 3, BP 3	XE 220 2,5x13,6x14 2,5x13,6x15
85-100	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	-	XE 220 2,5x13,6x15 2,5x13,6x16
105-120	15-9-5×1.5 15-10-5×2.0 18-9-5×2.0 18-10-5×2.5	740 744 844	15/9-5×1.5 15/10-5×2.0 18/9-5×2.0 18/10-5×2.5	220 220 420	200 370 390	-	-
125-140	15-10-5×2.0 15-11-5×2.0 18-10-5×2.5 18-11-5×2.0	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	-	-
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	-	-



Note: The POLY-CLIP FCA and ALPINA DCF 15/18, 12/15 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

The **AMIFLEX T Ham** casing is designed for products not subjected to smoking. Thermal processing of Ham in the **AMIFLEX T Ham** casing consists in cooking and cooling. The stages of drying and roasting must be excluded from the technological process.

Thermal processing of the molded products can be carried out in universal heat chambers (when mold frames are used), or in stationary cauldrons (when single-piece molds are used).

The following guidelines apply to cooking:

- for uniform heating of all cooked Ham in a batch, use molds of the same size and fill each mold with the same quantity of meat (by weight). This will ensure similar thermal processing conditions in all molds;

- regardless of the boiling method, the duration of processing must always be determined by the cooking readiness of the product. To obtain products with a long shelf life, the temperature in the core of the product must reach 71 ± 1 °C by the end of cooking, and must be held at that level for a period of 10–15 minutes.

4.5.1. Cooking

Cooking at a constant temperature (cooking in stationary cauldrons) is suitable for single-piece molds and a small production volume. In this case the temperature of the heating medium remains constant from the beginning to the end of thermal processing. A disadvantage of this method consists in overheating of the outer layers in the product.

Cooking at a growing temperature is suitable for thermal processing of Ham in mold frames placed into universal heat chambers. There are two methods: staged cooking, and delta cooking. In either case, cooking should start from a temperature of 50 – 55 °C to trigger the coloring reactions. Higher starting temperatures may cause color defects.



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.

Delta cooking creates more favorable conditions for uniform heating of sausages. The temperature in the chamber gradually increases in parallel with the increase of the temperature in the product core, with preservation of a certain difference (Δ). The optimal Δ value is 20 – 25°C. In the end of the process the chamber temperature remains steady, having reached a certain value. Delta cooking in production conditions requires a longer heating, but yields higher quality products.

4.5.2. Cooling

This stage of thermal processing has a significant effect on the characteristics of the finished product (yield, shape, structural cohesion of the product).

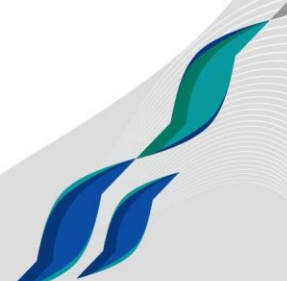
After completion of the cooking process, the product must be immediately cooled.

To prevent an excessive temperature in the core of the product and overheating of the cooling chambers, the preliminary cooling of Ham should be achieved either by spraying, or immersion of the molds in cold water to bring the temperature in the core of the product down to 25 – 30 °C.

Immediately upon preliminary cooling, the product should be left in the cooling chamber for at least 24 hours before removal from the mold, and at least 38 hours before sale, to ensure stabilization of the color and other sensory characteristics of the product.

Removal from the molds must be done only after complete cooling. The core temperature of the product must be 2 ± 2 °C.

Unlike molded ham produced without any casing, the encased Ham can be extracted from the molds without pre-heating of the molds with hot water.



If the product is not intended for slicing, then the casing should not be removed after cooking and cooling. The casing will serve as the transportation and storage packaging.

If the product is intended for slicing and repackaging under vacuum or in a modified atmosphere, take care to prevent recontamination of the product during its manipulation.

4.6. Transportation and storage of products

Transportation and storage of products manufactured with the use of the **AMIFLEX T Ham** casing shall be in accordance with the regulatory documentation for these products (GOST, TU).

Products packaged into the **AMIFLEX T Ham** casing and intended for slicing and repackaging, must be dried before packaging and therefore should not be subjected to temperature drops that may cause the formation of condensate on the 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 integrity of the manufacturer's packing.

5.2. The shelf life of the UV-unprinted **AMIFLEX T Ham** casing is 3 years from the date of manufacture, subject to compliance with the required conditions of transportation and storage at the user's warehouse, and preservation of the integrity of the manufacturer's packing.

The shelf life of the UV-printed **AMIFLEX T Ham** casing is 2 years from the date of manufacture, subject to compliance with the required conditions of transportation and storage at the user's warehouse, and preservation of integrity of the manufacturer's packing.



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