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Packaging Solutions

Casings



AMIFLEX T-Beef Bung/ Tko-Beef Bung and Tko

Process Operating Manual



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1. APPLICATION

This Process Operating Manual describes the process of production of cooked sausage and ham products with the use of the **AMIFLEX T-Beef Bung, Tko-Beef Bung and Tko** casings.

AMIFLEX T-Beef Bung, Tko-Beef Bung, and Tko are five-layer casings imitating the natural gut materials (bung, rounds). All these casings are made of polyamide, polyolefin and an adhesive (modified polyethylene).

The **AMIFLEX T-Beef Bung, Tko-Beef Bung, and Tko** casings can be used for production, transportation, storage and sale of:

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

The recommended shelf life for cooked sausages in the **AMIFLEX T-Beef Bung, Tko-Beef Bung , and Tko** casings is 60 days at a temperature from 0 to 6 °C and air relative humidity not higher than 75%.

The recommended shelf life for liver sausages in the **AMIFLEX T-Beef Bung, Tko-Beef Bung, and Tko** casings is 15 days after completion of the technological process, at a storage temperature of 4±2°C.

2. PROPERTIES AND ADVANTAGES OF THE CASINGS

2.1. The use of the **AMIFLEX T-Beef Bung, Tko-Beef Bung , and Tko** casings widens the assortment of products by diversification of the appearance of sausages (rings, half rings, festoons, bladders, etc.)

2.2. Mechanical strength of the casings makes it possible to mold the chubs with the use of high-capacity automatic or semi-automatic clippers at high rates of molding.

2.3. High elasticity of the casings provides for significant overstuffing relative to the nominal diameter. This reduces the consumption of casing per ton of the finished products in comparison with the traditional types of multilayer casings.



2.4. Low permeability to oxygen and water vapor is ensured by the carefully selected combination of polymers, and provides for the following advantages of the **AMIFLEX T-Beef Bung, Tko-Beef Bung , and Tko** 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 that cause 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.

2.2.5. High heat resistance of the polymers used for production of the casings significantly extends the utilization temperature range for the casing in comparison with the natural gut materials.

2.2.6. Physiological safety - the 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, and the production environment.

3. ASSORTMENT OF THE PRODUCTS

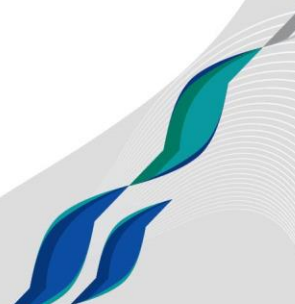
Calibers of the casing supplied:

- **AMIFLEX T-Beef Bung**: 35 – 80 mm;
- **AMIFLEX Tko-Beef Bung** : 45 – 80 mm;
- **AMIFLEX Tko**: 32 – 80 mm.

The ring-shaped **AMIFLEX Tko-Beef Bung** and **AMIFLEX Tko** casings can be supplied as rings of various diameters (see Table 1).

Table 1

Casing type	Casing caliber, mm	Internal diameter of the ring, cm
AMIFLEX Tko-Beef Bung	45 - 64	14 - 25
	65 - 80	25 - 45
AMIFLEX Tko	32 - 35	7 - 9, 9 - 12, 11 - 14, 14 - 17, 17 - 20
	36 - 42	9 - 12, 11 - 14, 14 - 17, 17 - 20
	43 - 64	11-14, 14 - 17, 17 - 20
	65 - 80	15 - 35



Colors of the **AMIFLEX T-Beef Bung** and **Tko-Beef Bung** casings: according to the Color Catalogue.

Colors of the **AMIFLEX Tko** casing: according to the Color Catalogue.

Bespoke colors are optional.

An integral part of the **AMIFLEX T-Beef Bung** and **Tko-Beef Bung** is a double-sided single-color imitation marking (two patterns); optionally, single- or double-sided printing is possible (1 to 6 colors), or CMYK printing.

The **AMIFLEX Tko casing** can be used for single- or double-sided printing. The number of colors varies from 1 to 6. CMYK printing is an option.

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 the original packing in dry, clean, and cool rooms (at a temperature from 5 to 35°C, and air relative humidity of not more than 80%) in conformity with the applicable sanitary and 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, protect the casing against exposure to high temperatures or direct sunlight.

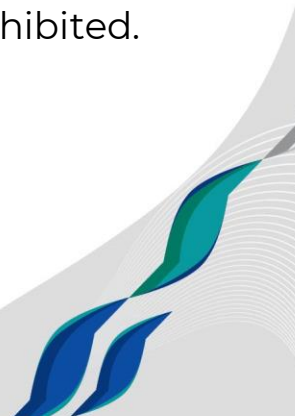
4.1.4 If the casing was stored at a temperature below 0°C, then prior to use hold it in its original packing at room temperature for at least 24 hours.

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 damage.

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



To provide for elasticity and trouble-free stuffing, the **AMIFLEX T-Beef Bung, Tko-Beef Bung** and **Tko** casings should be pre-soaked in potable water at a temperature of 20 – 25 °C. Water must penetrate inside the tube and wet the internal 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.

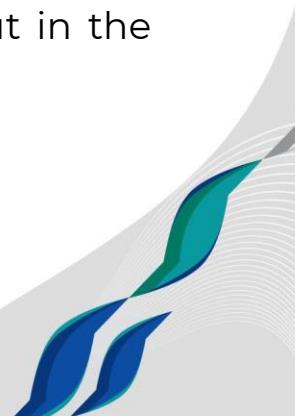
If too much casing was soaked, take it out, remove the excess water and leave the wet casing away from sources of heat and air drafts. Re-soak and process on the next day.

4.3. Preparation of the emulsion

During the thermal processing the sausage emulsion inside the **AMIFLEX T-Beef Bung, Tko-Beef Bung** and **Tko** casings does not lose moisture, therefore the calculation of the amount of water added to the emulsion 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. Emulsion with an elevated percentage of meat substitutes tends to swell more. This must be taken into account. 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 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 sausage products

The **AMIFLEX T-Beef Bung, Tko-Beef Bung , and Tko** casings are designed for automatic or semi-automatic stuffing and clipping equipment, but can also be manually tied.

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

The ratio between the stuffed caliber and the nominal caliber of the casing is a critical factor for the correct use of the casing.

The **AMIFLEX T-Beef Bung** and **AMIFLEX Tko-Beef Bung** casings should be filled with sausage emulsion with **35 - 50% overstuffing**.

The **AMIFLEX Tko** casing should be filled with sausage emulsion with **10 – 12% overstuffing**.

The recommended overstuffing percentage may, however, be somewhat reduced or increased depending on the batter consistence and temperature, the stuffing pressure, and the conditions of cooling after thermal processing. E.g., if the batter has a good binding ability or swelling capacity, it is recommended to reduce overstuffing of the casing relative to the nominal caliber to avoid rupture.

Compliance with these recommendations provides for a good appearance of the finished product, increases the stuffing capacity, and reduces the risk of water or fat pockets.

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 2

Diameter of the Amiflex Tko or Amiflex Tko-Beef Bung casing, mm	Shirring tube diameter, mm	Recommended outer diameter of the stuffing horn, mm
32 - 34	21	18
35 - 39	24	18, 20
40 - 42	26	20, 22
43 - 46	28	22, 24
47 - 57	32	24, 28
58 - 69	40	28, 36
70 - 79	52	36, 48
80	61	48

Table 3

Diameter of the Amiflex T-Sinuga casing, mm	Shirring tube diameter, mm	Recommended outer diameter of the stuffing horn, mm
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	61	48

When a clipper simultaneously applies two clips, make sure that the diameter of the sausage chub allows passage through the working part of the clipper. Should the chub diameter exceed the allowable value, it will be hard to pass it through the clipping zone, which increases the probability of damaging the casing, and contributes to the wear of the equipment. E.g., if the clipper is designed for chubs with the maximum stuffed caliber of 90, then the nominal caliber of the **AMIFLEX T-Beef Bung** or **AMIFLEX Tko-Beef Bung** casing must not exceed 67 mm with 35% overstuffing, or 60 mm with 50% overstuffing.

The ring-shaped **AMIFLEX Tko** casing is processed with the use of automatic and semi-automatic clippers, equipped with a string feeder and a special receiver for the sausage rings. The string length between the sausage ends is adjusted by means of the string feeder. However, if the string feeder is not included in the standard delivery set, this should not be a problem for processing of the ring-shaped casings. The string can be fed manually.

When manual clippers are used, the string is fed into the clipper working zone from the side of the shirred stick and clipped together with the casing.



When the casing is put over the horn, it must be positioned in such a way as to prevent the resulting rings twisting into the working parts of the clipper, and to guide them into the receiver tray.

The clip must securely hold the ends of the chub, without damaging the casing. Secure closure by the clips is ensured by compliance with the recommendations of the manufacturers of the clipping equipment. See Table 5 for recommendations on selection of the clips for the **AMIFLEX T-Beef Bung**, **AMIFLEX Tko-Beef Bung**, and **AMIFLEX Tko** casings.

Recommended clip types

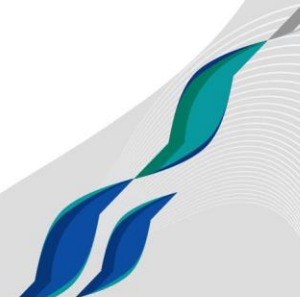
Table 4

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	
32 - 50	15-7-5×1.5 15-8-5×1.75 18-7-5×1.75	625 628 735	15/7-5×1.5 15/8-5×1.75 18 /7-5×1.75	210 410	175 370	B 1, BP 1 B 2, BP 2	XE 210 2,5x13,6x14
55 - 60	15-9-5×1.75 18-9-5×2.0	628 735	15 /9-5×1.75 18 /9-5×2.0	220 410	175 370	B 2, BP 2	XE 220 2,5x13,6x14 2,5x13,6x15
65 - 70	15-10-5×2.0 18 -9-5×2.0	628 632 735 740	15 /10-5×2.0 18 /9-5×2.0	220 410	175 200 370	B 2, BP 2 B 3, BP 3	XE 220 2,5x13,6x15
75 - 80	15-10-5×2.0 15-11-5×2.0 18-9-5×2.0 18-10-5×2.5	632 740	15/10-5×2.0 15/11-5×2.0 18 /9-5×2.0 18/10-5×2.5	220 230 410 420	200 370 390	B 3, BP 3	XE 220 XE 230 2,5x13,6x15 2,5x13,6x16

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.

For manual tying of sausages in the **AMIFLEX T-Beef Bung**, **Tko-Beef Bung** and **Tko** casings, it is recommended to use the string tying pattern similar to the products in the natural bung, bladders or rounds, i.e. the loops should be placed at certain intervals.

4.5. Thermal processing



Thermal processing of sausages in the **AMIFLEX T-Beef Bung**, **Tko-Beef Bung** and **Tko** casings consists in cooking and cooling. The technological process stages of drying and roasting may be disposed with.

Thermal processing of sausages can be made in heat chambers of various types, or in stationary boiling 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 115mm caliber sausage chubs:

- 55°C in heat chamber at 100% humidity - 20 minutes.
- 60°C in heat chamber at 100% humidity - 20 minutes.
- 65°C in heat chamber at 100% humidity - 20 minutes.
- 75°C in heat chamber at 100% humidity - 40 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 core temperature down to 25 - 35°C. After spraying, the sausage must be air-dried before putting it into the cold store.

Cold air cooling is not recommended. 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 sausage products

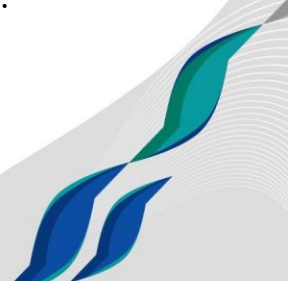
Transportation and storage of sausage products manufactured with the use of the **AMIFLEX T-Beef Bung, Tko-Beef Bung** and **Tko** casings shall be in accordance with the regulatory documentation for these products.

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.

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





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