



ATLANTIS-PAK

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Packaging Solutions

Casings **dyplex**

DYPLEX-MINI

Process Operating Manual



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1. APPLICATION

The present Process Operating Manual describes the process of production of frankfurters with the use of the **DYPLEX-Mini** casing.

DYPLEX-Mini is a multilayer glossy casing with dynamic permeability, which consists in a substantial increase in the WVTR and the OTR of the casing (up to the level of permeable casings) at temperatures above 60 °C, and a dramatic reduction of the WVTR and the OTR (down to the level of barrier casings) at the temperature of 0-6 °C.

The **DYPLEX-Mini** casing is made of polyamide, polyolefin, and an adhesive (modified polyethylene) duly approved for contact with food products. The quality of the raw materials used for production of the **DYPLEX-Mini** casing is confirmed by Russian and international quality certificates

The **DYPLEX-Mini** casing is made in accordance with the Specifications TU 2291-054-27147091-2013 and can be used for production, transportation, storage and sale of all types of frankfurters and wieners made by technologies that involve smoking (smoke-roasting).

The distinguishing feature of the **DYPLEX-Mini** casing is combination of dynamic permeability and small caliber, which makes it possible to manufacture small-portion products with a fixed weight (from 25 to 100 g) and prolonged shelf life.

The **DYPLEX-Mini** casing is intended for use on automatic frankfurter linker lines.

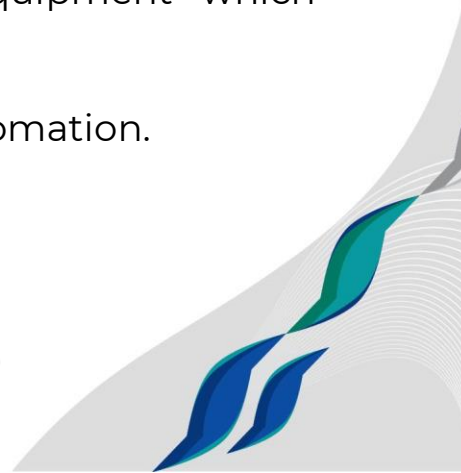
The recommended shelf life for frankfurters made in the **DYPLEX-Mini** casing is not more than 30 days after completion of the technological process at a storage temperature from 0 to 6 °C, and relative humidity of the air not more than 75%.

2. PROPERTIES AND ADVANTAGES

2.1. Specifications of the casing

DYPLEX-Mini casing is produced at modern equipment which provides:

- permanent control over all the parameters;
- extremely high level of manufacturing process automation.



Basic characteristics of quality parameters and test conditions of DYPLEX-Mini casing of all types are included into Product Specifications.

2.2. Advantages of the casing

Mechanical strength allows molding of products with the use of high-capacity equipment at high rates of molding;

High permeability gases and water vapor at the temperatures used for thermal processing of meat and sausage products (65 – 75 °C) makes it possible to make products with traditional sensory characteristics;

Low permeability to oxygen and water vapor at the temperatures of storage of sausage products (0 – 6 °C) provides for:

- zero losses during the storage of frankfurters and wieners;
- microbiological stability of products during the storage period;
- retardation of the oxidation processes that cause rancidification of fats and changes in the meat product's natural color;
- excellent selling appearance of the finished products (no wrinkles) throughout the shelf life.

Physiological safety - the **DYPLEX-Mini** casing is impervious to microbiological damage, because its formula is 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 the sausage production.

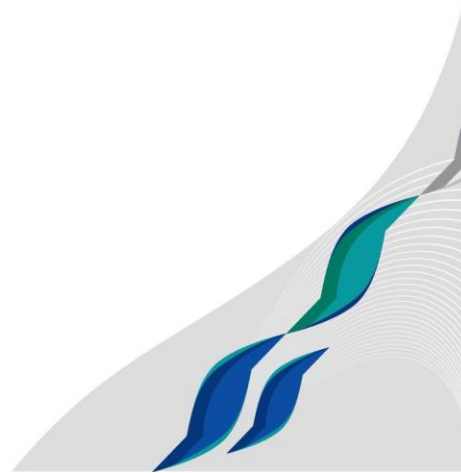
3. ASSORTMENT

Calibers of the casing: 18 – 32mm.

Casing colors: clear, smoke, walnut, pink, light smoke. Bespoke colors can be ordered.

DYPLEX-Mini can be used for single- or double-sided marking in a single-color, multicolor or CMYK printing with the use of volatile solvents-based inks.

The casing is supplied in shirred sticks.



Standard shirring parameters for the **DYPLEX-Mini** casing

Table 2

| | Casing type | Casing diameter | Shirring type | Length of shirred stick, mm | Length of casing in shirred stick, m |
|-------------|-------------|-----------------|----------------------|-----------------------------|--------------------------------------|
| DYPLEX-Mini | Type P | 18 - 23 | hard with open end | 240 - 245 | 25 |
| DYPLEX-Mini | Type A | | hard with closed end | | 25 |
| DYPLEX-Mini | Type P | 24 - 32 | hard with open end | | 33.3 |
| DYPLEX-Mini | Type A | | hard with closed end | | 33.3 |

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 °C to 35 °C, and air relative humidity not higher than 80%).

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

4.1.3 During storage and transportation, do not expose the casing to high temperatures or direct sunlight.

4.1.4 If the casing was stored at a subzero temperature, 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.

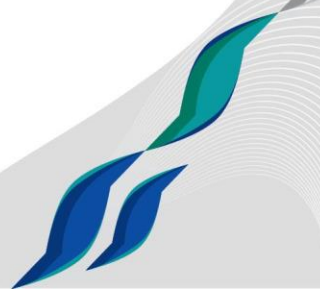
4.1.6 The casing must not be damaged throughout the technological cycle.

4.2. Preparation of the casing for use

The **DYPLEX-Mini** casing intended for automatic lines requires no preliminary soaking.

The **DYPLEX-Mini** casing intended for semi-automatic lines can be processed with or without pre-soaking, depending on the desired stuffed caliber and equipment capabilities.

The **DYPLEX-Mini** casing intended for linking stuffers or for stuffing and clipping equipment requires preliminary soaking.



Soak in potable water with a temperature of 20 - 25 °C during 20-30 minutes.

Never soak the casing in hot water to avoid premature shrinkage.

4.3. Composition of the emulsion

The batter for production of frankfurters and wieners in the **DYPLEX-Mini** casing shall be prepared in accordance with the regulatory documents for these products.

It should be borne in mind that in the process of thermal processing, the batter inside the **DYPLEX-Mini** casing loses 0.5 – 3% of moisture, therefore 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 and the moisture-retaining properties of the additives used.

It is recommended to reduce the added moisture by 10% of the batter weight, on the average, as compared with the recipes for the natural, collagen, and viscose-reinforced casings.

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.

4.4. Molding of sausage products

Before processing, make sure that there are no burrs on the equipment parts or the work table surface.

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

To ensure a good appearance of the finished products and reduce the risk of water and fat pockets, the **DYPLEX-Mini** casing should be filled with the following overstuffing rates:

- **3-5%** (without pre-soaking)
- **6-8%** (with pre-soaking).

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.

The speed of stuffing of the **DYPLEX-Mini** casing should be determined with regard to the technical condition of the equipment. The desired molding parameters are achieved by adjustment of the molding equipment.

When stuffing the **DYPLEX-Mini** casing, make sure that the casing diameter matches the stuffing horn diameter.

Recommended parameters for processing of the **DYPLEX-Mini** casing on automatic or semi-automatic lines

Table 3

| Caliber of casing, mm | Recommended stuffed caliber, mm | Townsend automatic lines | | Handtmann and Vemag automatic lines, horn diameter, mm |
|-----------------------|---------------------------------|--------------------------|-------------------|--|
| | | Horn No. | Horn diameter, mm | |
| 18 | 18,5 - 19 | 11/12 | 8.7/9.5 | 8 - 9 |
| 19 | 19.5 - 20 | 11/12 | 8.7/9.5 | 8 - 9 |
| 20 | 20.5 - 21 | 13/14 | 10.3/11.1 | 10 - 11 |
| 21 | 21.5 - 22 | 13/14 | 10.3/11.1 | 10 - 11 |
| 22 | 22.5 - 23 | 14/15/16 | 11.1/11.9/12.7 | 11 - 12 |
| 23 | 23.5 - 24 | 14/15/16 | 11.1/11.9/12.7 | 11 - 12 |
| 24 | 24.5 - 25 | 14/15/16 | 11.1/11.9/12.7 | 11 - 12 |
| 25 | 25.5 - 26 | 14/15/16 | 11.1/11.9/12.7 | 11 - 12 |
| 26 | 26.5 - 27 | 16/17/18 | 12.7/13.5/14.3 | 13 - 14 |
| 27 | 27.5 - 28 | 16/17/18 | 12.7/13.5/14.3 | 13 - 14 |
| 28 | 29.5 - 30 | 17/18 | 13.5/14.3 | 14 - 16 |
| 29 | 30 - 30.5 | 17/18 | 13.5/14.3 | 14 - 16 |
| 30 | 31 - 32 | 17/18 | 13.5/14.3 | 14 - 16 |
| 31 | 32 - 32.5 | 18/20 | 14.3/15.8 | 16 - 18 |
| 32 | 33 - 33.5 | 18/20 | 14.3/15.8 | 16 - 18 |

4.5. Thermal processing

Thermal processing of cooked and semidry sausages in the **DYPLEX-Mini** casing can be performed in heat chambers of different types.

The manufacturers should choose their individual thermal processing modes, based on the equipment capacity and the desired result of thermal processing.

Adjustment of the temperature, humidity and duration of the different thermal processing stages controls the moisture losses, the color and taste of the product, and the thickness of the resulting crust.



We recommend the classical thermal processing, which includes the stages of drying (color formation), smoking, and cooking:

Drying should start at the temperature of 50 – 55 °C. As the drying cycle progresses, the temperature is gradually raised to 65 °C. At this stage the batter proteins coagulate and the 'protein crust' is formed.

The next stage is smoking at a temperature of about 70 - 75 °C and the air humidity of 40 – 60%. At this stage the crust further consolidates, and its coloring occurs under the effect of the smoke components.

Next cooking is done at the air humidity of 100% and the temperature of 75 – 80 °C until the product is ready for consumption.

After completion of the cooking process, it is recommended to add a drying stage lasting 10-15 minutes at the temperature of 65 °C to restore the crust damaged at the cooking stage.

The following is an example of thermal processing suitable for the **DYPLEX-Mini** casing, caliber 24:

| No. | Process | Temperature, °C | Humidity, % | Time. min. |
|-----|----------------------|-----------------|-------------|------------------|
| 1 | Curing | 55 | 20 – 30 | 15 |
| 2 | Drying 1 | 60 | - | 15 |
| 3 | Drying 2 | 65 | - | 10 |
| 4 | Smoking | 70 | 40 | 15 |
| 5 | Smoking | 75 | 60 | 25 |
| 6 | Cooking to readiness | 78 | 99 | To 72 °C in core |
| 7 | Removal | 40 | | 3 |

Upon completion of the cooking, the products must be immediately cooled. The first cooling stage is cold water showering (timed sprayers can be used) until the core temperature is down to 25 – 35 °C. After spraying, air-dry the products, then place them in a cold store.

Cold air cooling is undesirable. Exclude any exposure of the finished frankfurters to air drafts until completely cooled, because this may cause wrinkles on the surface.

4.6. Transportation and storage of sausage products

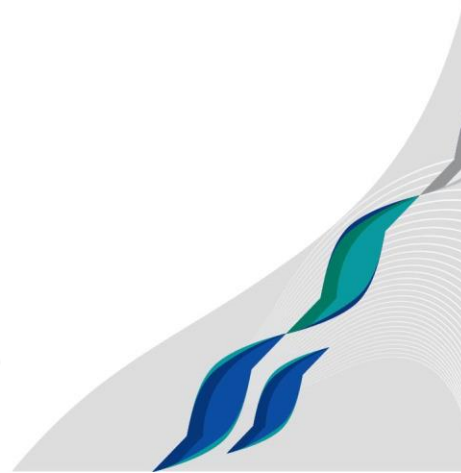
Transportation and storage of frankfurters and wieners manufactured with the use of the **DYPLEX-Mini** casing shall be in accordance with the regulatory documentation for these products.



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 **DYPLEX-Mini** casing is 3 years from manufacture.



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