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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.

The **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 polyamide 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 extended shelf life.

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

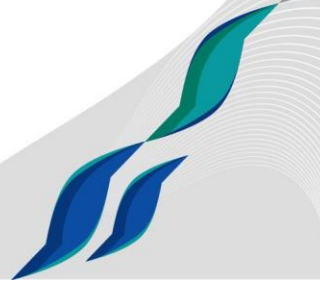
The recommended shelf life for frankfurters made in the **DYPLEX-Mini** casing is not more than 30 days after completion of the technological process at a storage temperature from 0 to 6 °C, and air relative humidity not more than 75%.

2. PROPERTIES AND ADVANTAGES

2.1. Technical characteristics of the DYPLEX-Mini casing

2.1.1. The **DYPLEX-Mini** casing is made on advanced equipment, which allows:

- continuous control of all parameters;
- maximum automation of the manufacturing process.



2.1.2. The basic quality characteristics and the test conditions for the **DYPLEX-Mini** casing of all types are indicated in the specifications.

2.2. Advantages of the casing

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

High permeability to 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 the 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 casing is impervious to microbiological damage, because its formula are proof to 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

Calibers of the casing: 18 – 32mm.

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

The **DYPLEX-Mini** can be used for single- or double-side single-color, multicolor or CMYK printing with the use of volatile solvents-based inks.

Form of supply: sticks of shirred casing.

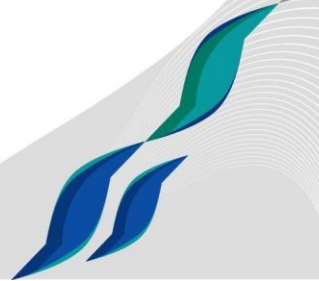


Table 1

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

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

4. HOW TO USE THE CASING**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 the temperature from 5 °C to 35 °C with the air relative humidity not exceeding 80%).

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 temperatures or direct sunlight.

4.1.4. If the casing was stored at a subzero temperature, then prior to use hold it in its original packing at room temperature for not less than 24 hours.

4.1.5. Never drop the boxes containing the casing or subject them to impacts.

4.1.6. Throughout the technological cycle of production, take care to avoid damage of the casing.

4.2. Preparation for processing

The **DYPLEX-Mini** casing intended for automatic frankfurter lines does not require any additional preparation (soaking) before stuffing.

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

The **DYPLEX-Mini** casing intended for stuffer linkers or for stuffing and clipping equipment requires pre-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. Forcemeat composition

The forcemeat 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 forcemeat inside the **DYPLEX-Mini** casing loses from 0.5 to 3% of moisture, therefore calculation of the amount of water added to the forcemeat 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 forcemeat 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 forcemeat during the thermal processing. Forcemeat with an elevated percentage of meat substitutes tends to swell more. This must be taken into account. In order to preserve the forcemeat'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.

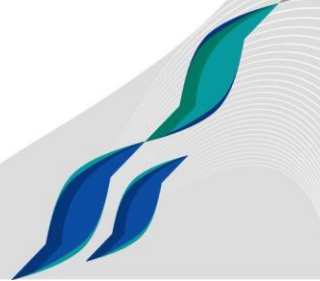
4.4. Forming of sausages

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

Never prick the chubs (puncture 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 stuffed with the following overfilling ratios:

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



During the forming 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 consistency and temperature, the stuffing pressure, and the conditions of cooling after the thermal processing.

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

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

Table 2

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

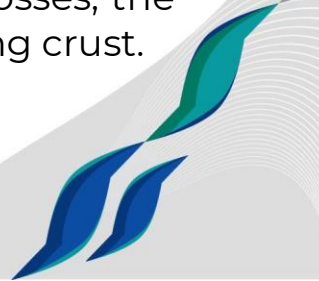
Casing caliber, mm	Recommended stuffed caliber, mm	Townsend automatic lines		Handtmann and Vemag automatic lines, horn diameter, mm
		Horn No.	Horn diameter, mm	
19	18.5 - 19	11/12	8.7/9.5	8 - 9
20	19.5 - 20	11/12	8.7/9.5	8 - 9
21	20.5 - 21	13/14	10.3/11.1	10 - 11
22	21.5 - 22	13/14	10.3/11.1	10 - 11
23	22.5 - 23	14/15/16	11.1/11.9/12.7	11 - 12
24	23.5 - 24	14/15/16	11.1/11.9/12.7	11 - 12
25	24.5 - 25	14/15/16	11.1/11.9/12.7	11 - 12
26	25.5 - 26	14/15/16	11.1/11.9/12.7	11 - 12
27	26.5 - 27	16/17/18	12.7/13.5/14.3	13 - 14
28	27.5 - 28	16/17/18	12.7/13.5/14.3	13 - 14
29	29.5 - 30	17/18	13.5/14.3	14 - 16
30	30 - 30.5	17/18	13.5/14.3	14 - 16
31	31 - 32	17/18	13.5/14.3	14 - 16
32	32 - 32.5	18/20	14.3/15.8	16 - 18

4.5. Thermal processing

Thermal processing of products 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 solidity 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.

This is followed by cooking at the air humidity of 98% and the temperature of 78 – 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.

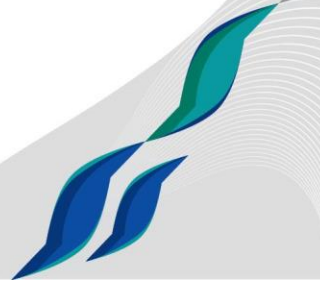
The following is an example of thermal processing suitable for the **DYPLEX-Mini** casing, caliber 24:

Table 3

No.	Process	Temperature, °C	Humidity, %	Time, min
1	Heating	55	20-30	15
2.	Drying 1	60	-	15
3.	Drying 2	65	-	10
4.	Smoking	70	40	15
6.	Smoking	75	50	25
7.	Until ready	78	99	To 72 °C in core
8.	Removal	40		3

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

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



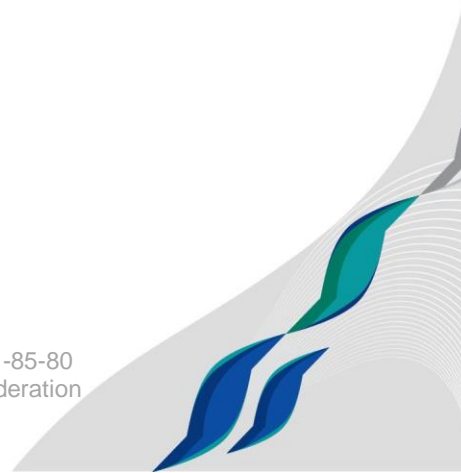
4.6. Transportation and storage of sausage products

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 specified characteristics 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 the date of manufacture.



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