BS EN 15774:2010

BSI Standards Publication

Food processing machinery — Machines for processing fresh and filled pasta (tagliatelle, cannelloni, ravioli, tortellini, orecchiette and gnocchi) — Safety and hygiene requirements

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The UK participation in its preparation was entrusted to Technical Committee MCE/3/5, Food industry machines.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Food processing machinery - Machines for processing fresh and filled pasta (tagliatelle, cannelloni, ravioli, tortellini, orecchiette and gnocchi) - Safety and hygiene requirements

Machines pour les produits alimentaires - Machines pour pâtes alimentaires (tagliatelle, cannelloni, ravioli, tortellini, orecchiette et gnocchi) - Prescriptions relatives à la sécurité et à l'hygiène

Nahrungsmittelmaschinen - Maschinen zur Herstellung von frischen und gefüllten Teigwaren (Tagliatelle, Cannelloni, Ravioli, Tortellini, Orecchiette und Gnocci) - Sicherheits- und Hygieneanforderungen

This European Standard was approved by CEN on 2 October 2010.

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Foreword

This document (EN 15774:2010) has been prepared by Technical Committee CEN/TC 153 “Machinery intended for use with foodstuffs and feed”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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Introduction

This European Standard is a type C standard as defined in the introduction of EN ISO 12100:2003.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

Complementary to the hygiene requirements common to all food processing machines, specific requirements for cleanability and sanitation of the machines in the scope are formulated.

1 Scope

This European Standard applies to machines for the processing of fresh and filled pasta, by mixing, kneading, dough sheet forming, pasta forming and pasteurizing, as described in Clause 3.

It applies to stationary and movable machines (not intended to be moved during operation), with a nominal capacity of not less than 25 kg/h.

This European Standard deals with all significant hazards, hazardous situations, and events when the machines falling within the scope of this standard are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4). It deals with the hazards during the following phases of themachines' lifetime: transport, assembly and installation, commissioning, setting and adjusting, operation, cleaning, fault finding, maintenance, de-commissioning, dismantling, disabling and scrapping.

This European Standard applies to the following groups of machines:

— discontinuous manually loaded kneading machines with or without lifting and tilting devices;

— continuous kneading machine;

— combination of dough kneading and dough sheet forming machine;

— forming machine processing one single dough sheet;

— forming machine processing two dough sheets;

— dough sheet forming machine;

— sizing roller machine;

— dough transport shuttle machine;

— steam pasteurizer machine;

— cooler machine;

— dough sheet cutting machine;

— gnocchi machine;

— typical shapes pasta machine.

This European Standard is not applicable to the following machines:

— household machines;

— auxiliary equipment (not changing the characteristics of product): conveying systems not part of the machinery, weighting and bagging equipment, lifting and tilting machinery (dealt with in EN 13288).

This European Standard is not applicable to pasta processing machines, which are manufactured before the date of its publication as EN.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 626-1:1994+A1:2008, *Safety of machinery — Reduction of risks to health from hazardous substances emitted by machinery — Part 1: Principles and specifications for machinery manufacturers*

EN 842:1996+A1:2008, *Safety of machinery — Visual danger signals — General requirements, design and testing*

EN 953:1997+A1:2009, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1672-2:2005+A1:2009, *Food processing machinery — Basic concepts – Part 2: Hygiene requirements*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General Requirements (IEC 60204-1:2005, modified)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN ISO 3744:2009, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 7731:2008, *Ergonomics — Danger signals for public and work areas — Auditory danger signals (ISO 7731:2003)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12001:2009, *Acoustics — Noise emitted by machinery and equipment — Rules for the drafting and presentation of a noise test code (ISO 12001:1996)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13732-3:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 3: Cold surfaces (ISO 13732-3:2005)*

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

EN ISO 14122-1:2001, *Safety of machinery — Permanent means of access to machinery — Part 1: Choice of fixed means of access between two levels (ISO 14122-1:2001)*

EN ISO 14122-2:2001, *Safety of machinery — Permanent means of access to machinery — Part 2: Working platforms and walkways (ISO 14122-2:2001)*

EN ISO 14122-3:2001, *Safety of machinery — Permanent means of access to machinery — Part 3: Stairs, stepladders and guard-rails (ISO 14122-3:2001)*

EN ISO 14122-4:2004, *Safety of machinery — Permanent means of access to machinery — Part 4: Fixed ladders (ISO 14122-4:2004)*

3 Terms and definitions and description of machines

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1.1
bowl lid
movable guard used to close bowl containing kneading tools

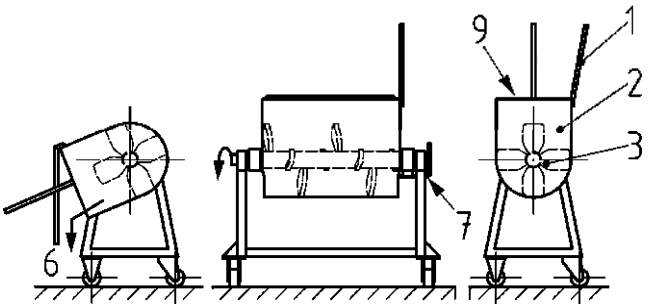
3.2 Description of machines for processing fresh and filled pasta

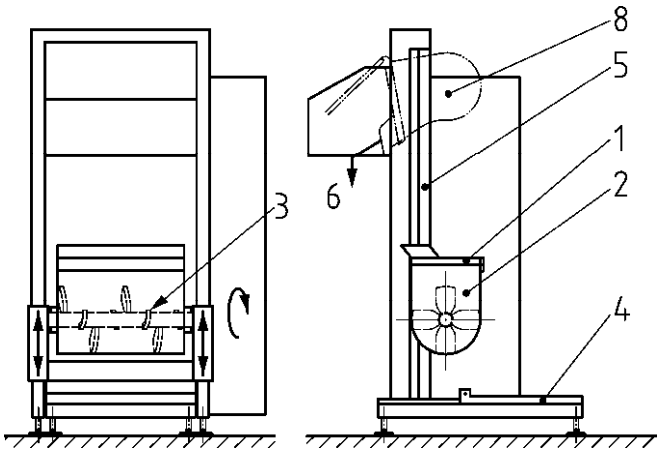
3.2.1 discontinuous manually loaded kneading machines with or without lifting and tilting devices (Figure 1)

Machine which is manually loaded with the quantity of flour, semolina or other milled product, water, and any other ingredient (i.e. eggs, spinach, tomatoes, etc.) necessary to prepare the (dough) pasta by kneading.

The principal components are bowl with bowl lid and kneading device/kneading tool.

Optional assemblies: lifting and tilting system





Key

1 bowl lid
2 bowl
3 kneading tool
4 tip device
5 lifting system
6 discharge dough
7 bowl locking device
8 tilting system
9 ingredient supply

Figure 1a — Discontinuous manually loaded kneading machines without lifting and tilting system

Figure 1b — Discontinuous manually loaded kneading machines with lifting and tilting system

3.2.2 continuous kneading machine (see Figure 2)

3.2.2.1 General

Machine with automatically loading with the quantity of flour, semolina or other milled product, water, and any other ingredient (i.e. eggs, spinach, tomatoes, etc.) necessary to prepare the dough by kneading and automatically continuously dough discharge.

The principal components are:

— kneading bowl with single or double shaft;

— premixing device;

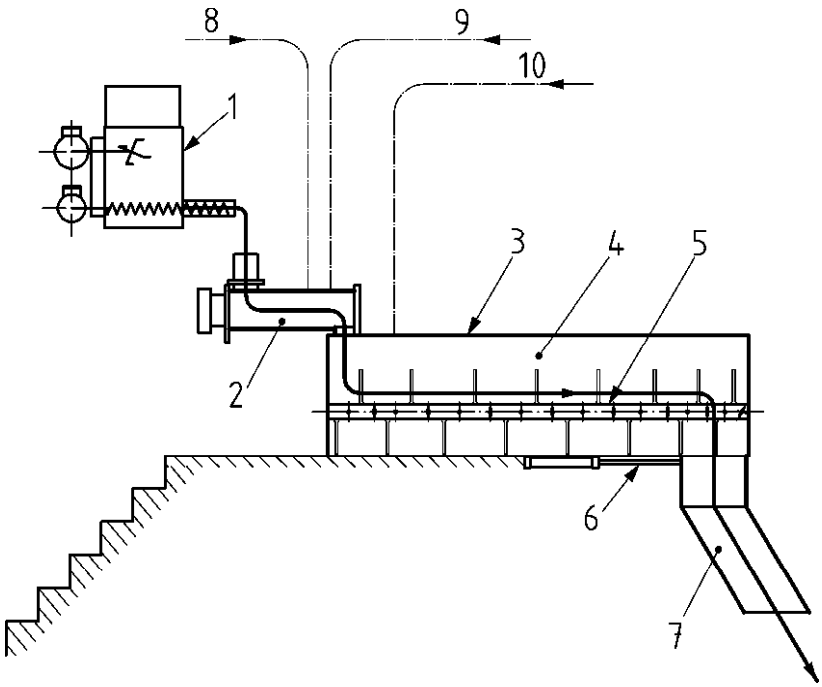
— flour dosing device;

— liquid dosing device;

— dough stabilization systems.

Optional assemblies: premixing device, dough stabilization system.

For the description of the principal components and optional assemblies see 3.2.2.1 to 3.2.2.5 and Figures 3 to 6



Key

1	dosing device for flour, semolina or other milled product	6	dough exit gate
2	premixing device	7	hopper
3	bowl lid	8	eggs feeding
4	bowl	9	liquid feeding
5	shaft with blades	10	feeding for dough rework

Figure 2 — Continuous kneading machine

3.2.2.2 kneading bowl (see Figure 3)

Part of the continuous kneading machine where the dough is produced by kneading. Kneading is performed either by a single shaft with kneading blades or by two shafts with kneading blades driven in counterrotation. The discharge of dough at the end of the bowl is carried out by the last kneading blades.

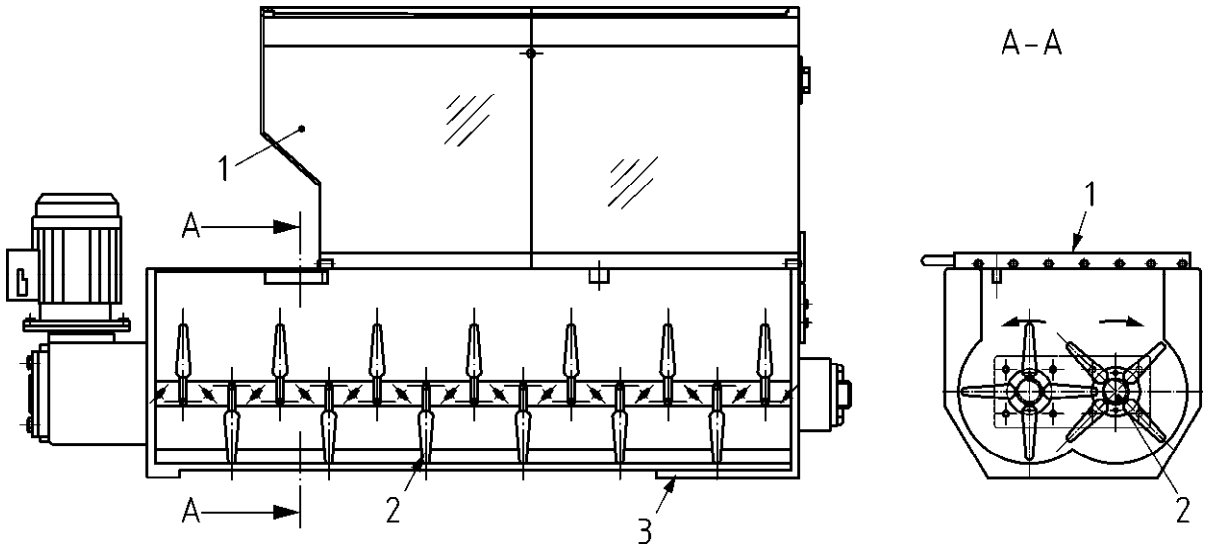
The principal components are:

— bowl with bowl lid (one or more);

— single shaft with kneading blades or

— two shafts with kneading blades driven in counterrotation;

— dough exit gate.



Key

1 bowl lid
2 shaft with blade
3 dough exit gate

Figure 3a — Kneading bowl singles shaft **Figure 3b — Kneading bowl double shaft**

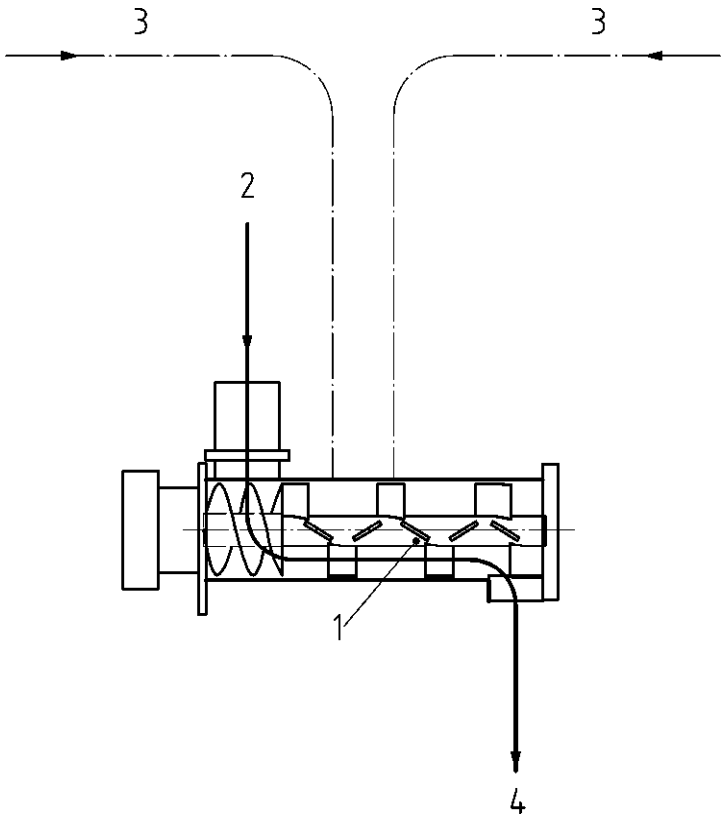
3.2.2.3 premixing device (see Figure 4)

Device that carries out the initial mixing stage of milled products and liquid ingredients i.e. water and eggs by rotation of a mixing tool in a tube (line blender).

The principal components are:

— tube with connection pieces for inlet of milled product and liquid and premix outlet,

— mixing tool (e.g. shaft with blades).



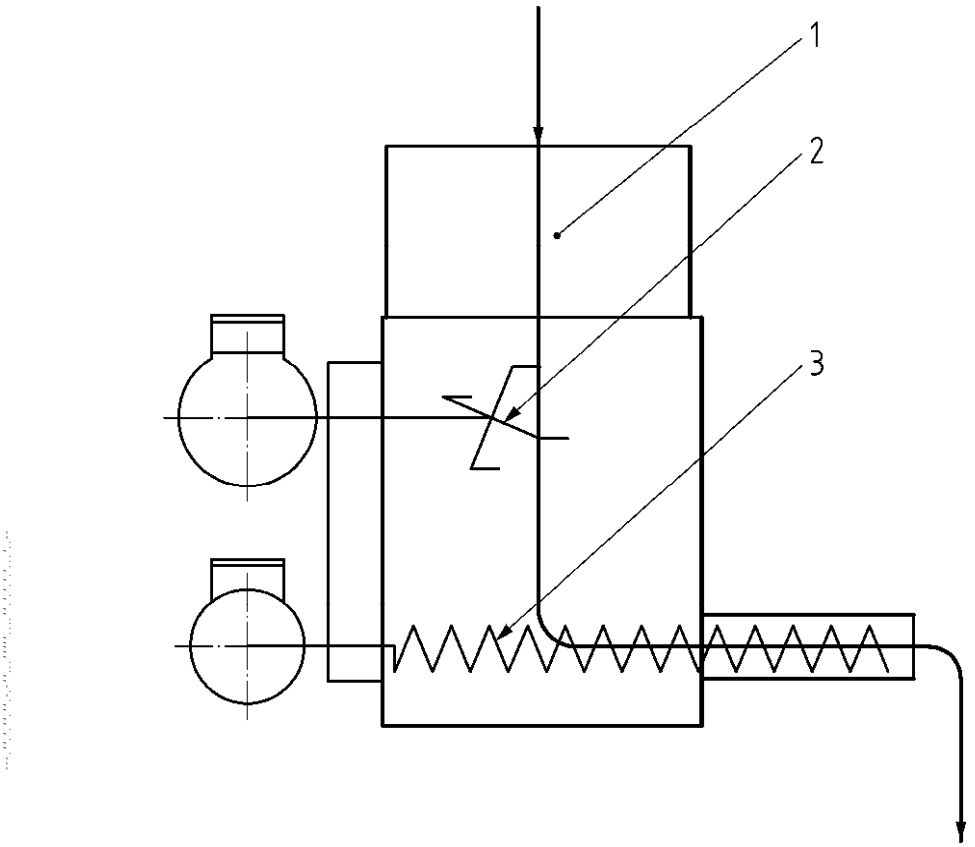
Key

1 shaft with blades
2 milled products entry
3 liquid entry
4 product exit

Figure 4 — Premixing device

3.2.2.4 dosing device for flour, semolina or other milled product (see Figure 5)

Device that measures the flour as a percentage. The flour falls into the hopper where the shaker, driven by an electric motor, mixes it continuously to ensure a uniform flow of product towards the dosing screw. The screw, driven by the second motor, measures the product volumetrically and forwards it to the centrifugal kneading machine (premixing device).



Key

1 hopper
2 shaker
3 dosing screw

Figure 5 — Dosing device for flour, semolina or other milled product

3.2.2.5 device for dough stabilization (see Figure 6)

Device where the needed floor time is provided that is necessary for achieving the required stability of dough.

In systems with vertical dough flow the dough is filled overhand in a dough box and the required residence time is achieved by the velocity of the rotary discharge valve.

In systems with horizontal dough flow the dough is filled in a dough box at the inlet side. The needed floor time is achieved by the velocity of the horizontal conveyor belt that transports the dough to the discharge.

The principal components are:

Vertical systems:

— dough box,

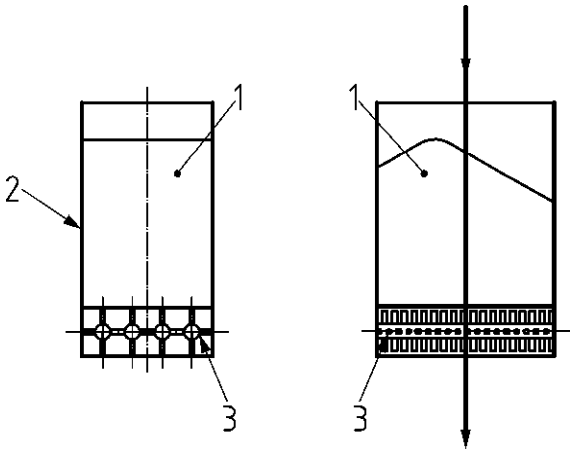
— rotary discharge valve.

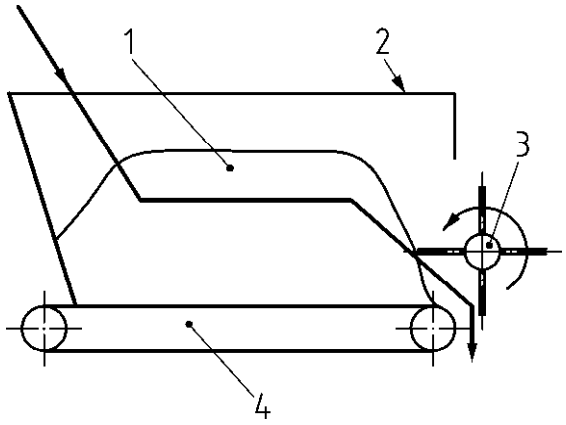
Horizontal systems:

— dough box,

— conveyor belt,

— discharge.





Key

1 dough
2 dough box
3 rotary discharge valve/discharge
4 conveyor belt

Figure 6a — Device for dough stabilization vertical

Figure 6b — Device for dough stabilization by belt

3.2.3 combination of dough kneading and dough sheet forming machine (see Figure 7)

Kneading machine combined with a dough sheet forming machine where the final product is a dough sheet for further processing in pasta machines. After kneading the dough sheet is formed in an arrangement composed of three rollers with lobes for the breaking and of two smooth rollers for the sheet finishing.

The principal components are:

— kneading bowl with bowl lid;

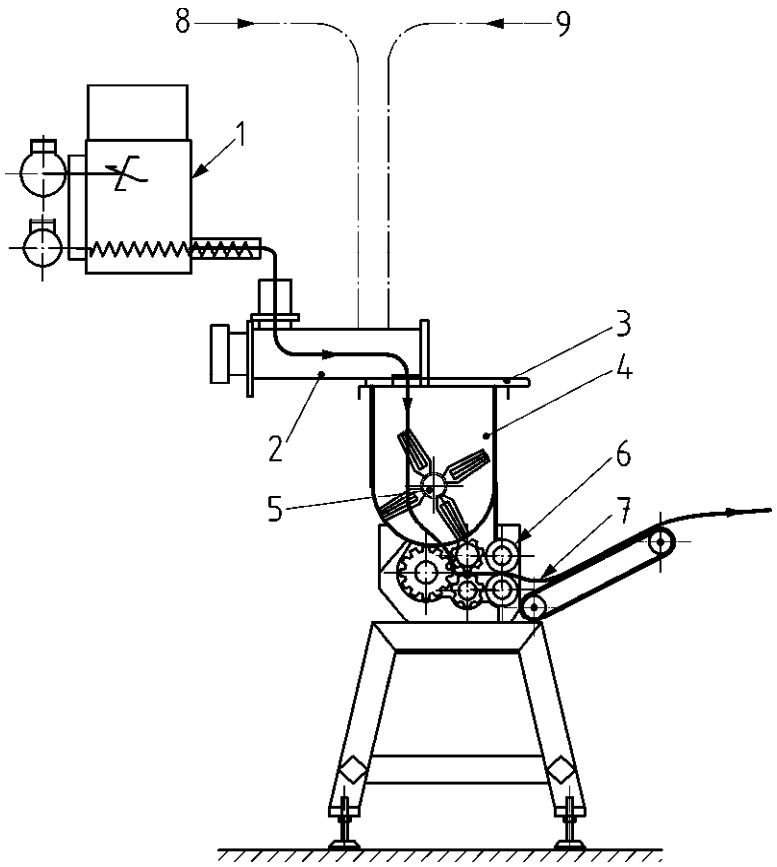
— shaft with kneading blades;

— dough sheet forming unit consisting of three rollers with lobes for the breaking and of two smooth rollers;

— for the sheet finishing;

— conveying belt for taking off the dough sheet.

Optional assemblies: flour dosing device, premixing device.



Key

1 flour dosing device
2 premixing device
3 bowl lid
4 bowl
5 shaft with blades
6 rollers
7 belt
8 eggs supply
9 liquid dosing pump

Figure 7 — Combination of dough kneading and dough sheet forming machine

3.2.4 forming machine processing one single dough sheet (see Figure 8)

Machine that can produce ravioli or cappelletti by filling, folding and closing one single cut fresh piece of dough sheet.

The principal components are:

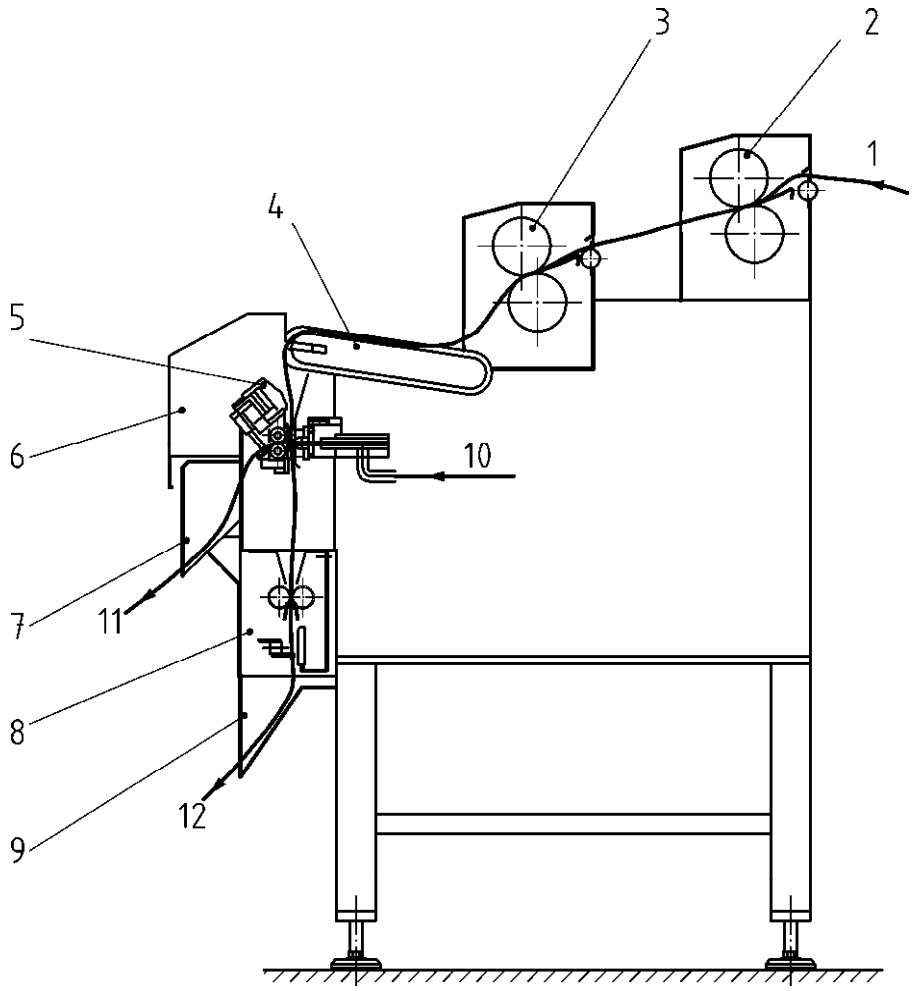
— one or two roller units for gross and fine calibration of the dough sheet;

— feeding device for dough sheet supply to the die block (mould) with intermittent movement;

— supply and dosing unit for the filling;

— die block (mould) consisting of simultaneously working devices for shearing, forming, filling and closing the dough sheet and rolling the pasta afterwards.

Optional assemblies: a station for rolling and sizing ravioli, devices for cutting and collecting scrap (dough residues) for recycling.



Key

1 dough sheet supply
2 roller unit for gross calibration
3 roller unit for fine calibration
4 dough sheet feeding belt
5 mould
6 mould guard
7 product collection chute
8 scraps cutter
9 scraps collection
10 filling supply
11 product discharge chute
12 scraps discharge chute

Figure 8 — Forming machine processing one single dough sheet

3.2.5 forming machine processing two dough sheets (see Figure 9)

Machine used for the industrial production of ravioli by filling and closing two overlapping dough sheets.

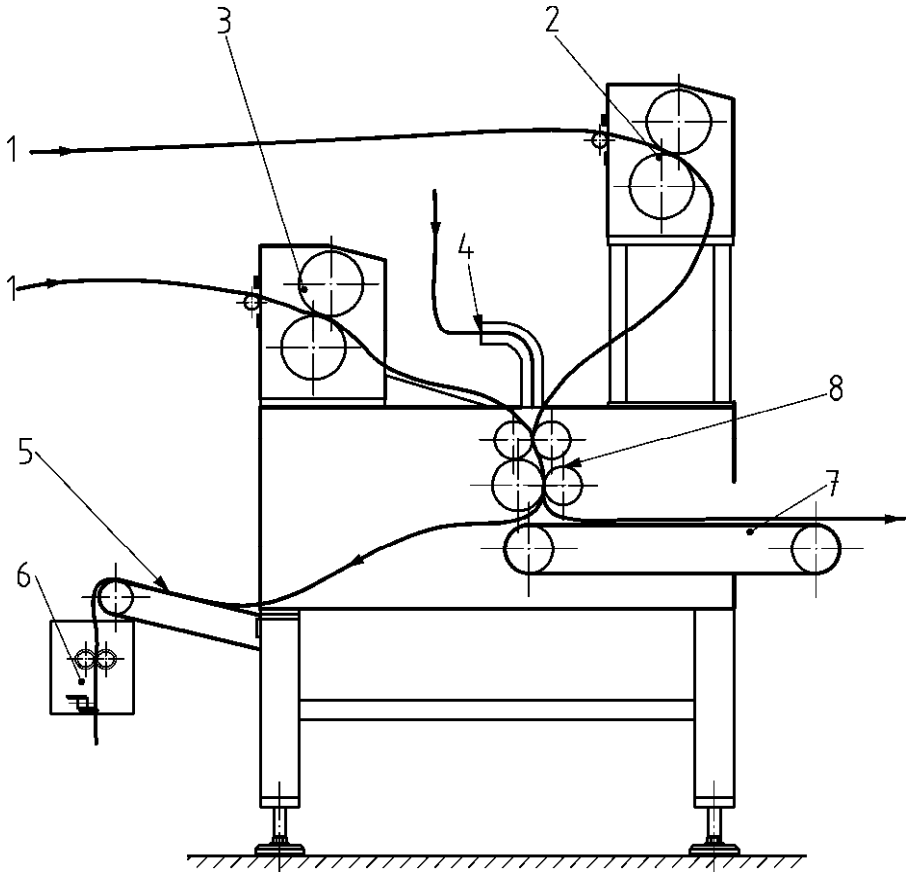
The principal components are:

— roller unit for calibration of each dough sheet;

— supply and dosing unit for the filling;

— die block (mould) consisting of simultaneously working devices for forming, filling and closing the dough sheets.

Optional assemblies: devices for cutting and collecting scrap (dough residues) for recycling.



Key

1	sheet supply	5	scrap collection belt
2	front sizing roller unit	6	scrap cutter
3	rear sizing roller unit	7	product collection belt
4	filling supply	8	mould

Figure 9 — Forming machine processing two dough sheets

3.2.6 dough sheet forming machine (see Figure 10)

Machine that forms a rough dough sheet right to the final customer's requirements, using an arrangement composed of three rollers with lobes for the breaking and of two smooth rollers for the sheet finishing. Dough is supplied through a hopper.

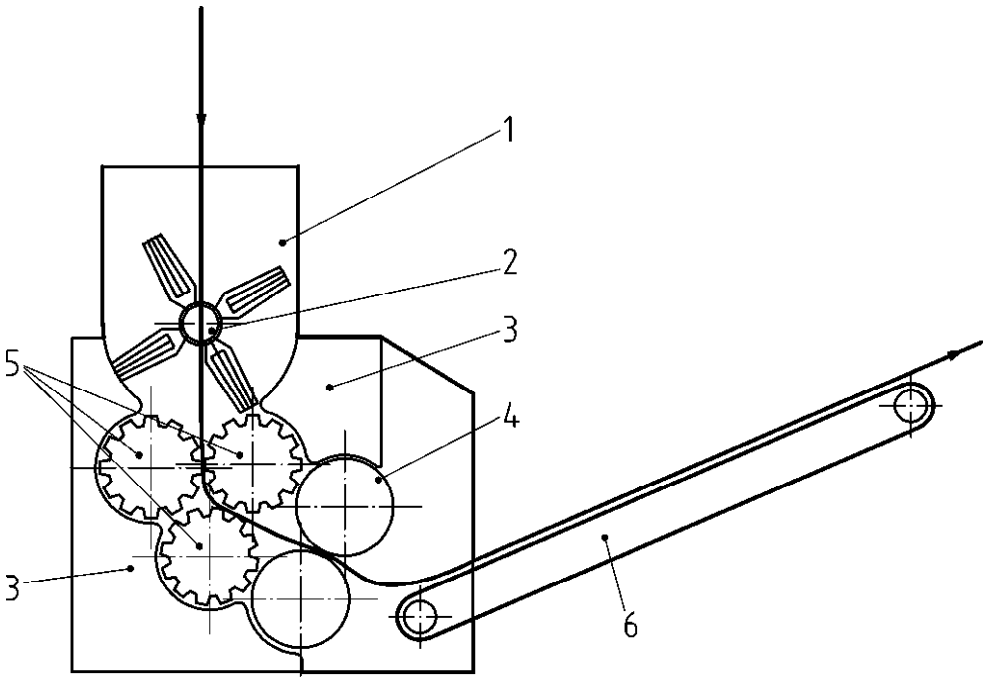
The principal components are:

— hopper with mixing device (shaft with blades);

— kneading rolls inside a special formed housing;

— calibrating rolls;

— optional assemblies: dough sheet conveyor belt.



Key

1 hopper
2 shaft with blades
3 curved plates
4 fine calibrating rolls
5 kneading rolls
6 conveyer belt

Figure 10 — Dough sheet forming machine

3.2.7 sizing roller machine (see Figure 11)

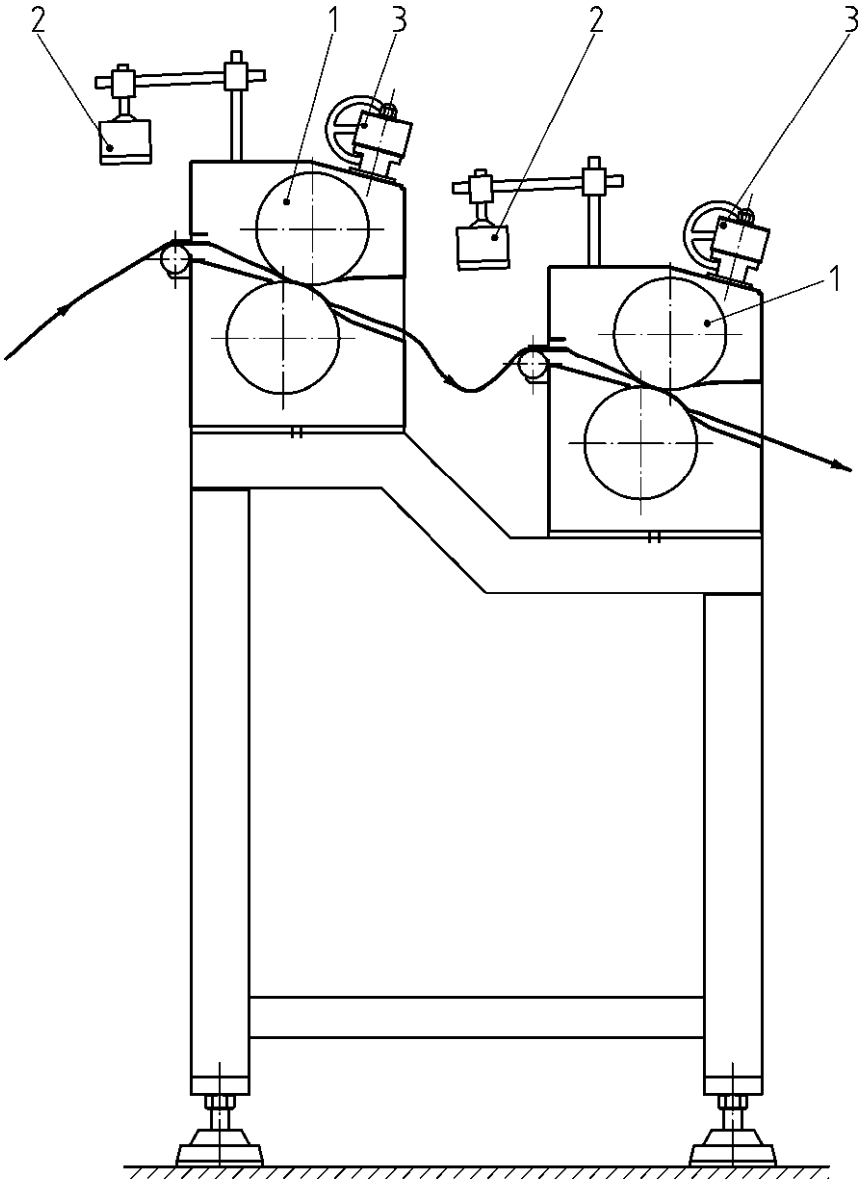
Machine for calibrating a dough sheet that is produced in the dough sheet forming machine.

The principal components are:

— one or more pairs of calibrating rolls placed in series;

— automatic loop control;

— handwheel for adjustment of roller clearance.



Key

1 sizing Rollers
2 automatic loop control
3 adjustment of roller clearance

Figure 11 — Sizing roller machine

3.2.8 dough transport shuttle machine (see Figure 12)

Machine for continuous dough transport on a rail mounted system between dough producing machinery (kneading machine, premixing device) and dough processing machinery (dough sheet forming machine, extrusion die).

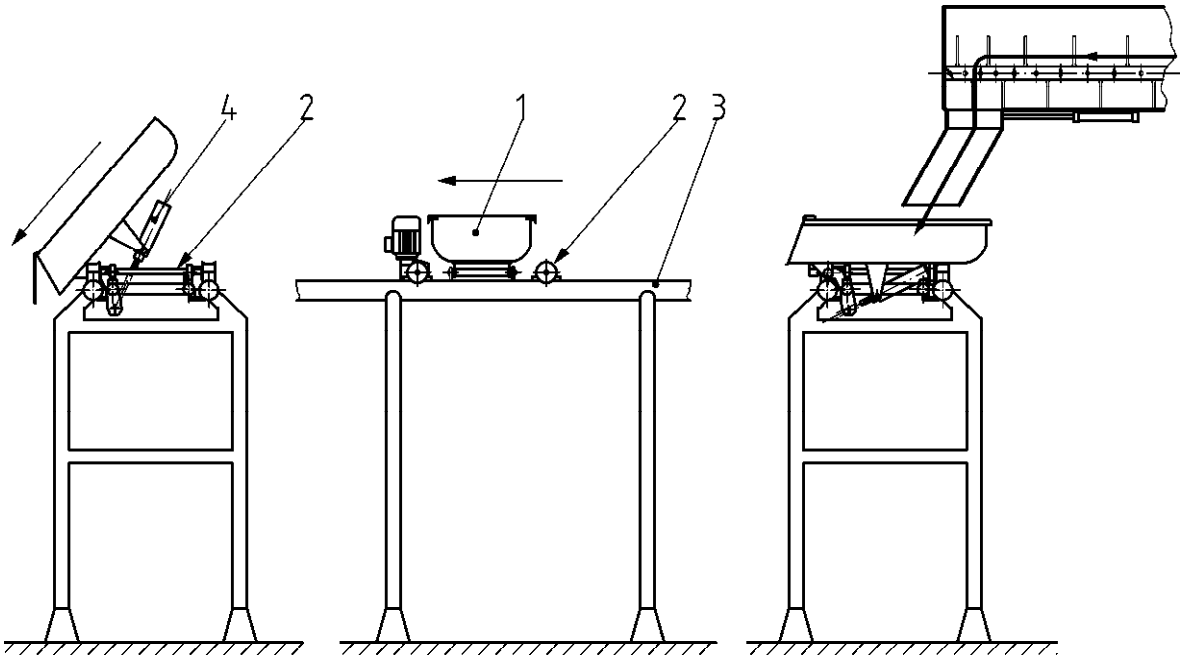
The principal components are:

— stand with roller rails;

— chain driven shuttle with tiltable fixing device for the trough;

— trough;

— quick acting closure for trough mounting.



Key

1 trough
2 shuttle
3 stand with roller rails
4 tilting device

Figure 12 — Dough transport shuttle machine

3.2.9 steam pasteurizer machine (see Figure 13)

Machine used for hydrothermal treatment (pasteurization) of product with steam in the production of fresh pasta for reducing the bacterial charge of the product to the necessary level.

The principal components are:

— tunnel in which a wire mesh or plastic belt conveyor covered by a flow of steam runs through three thermal treatment sections:

  — preheating section to warm up incoming product from the forming machine;

  — heating-up zone to uniformly cover the product with steam and quickly bring up the product to the treatment temperature;

  — treatment section to give the product the necessary residence time to reach the intended bacterial charge reduction;

— steam tunnel:

  — wire mesh or plastic belt conveyor for product transport;

  — steam spraying ramp placed over and under the belt;

— outlet section (heated);

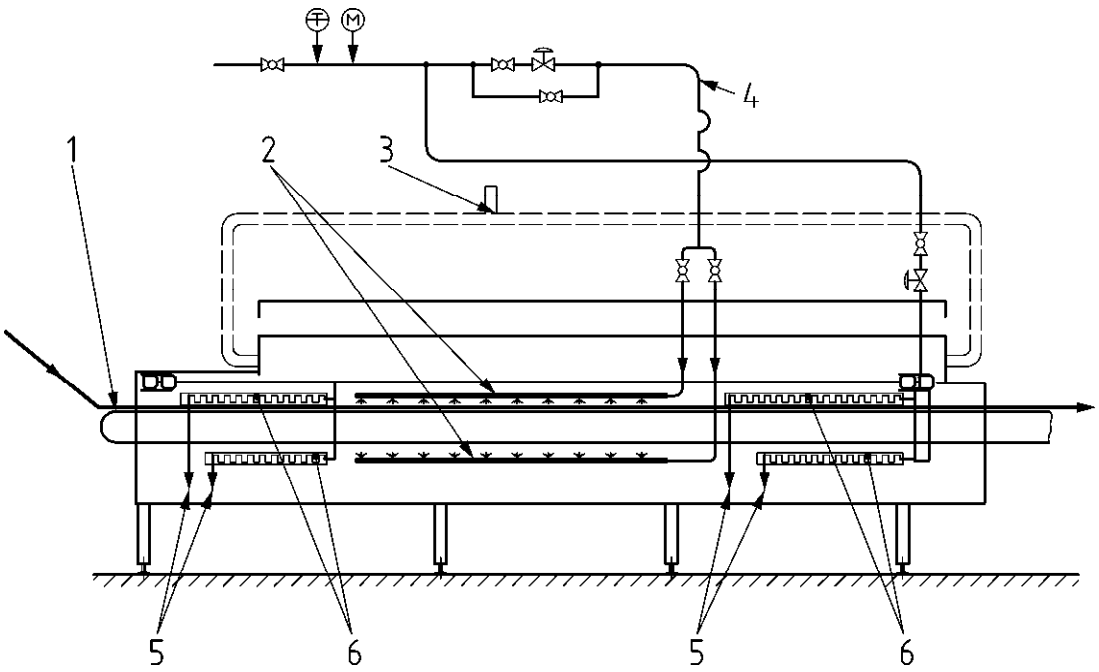
— spraying ramp with nozzles for the belt cleaning;

— tank for collecting the condensate;

— electric driven lifting device of the treatment room panels;

— steam sealing system, with water;

— steam tunnel temperature adjustment, hoods for humidity extraction.



Key

1 product conveying belt
2 steam spraying bars
3 steam suction system
4 steam supply system
5 condensate discharge
6 heating coils

Figure 13 — Steam pasteurizer machine

3.2.10 cooler machine (see Figure 14)

Machine mainly used for decreasing the product temperature in fresh pasta after pasteurization to a temperature that limits the bacterial growth as needed for the wanted shelf life.

The principal components are:

— cooling chamber;

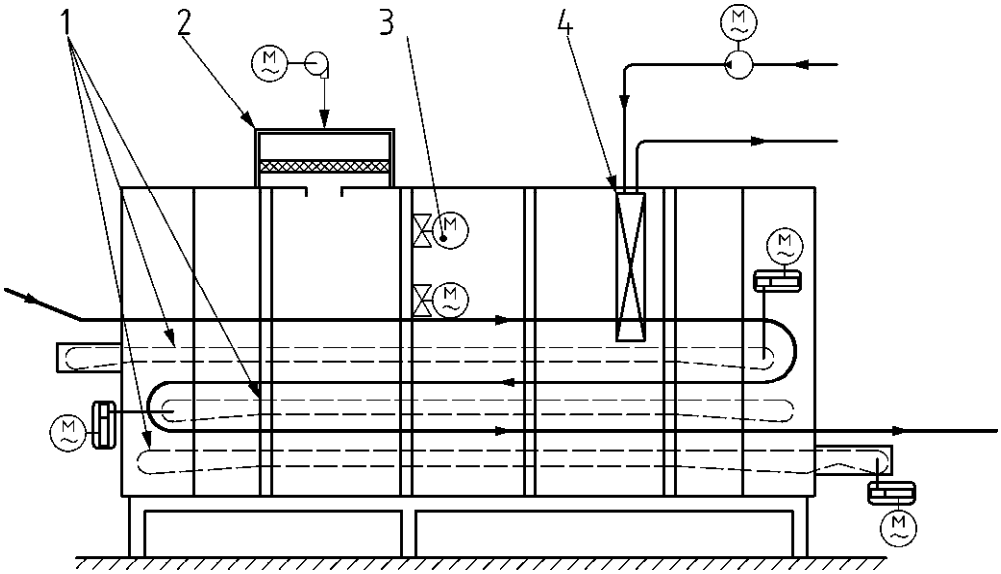
— wire mesh plastic belt conveyor;

— refrigerating plant consisting of condenser and refrigeration sets (refrigeratory);

— fans;

— air filtering or air sterilization device.

The system of refrigeration is not part of the machine.



Key

1 conveying tiers
2 filtered air injection group
3 ventilation
4 cooling batteries

Figure 14 — Cooler machine

3.2.11 dough sheet cutting machine (see Figure 15)

Machine suitable for laminating and cutting a dough sheet for the production of tagliatelle.

The principal components are:

— one or two pairs of dough sheet calibrating rolls;

— cutter block for longitudinal cutting (tagliatelle forming);

— transversal knife for cutting the product length.

Optional assemblies: conveyor belt for product transport to the next process.

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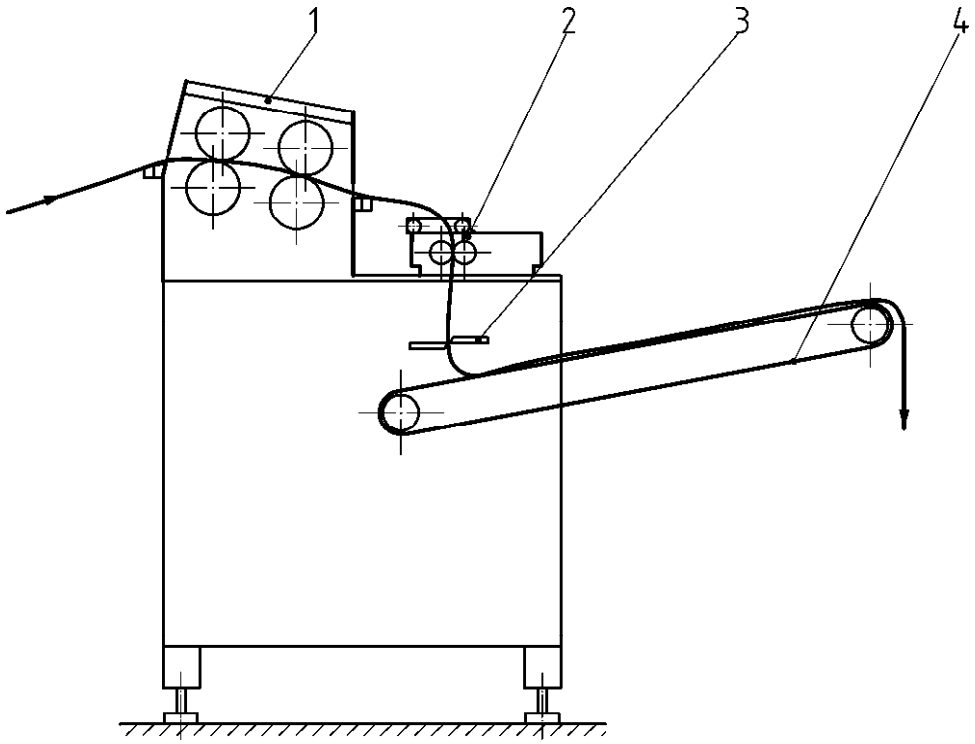


Key

1 sizing rollers
2 cutter block (longitudinal cutting)
3 knife blade (transversal cutting)
4 product conveyor belt

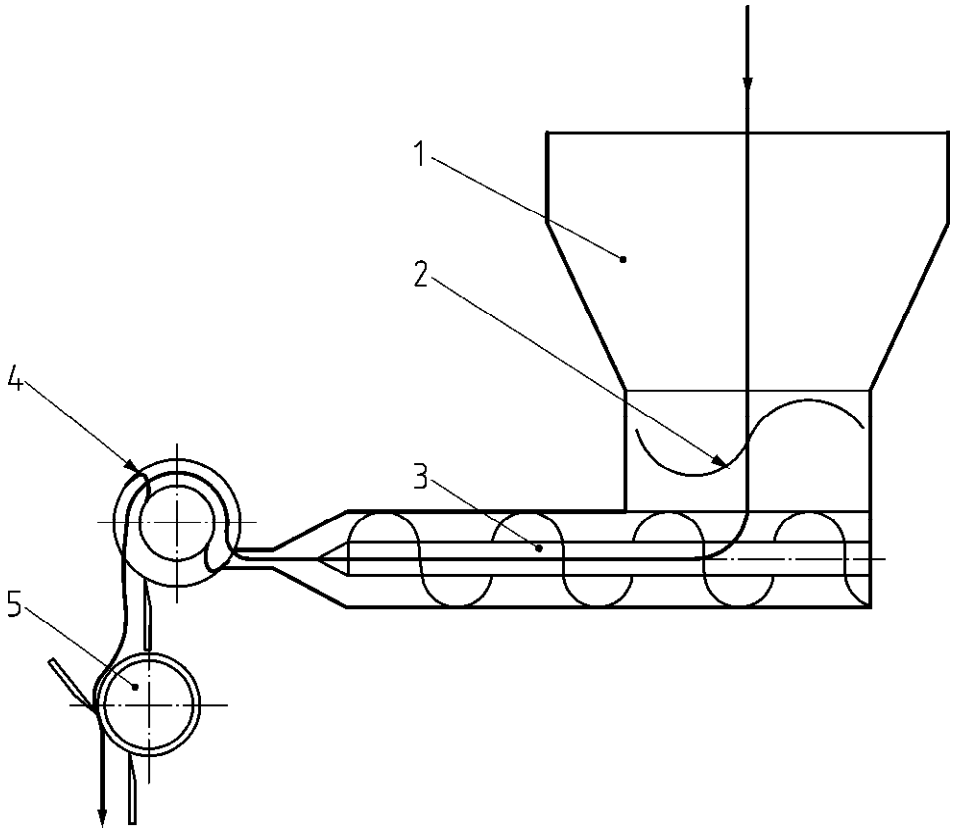
Figure 15 — Dough sheet cutting machine

3.2.12 gnocchi machine (see Figure 16)

Machine for the production of gnocchi by extrusion and afterwards cutting of dough. Parameters for the desired gnocchi size are the diameter of the extrusion die and the cutting knives speed.

The principal components are:

- hopper,
- barrel extruder,
- extrusion die,
- cutting room,
- rotating knives.



Key

1 hopper
2 mixing device
3 screw
4 rotating knives
5 shape roller

Figure 16 — Gnocchi machine

3.2.13 typical shapes pasta machine (see Figure 17)

Machine for the production of different shapes of typical regional pasta, like: orecchiette, cavatelli, strascinati, genovesi, maccheroni al ferro, ricciarelli, strozzapreti, etc. by extrusion, afterwards cutting and feeding to a form for shaping.

The principal components are:

— hopper with vertical screw,

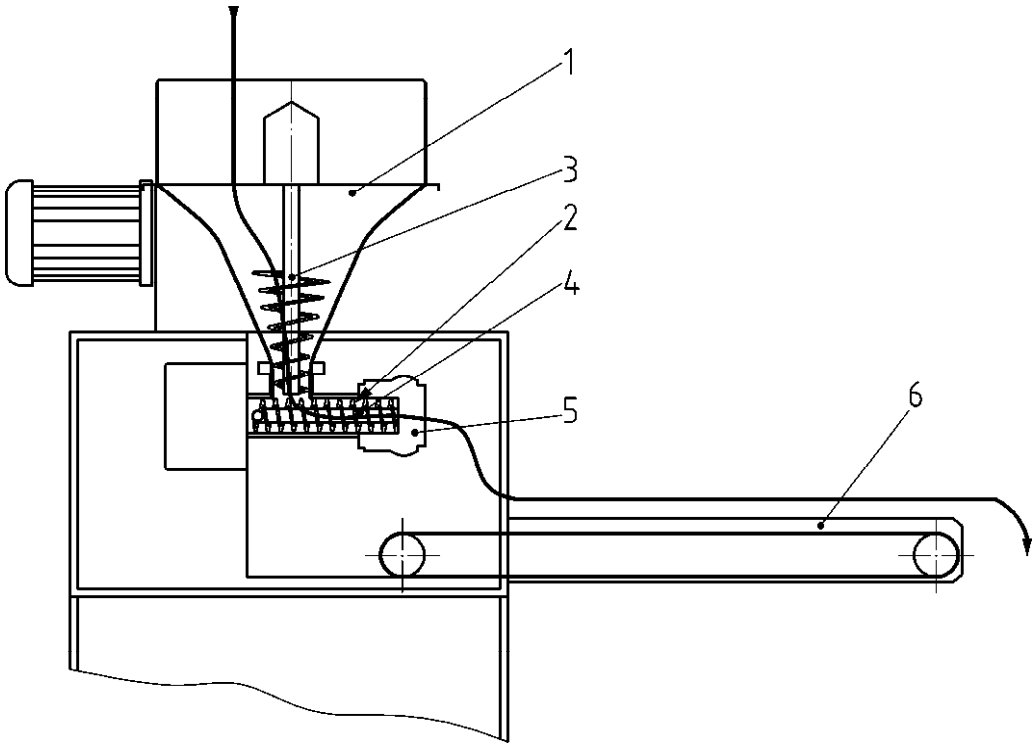
— barrel extruder,

— extrusion die,

— rotating knifes,

— form for pasta shaping.

Optional assemblies: conveyor belt.



Key

1 hopper
2 horizontal screw
3 vertical screw
4 rotating Knifes
5 extruder
6 conveyor belt

Figure 17 — Typical shapes pasta machine

4 List of significant hazards

4.1 General

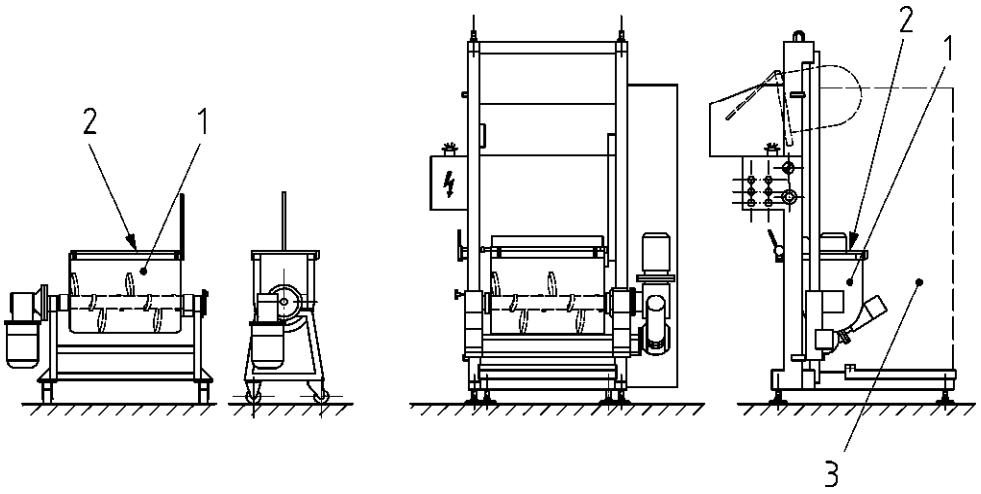
This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

4.2 Mechanical hazards

4.2.1 General

The Figures 18 to 31 illustrate the different danger zones associated with mechanical hazards for each kind of machines.

4.2.2 Discontinuous manually loaded kneading machines with or without lifting and tilting devices



Key

1 Zone 1
2 Zone 2
3 Zone 3

Figure 18 — Danger zones of discontinuous manually loaded kneading machine with or without lifting and tilting devices

— Zone 1

Access to the rotating tools through the feed opening: hazard of crushing shearing, cutting between and drawing-in between the bowl blades and basin to the arms or any part of the body.

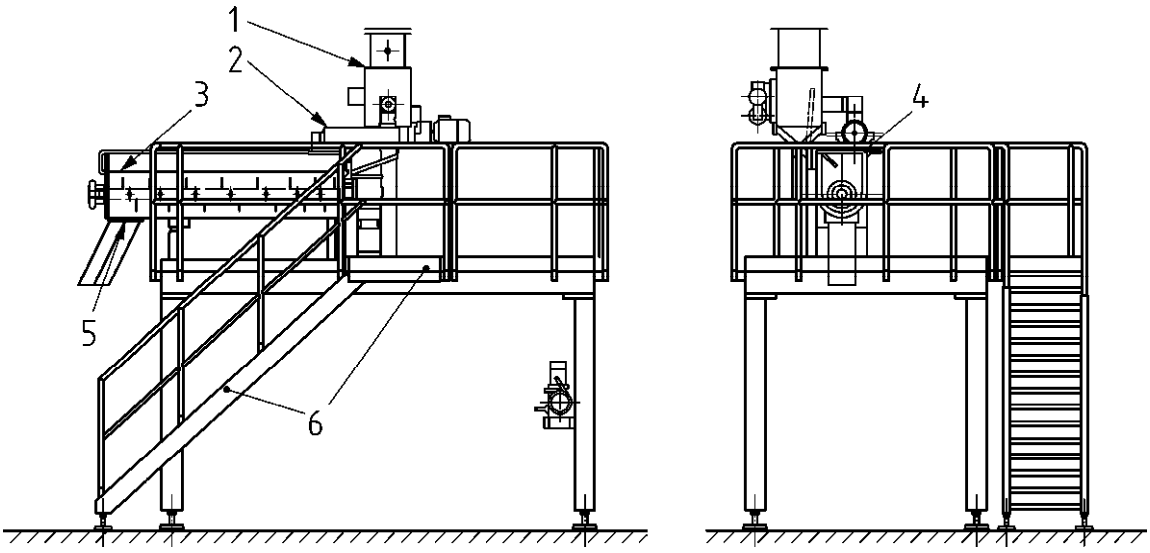
— Zone 2

Loss of stability of bowl lid and movement of machine: hazard of crushing of hands and feet.

— Zone 3

Area around mixing machine: hazards of trapping and crushing by uncontrolled discent of bowl, impact when the bowl is moving or between bowl and fixed part may cause injury to the body or arms.

4.2.3 Continuous kneading machine



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4
5 Zone 5
6 Zone 6

Figure 19 — Danger zones of continuous kneading machine

— Zone 1

Flour dosing device: access to moving parts may cause hazards like crushing, shearing and drawing-in into the dosing screws of hand and arm.

— Zone 2

Premixing device: access to moving parts may cause hazards like shearing and cutting of hand and arm.

— Zone 3

Shaft with blades: access to moving parts may cause hazards like crushing, shearing, cutting and drawing-in between the blades and the bowl of the upper limbs or any part of the body.

— Zone 4

Bowl lid: unexpected movement due to loss of stability may cause hazards like crushing of upper limbs.

— Zone 5

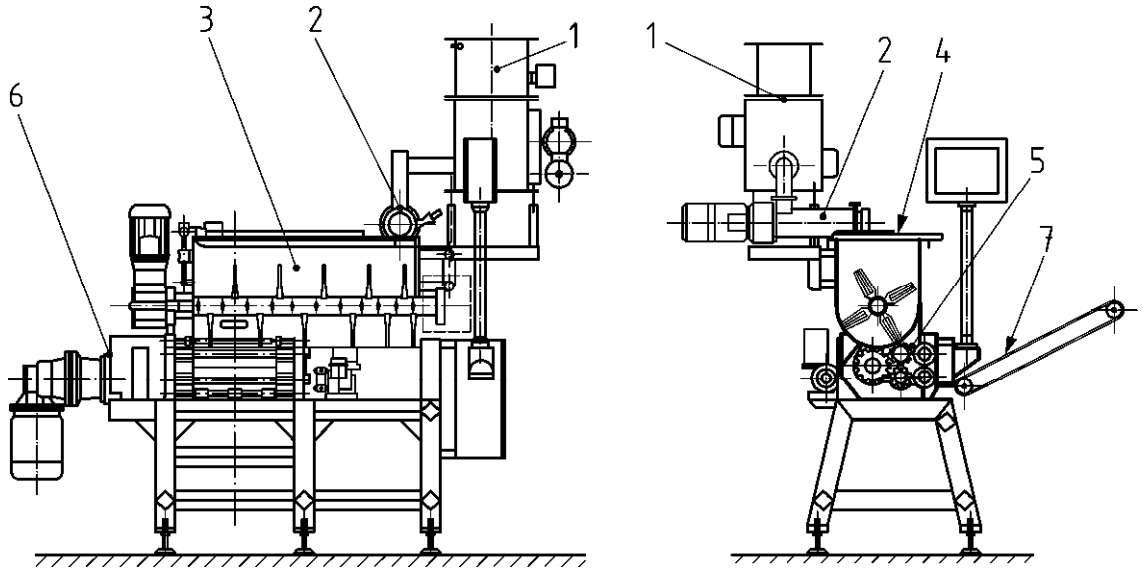
Dough exit gate: access to the moving gate may cause hazards like crushing and shearing between the dough exit gate and the bowl of the upper limbs. Access to the space below the dough exit gate may cause an impact hazard for the body from dropping dough.

Access to the moving shaft with blades through the dough exit gate: see Zone 3.

— Zone 6

Means of access to machinery: Slip accidents can occur if liquids or solids from the machine e.g. lubricants or the product spill onto traffic routes, workstations or means of access around the machine.

4.2.4 Combination of dough kneading and dough sheet forming machine



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4
5 Zone 5
6 Zone 6
7 Zone 7

Figure 20 — Danger zones of combination of dough kneading and dough sheet forming machine

— Zone 1

Flour dosing device: access to moving parts may cause hazards like crushing, shearing and drawing-in into the dosing screws of hand and arm.

— Zone 2

Premixing device: access to moving parts may cause hazards like shearing and cutting of hand and arm.

— Zone 3

Shaft with blades: access to moving parts may cause hazards like crushing, shearing, cutting and drawing-in between the blades and the bowl of the upper limbs or any part of the body.

— Zone 4

Bowl lid: unexpected movement due to loss of stability may cause hazards like crushing of upper limbs.

— Zone 5

Breaking and sizing rollers: access to moving parts may cause hazards like crushing and drawing-in of fingers, hand and arm.

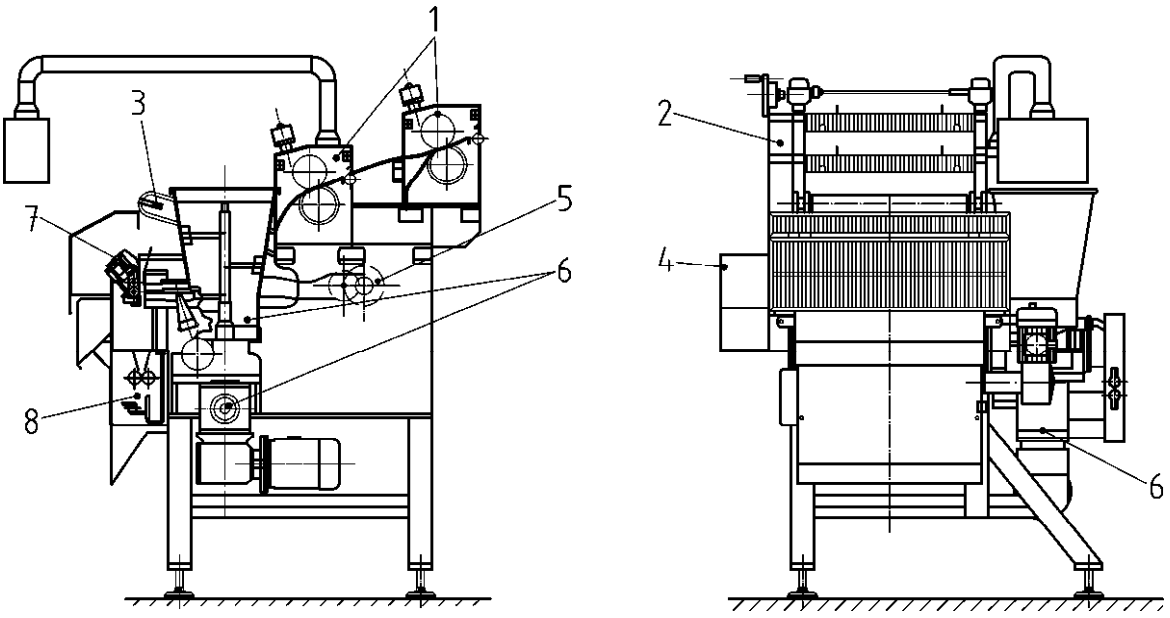
— Zone 6

Access to the roller drive: hazards of entanglement and crushing of hand and arm.

— Zone 7

Dough sheet conveyor belt: access to moving parts may cause hazards like abrasion cutting and entanglement of fingers and hands.

4.2.5 Forming machine processing one single dough sheet



Key

1	Zone 1	5	Zone 5
2	Zone 2	6	Zone 6
3	Zone 3	7	Zone 7
4	Zone 4	8	Zone 8

Figure 21 — Danger zones of forming machine processing one single dough sheet

— Zone 1

Calibration rollers: access to moving parts may cause hazards like crushing and drawing -in of hand and arm.

— Zone 2

Access to finishing roller drive: hazards entanglement and crushing of fingers and hand.

— Zone 3

Feeding conveyor belt: access to moving parts may cause hazards like abrasion cutting and entanglement of fingers and hands.

— Zone 4

Control mould unit: access to moving parts may cause hazards like crushing of fingers, hand and arm.

— Zone 5

Access to the drive central unit: hazards of entanglement and crushing of fingers and arm.

— Zone 6

Hopper for filling supply: access to moving parts may cause hazards like crushing and entanglement of

fingers and hand.

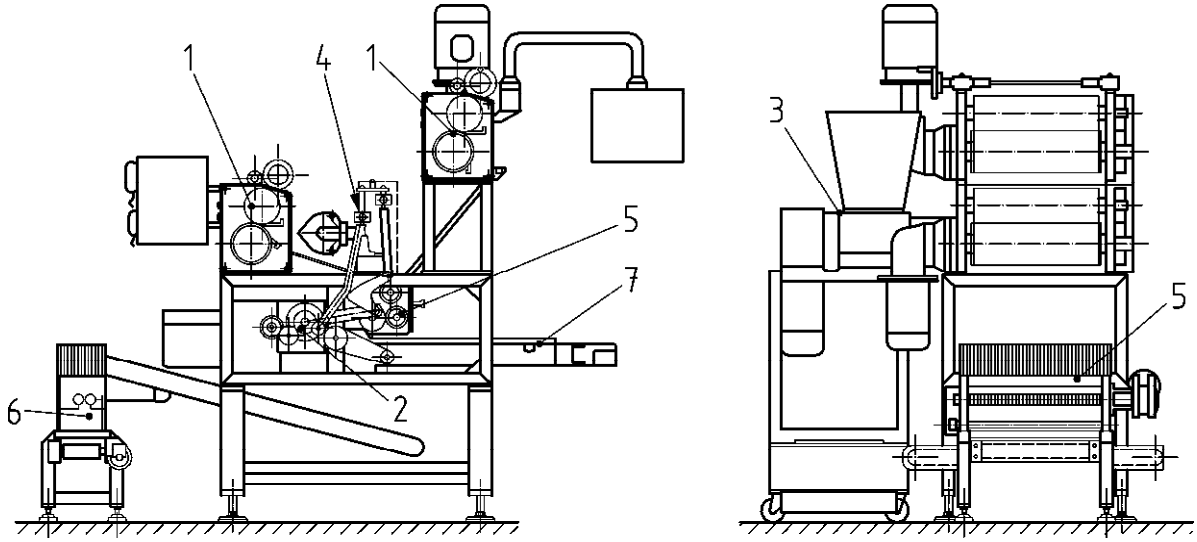
— Zone 7

Moulder: access to moving parts may cause hazards like crushing of fingers.

— Zone 8

Scrap cutter: access to moving parts and the cutting knives may cause hazards like shearing and cutting of fingers and hand.

4.2.6 Forming machine processing two dough sheets



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4
5 Zone 5
6 Zone 6
7 Zone 7

Figure 22 — Danger zones of forming machine processing two dough sheets

— Zone 1

Finishing rollers: access to moving parts may cause hazards like crushing and drawing-in of fingers, hand and arm.

— Zone 2

Access to drive mould unit: hazard of crushing between the moving part of the press of fingers and hand.

— Zone 3

Pump: access to moving parts may cause hazards like crushing and entanglement of fingers and hand.

— Zone 4

Hopper for filling supply: access to moving parts may cause hazards like crushing and entanglement of fingers and hand.

— Zone 5

Moulder: access to moving parts may cause hazards like crushing of fingers.

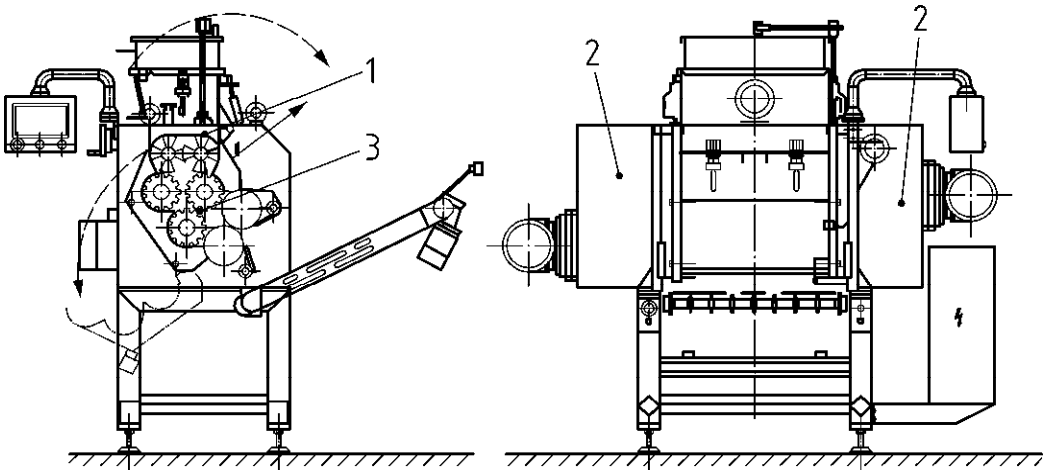
— Zone 6

Scrap cutter: access to moving parts and the cutting knives may cause hazards like shearing and cutting of fingers and hand.

— Zone 7

Product transfer belt: access to moving parts may cause hazards like abrasion cutting and entanglement of fingers and hands.

4.2.7 Dough sheet forming machine



Key

1 Zone 1
2 Zone 2
3 Zone 3

Figure 23 — Danger zones of dough sheet forming machine

— Zone 1

Hopper for dough supply: access to moving parts may cause hazards like crushing and entanglement of fingers and hand.

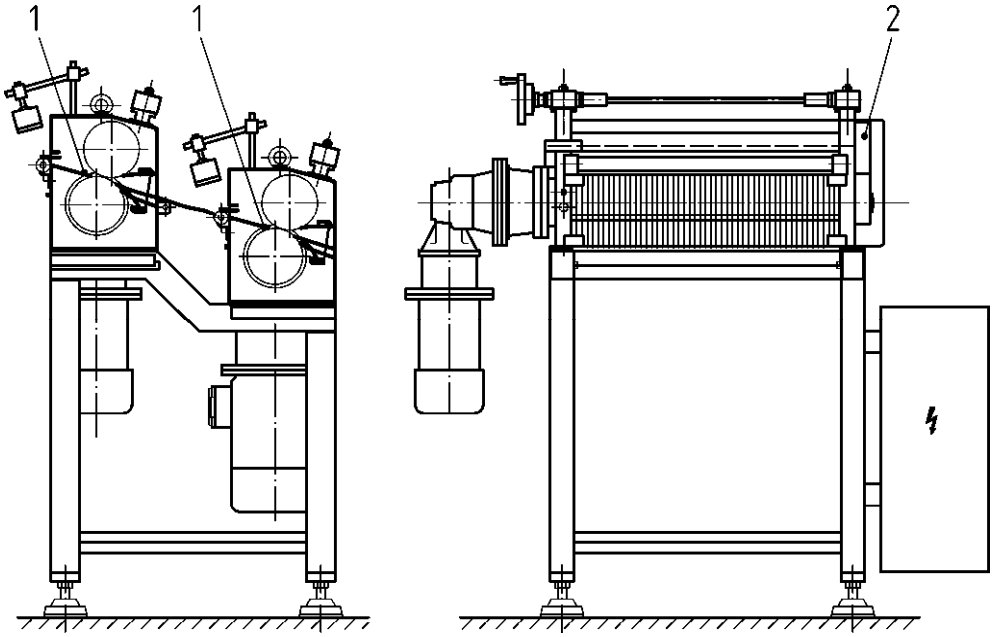
— Zone 2

Breaking and sizing rollers: access to moving parts may cause hazards like crushing and drawing-in of fingers, hand and arm.

— Zone 3

Access to finishing roller brake and finishing rollers: hazard of crushing between the rollers of hand and arm.

4.2.8 Sizing roller machine



Key

1 Zone 1

2 Zone 2

Figure 24 — Danger zones of sizing roller machine

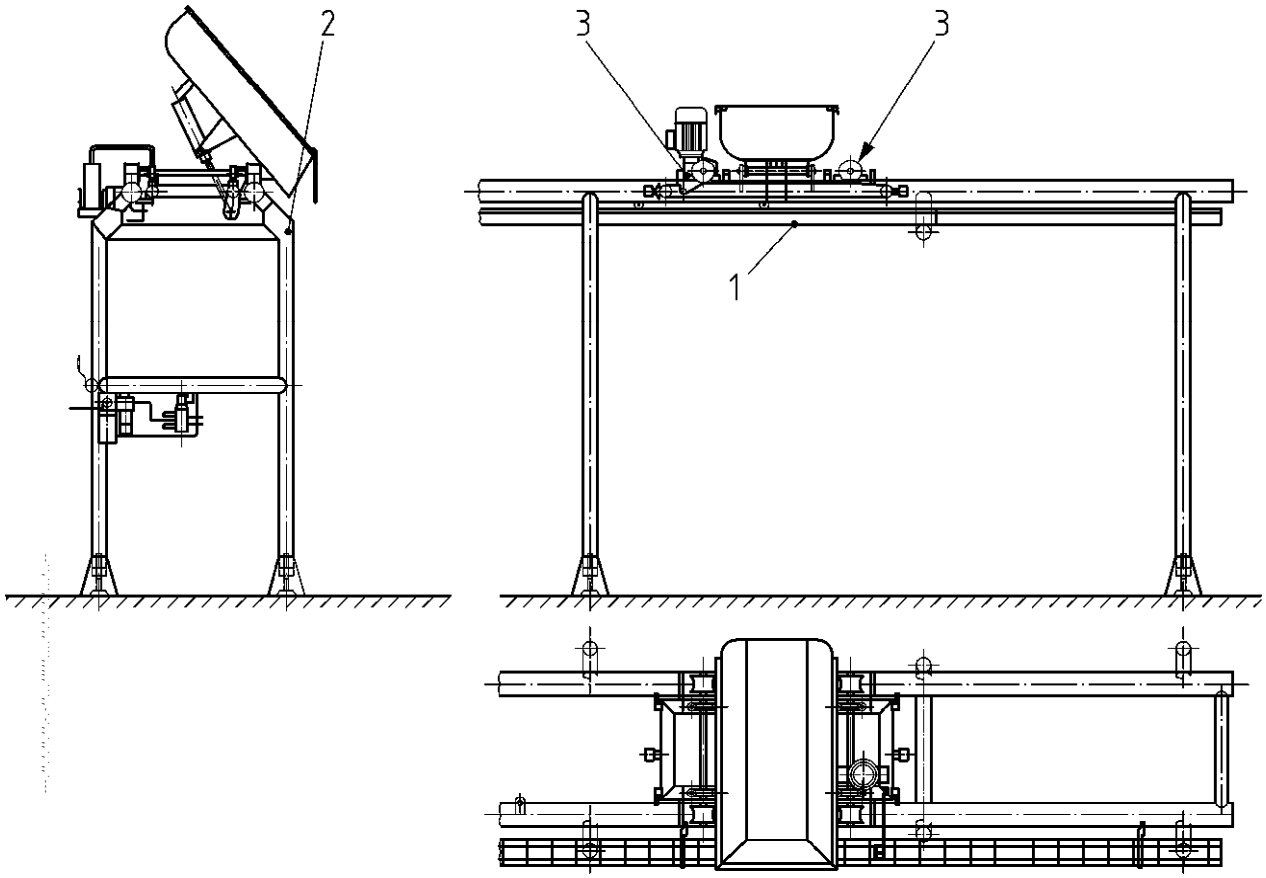
— Zone 1

Sizing rollers: access to moving parts may cause hazards like crushing and drawing-in of fingers, hand and arm.

— Zone 2

Access to gear box: hazard of crushing between the rollers of hand and arm.

4.2.9 Dough transport shuttle machine



Key

1 Zone 1
2 Zone 2
3 Zone 3

Figure 25 — Danger zones of dough transport shuttle machine

— Zone 1

Stand with roller rails: access to the roller rails may cause hazards like crushing and shearing of fingers and hands.

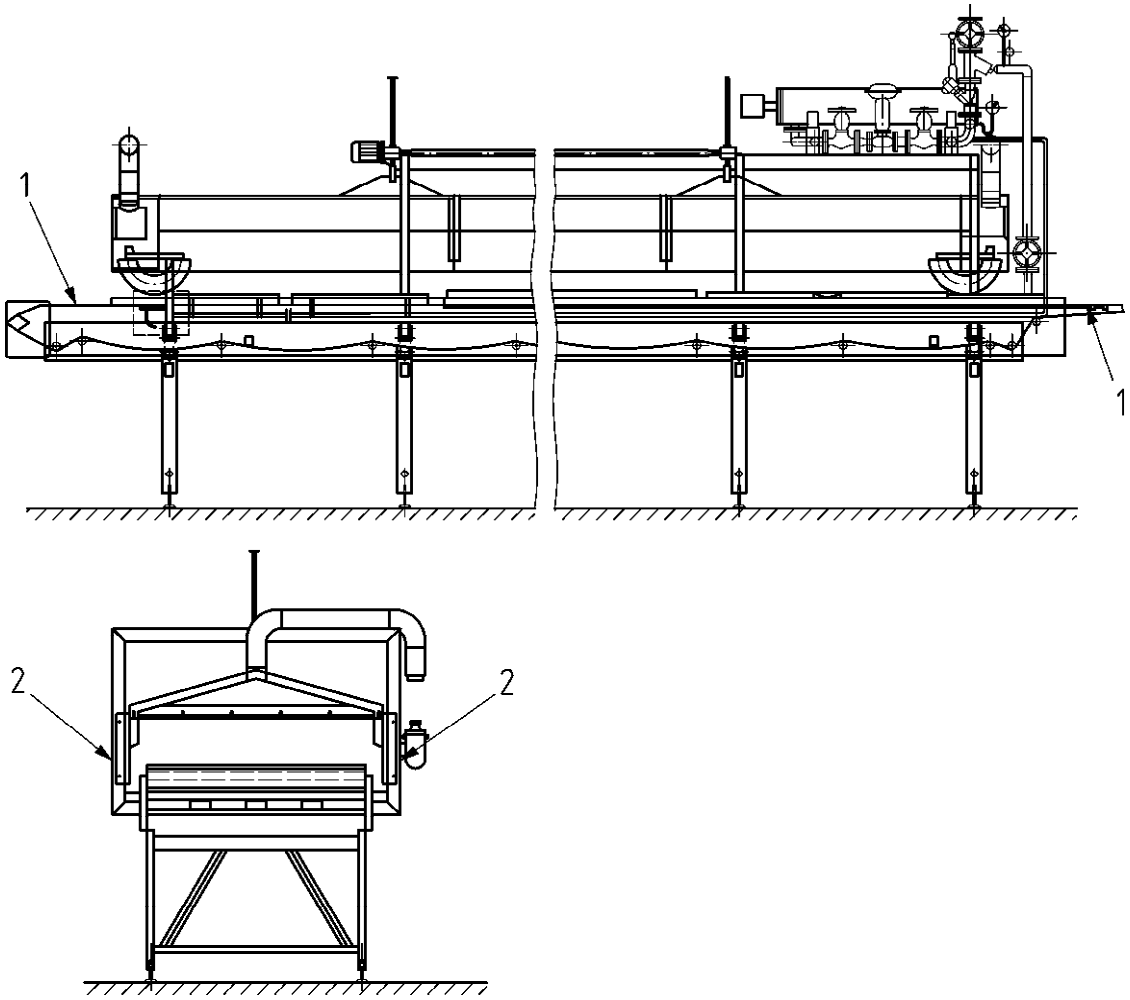
— Zone 2

Dough exit gate: access to the space below the unloading position may cause an impact hazard.

— Zone 3

Shuttle with trough: access to the moving shuttle may cause an impact hazard for the head and access to moving parts of the dumping device may cause hazards like crushing and shearing of fingers and hands.

4.2.10 Steam pasteurizer machine



Key

1 Zone 1

2 Zone 2

Figure 26 — Danger zones of steam pasteurizer machine

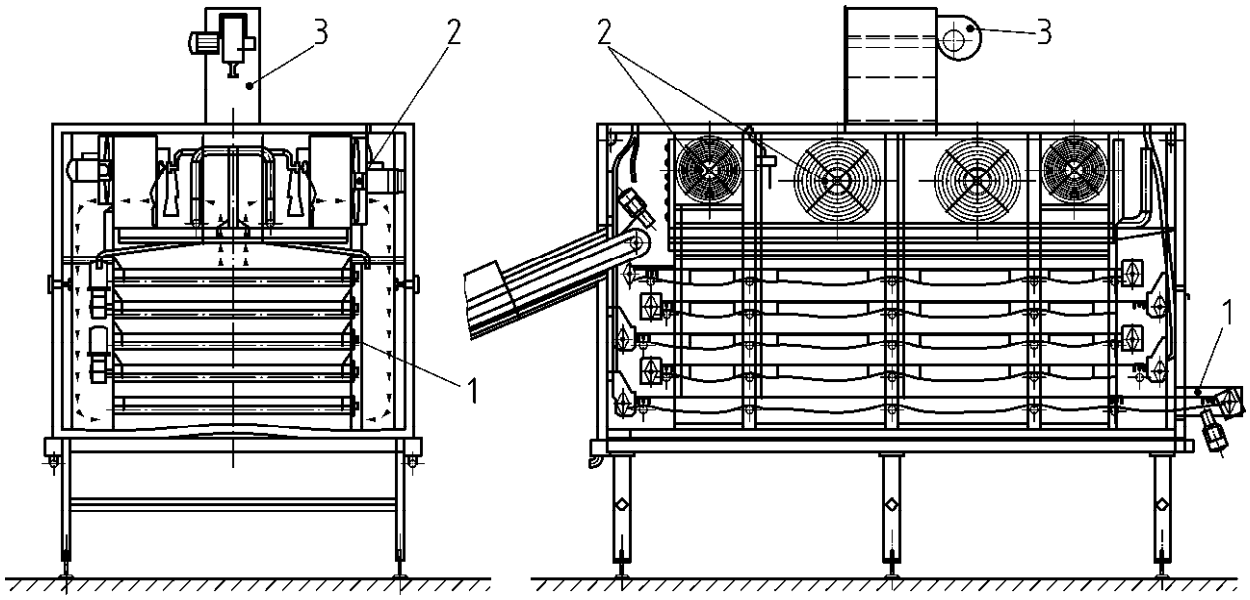
— Zone 1

belt conveyor: access to moving parts may cause hazards like shearing, cutting and entanglement of fingers and hand.

— Zone 2

Lifting device for tunnel panels: access to moving parts of the lifting device may cause hazards like crushing and shearing of fingers and hand. In case of failure of the elevating mechanism, crashing down of the tunnel panels may cause hazards like crushing and impact for the upper limbs, the body and the head.

4.2.11 Cooler machine



Key

1 Zone 1
2 Zone 2
3 Zone 3

Figure 27 — Danger zones of cooler machine

— Zone 1

Wire mesh belt conveyor: access to moving parts may cause hazards like shearing, cutting and entanglement of fingers and hand.

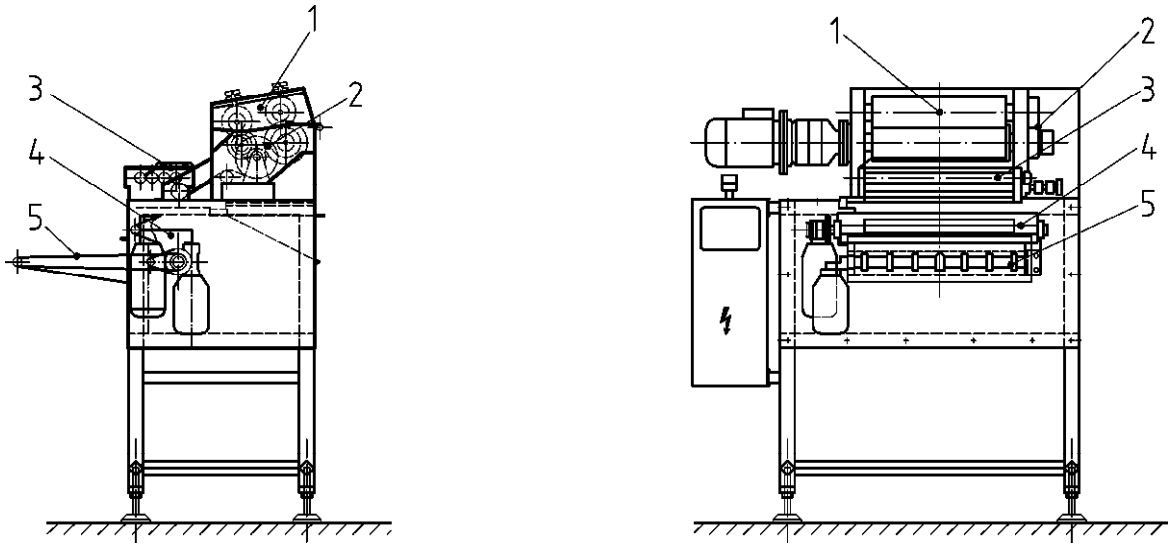
— Zone 2

Internal fan: access to moving parts may cause hazards like shearing, cutting and entanglement of fingers and hand.

— Zone 3

External fan: access to moving parts may cause hazards like shearing, cutting and entanglement of fingers and hand.

4.2.12 Dough sheet cutting machine



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4
5 Zone 5

Figure 28 — Danger zones of dough sheet cutting machine

— Zone 1

Finishing rollers: access to moving parts may cause hazards like crushing and drawing-in of fingers, hand and arm.

— Zone 2

Access to gear box: hazard of crushing of fingers and hand.

— Zone 3

Cutter block for longitudinal cutting: access to moving parts and the cutter block may cause hazards like shearing and cutting of fingers and hand.

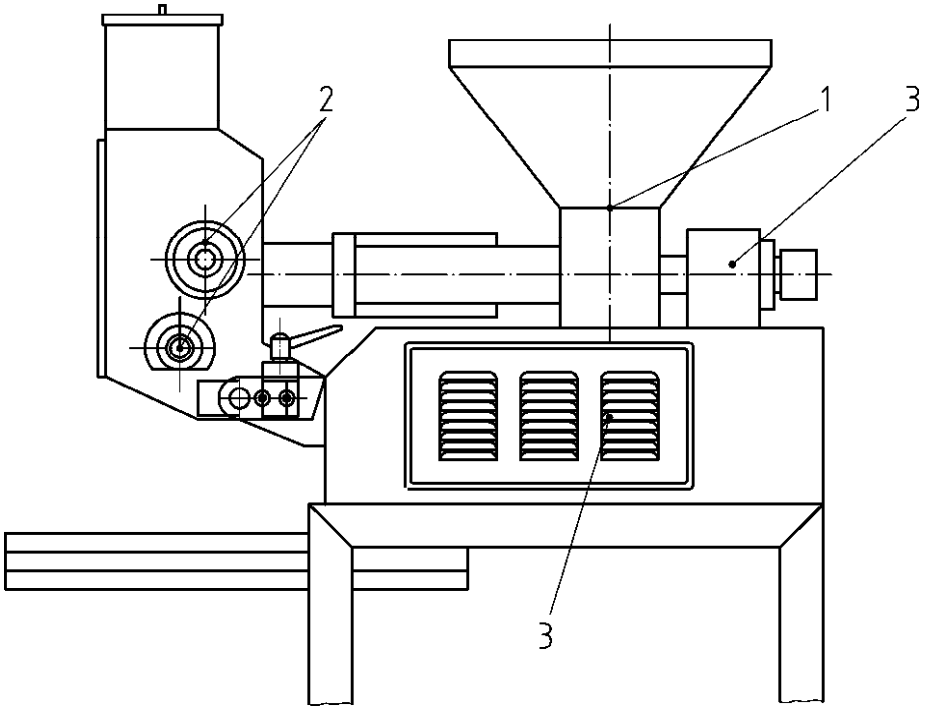
— Zone 4

Transversal knife for cutting the product length: access to moving parts and the transversal knife may cause hazards like shearing and cutting of fingers and hand.

— Zone 5

Product transfer belt: access to moving parts may cause hazards like abrasion cutting and entanglement of fingers and hands.

4.2.13 Gnocchi machine



Key

1 Zone 1
2 Zone 2
3 Zone 3

Figure 29 — Danger zones of gnocchi machine

— Zone 1

Hopper for ingredient supply: access to moving parts may cause hazards like crushing and entanglement of fingers and hand.

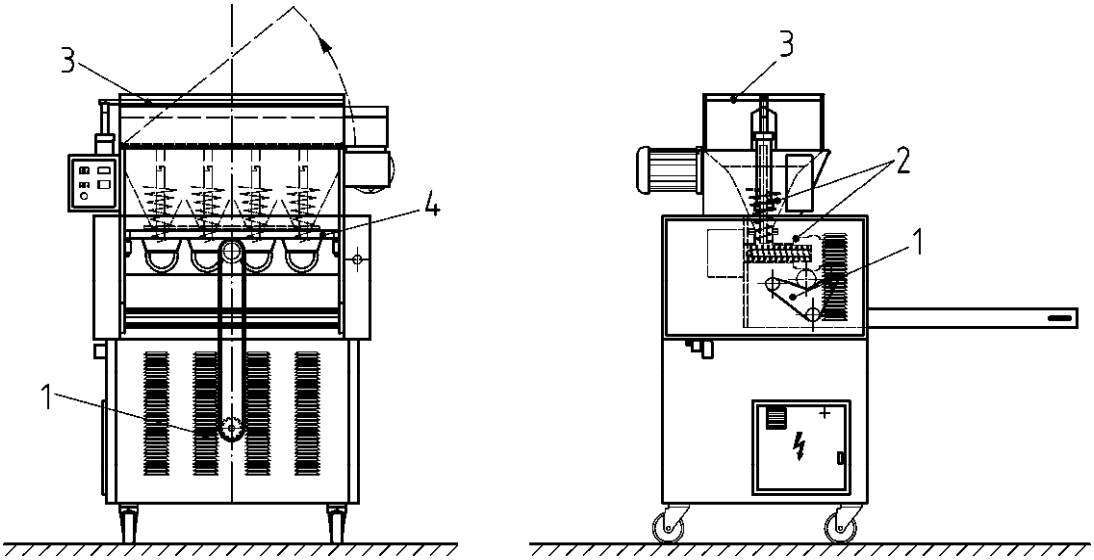
— Zone 2

Dough extruder, cutting knifes: access to cutting room may cause cutting, drawing-in and crushing of fingers and hand.

— Zone 3

Forming device: access to the forming device may cause cutting and crushing of fingers and hand.

4.2.14 Typical shapes pasta machine



Key

1 Zone 1
2 Zone 2
3 Zone 3
4 Zone 4

Figure 30 — Danger zones of typical shapes pasta machine

— Zone 1

Transmission parts: access to moving parts may cause hazards like shearing and cutting of fingers and hand.

— Zone 2

Vertical screw of hopper and horizontal screw of dough extruder: access to moving parts may cause hazards like shearing, cutting and drawing-in of fingers and hand.

— Zone 3

Hopper for dough supply: access to moving parts may cause hazards like trapping, shearing and cutting of hand, arm and other parts of the body.

— Zone 4

Cutting knives: access to moving parts and the cutting knives may cause hazards like cutting of fingers.

4.3 Electrical hazards

Hazard or electric shock direct or indirect contact with live components.

Hazard of external influences on electrical equipment (e.g. cleaning with water).

Electrical equipment on the machine generates a potential electric shock hazard.

If liquids, e.g. product spillage or cleaning substances like water, come into contact with the electrical conductors, there is a risk of electric shock.

4.4 Thermal hazards

Hydrothermal treatment machine and cooler can present hazards of burning and scalding of hand when touch hot part of the machine.

Parts of the steam pasteurizer e.g. wire mesh belt conveyor, steam supply and condensate collecting, or parts of the cooler e.g. refrigerating plant, which have high surface temperatures, may cause burning hazards.

The burning hazard will usually continue to exist for a period of time after power has been disconnected.

4.5 Hazards generated by noise

Machines can generate an airborne noise which may lead to hearing damage or cause accidents due to the interference with the oral communication or a reduced perception of the acoustical warning signals. Noise generated by machines can result in:

— permanent hearing loss;

— tinnitus;

— tiredness, stress etc.;

— other effects such as loss of balance, loss of awareness;

— interference with speech communication;

— inability to hear acoustic warning signals.

4.6 Hazards resulting from the inhalation of harmful mists and dusts

Loading the products exposes operators to dust including flour and ingredients which may be harmful to their health, causing rhinitis (running noses), watering eyes and possibly occupational asthma.

4.7 Hazards due to slip, trip and fall

Walkways, stairs and gangways may cause hazards like slip, trip and fall.

Slip accidents can occur if liquids or solids from the machine e.g. lubricants or the product, spill onto traffic routes, work stations or means of access around the machine.

Trip accidents may occur if parts of the machine protrude beyond the machine frame at low level, or if cables and pipes associated with the machine are incorrectly installed.

Falls may occur if people climb or stand on parts of the machine above floor level, e.g. for loading, maintenance or cleaning.

4.8 Hazards generated by neglecting ergonomic principles

During operation, cleaning and maintenance, there is a hazard to safety and health resulting from awkward body postures or the use of excessive effort.

Loading products into the bowl especially at heights can create a risk of injury to the body from lifting, pushing and pulling of heavy loads.

4.9 Hazards generated by neglecting hygienic design principles

The neglect of hygienic principles can create unacceptable contamination of foodstuff and therefore a risk to human health of the operator and consumer, e.g. through physical, chemical or microbial pollution.

4.10 Hazards due to loss of stability or overturning

Hazard to the body by impact or crushing in particular for small machines with wheels.

5 Safety and hygiene requirements and/or protective measures

5.1 General

Machinery shall comply with the safety and hygiene requirements and/or protective measures of this clause.

In addition, the machine shall be designed according to the principles of EN ISO 12100-1:2003 and EN ISO 12100-2:2003 for hazards relevant but not significant, which are not dealt with by this European Standard (e.g. sharp edges).

5.2 Mechanical hazards

5.2.1 Elimination of crushing hazards by design

Any gaps between moving parts and between moving parts and fixed parts of the machine shall be so arranged that either it is not possible for a finger to enter the gap (i.e. a gap of 6 mm or less) or the gap shall be sufficiently large to prevent trapping and crushing in accordance with Table 1 of EN 349:1993+A1:2008.

5.2.2 Moving transmission parts

Access to danger zones of drive shafts, coupling between the motor and reduction gear and transmission belts shall be prevented by fixed guards or movable interlocking guards in accordance with EN 953:1997+A1:2009.

The safety related part of the control system, performing the safety related stop function, including interlocking device, shall fulfil at least performance level c in accordance with EN ISO 13849-1:2008.

Openings in guards shall comply with Table 4 of EN ISO 13857:2008.

5.2.3 Moving parts contributing to the work

Access to moving parts contributing to the work, e.g. paddles of mixing units shall be prevented by fixed or movable guards, in accordance with EN 953:1997+A1:2009. Movable guards shall be provided with interlocking devices with guard locking in accordance with EN 1088:1995+A2:2008. If opening the interlocked guard causes the dangerous movements to stop within 3 seconds, guard locking is not required.

The safety related part of the control system, performing the safety related stop function, including interlocking device, shall fulfil at least performance level c in accordance with EN ISO 13849-1:2008.

Openings in guards shall comply with Table 4 of EN ISO 13857:2008.

Moving parts at feeding and discharging zones that for technical reasons cannot be safe guarded in accordance with the rules above shall be controlled using a hold to run control device in accordance with 5.4.1.

5.2.4 Bowl lid

Non-powered bowl lids shall be stable when in the open position to prevent unintentional closing (e.g. with balancing systems). The closing speed of the bowl lids shall not exceed 50 mm/s when the distance of the bowl to the front edge lid is less than 200 mm.

Powered bowl lids shall be operated by a hold-to-run control device in accordance with 5.4.1 and shall remain in their position or stop and maintain their position when the power supply fails.

For ergonomic requirements see 5.9.

5.3 Electrical hazards

5.3.1 General

Unless stated otherwise in this clause, all electrical equipment associated with the machine shall comply with the requirements of EN 60204-1:2006.

5.3.2 Safety requirements relating to electromagnetic phenomena

The machines shall have sufficient immunity to electromagnetic disturbances to enable them to operate safely as intended and not fail to danger when exposed to the levels and types of disturbances intended by the manufacturer. The manufacturer of the machines shall design, install and wire the equipment and subassemblies taking into account the recommendations of the suppliers of these sub-assemblies.

5.3.3 Power circuits

Devices for detection and interruption of over-current shall be applied to each live conductor in compliance with EN 60204-1:2006, 7.2.3. In case of single phase machines, no such device is required for earthed neutral conductor.

5.3.4 Earth faults

When equipment within the scope of this European Standard is supplied from a single phase conductor and an earthed neutral conductor, there is no requirement for double pole interruption in the control circuit, according to 9.4.3.1 of EN 60204-1:2006.

5.3.5 Emergency stop

Emergency stop devices shall be in accordance with EN ISO 13850:2008 and shall be located as minimum at each operator control station.

5.3.6 Degrees of protection of external enclosures of electrical equipment (see EN 60529:1991)

Enclosures including control actuating devices, signals and display elements exposed motor used in locations that are cleaned with low pressure water jet, shall be at least IP 55.

NOTE For the machinery covered in this standard the cleaning with low pressure water jet is regarded as an efficient cleaning method (see Clause 7). The degrees of protection of IP 55 is suitable for this cleaning method. For the use of medium pressure and high pressure water jet a higher IP rating is necessary.

5.3.7 Supply disconnecting device

Each machine shall be equipped with a supply disconnecting device according to 5.3 of EN 60204-1:2006 capable of being equipped with means to lock them in the "off" position. The manually operated elements of controls shall be easily and safely accessible and be designed, mounted and marked so as to allow instant recognition of their purpose, as well as direction and condition of switching. If a combination plug / socket is

provided, the operator shall be able to check from any of the points which he has access that the plug remains removed.

5.4 General aspects of controls

5.4.1 Hold to run control devices

Hold to run control devices, as defined in 3.26.3 of EN ISO 12100-1:2003, shall comply with the following:

a) the control devices shall be located in a fixed position and at a safe distance from the relevant danger point(s) so that it is not possible to reach the danger point(s) while operating the device. When the control device is released the dangerous movement shall stop within such time that the danger point can not be reached before the movement stops;

b) the operator shall have a clear view of the complete danger zone;

c) the dangerous movement shall be not faster than necessary.

d) a separate stop control device is needed near each hold to run control devices.

e) the safety related part of the control system, performing the safety related stop function, including hold to run control device, shall fulfil at least performance level c in accordance with EN ISO 13849-1:2008.

5.4.2 Controls for maintenance or cleaning

Where, for maintenance or cleaning of machinery, a guard has to be displaced or removed and/or a protective device has to be disabled, and where it is necessary for the purpose of these operations for the machinery or part of the machinery to be put in operation, safety of the operator shall be achieved using a specific control mode which simultaneously disables all other control modes, permits operation only by continuous actuation of an enabling device, or a hold-to-run control or a two hand control device and permits operation of the hazardous elements only in reduced risk conditions (e.g. reduced speed, limited movement, reduced power of force). The location of the control device shall allow a good view of the controlled elements e.g. if necessary by using a portable control device that plugs in at a local control position. An emergency stop device shall be within reach of the operator. The access to the danger zone shall be restricted as far as possible.

The mode selector shall allow unambiguous selection of this "maintenance mode" and shall be lockable in each position (see also 4.11.9 and 4.11.10 of EN ISO 12100-2:2003).

5.4.3 Interlocking system of guards

Interlocking system of guards shall:

— comply with 5.2, 5.3, 5.4, 5.5, 5.6, 5.7 and 5.8 of EN 1088:1995+A2:2008;

— comply with hygiene requirements of EN 1672-2:2005+A1:2009 and Annex A of this standard;

— be protected against the action of dough, cleaning and disinfections agents, oil and liquids.

5.4.4 Start warning

Where, e.g. because of the size of the machine, from the control position the operator is not able to ensure that there are no exposed persons in the danger zones of the machine there shall be a start warning. The start warning shall consist of an acoustic and/or visual signal automatically given when the start command is given. Before the machine starts, exposed persons shall have the time and the means to prevent the machine starting up. Acoustic signals shall comply with EN ISO 7731:2008 and visual signals with EN 842:1996+A1:2008.

5.5 Thermal hazards

The temperatures of accessible touchable surfaces shall not exceed the limits given in Clause 4 of EN ISO 13732-1:2008. The contact period for surfaces intended to be touched during operation shall be assumed to be not less than 4 s. (see Annex B of EN ISO 13732-1:2008).

Where parts are cooled, the temperatures of the touchable surfaces shall comply with the limits given in Clause 5 of EN ISO 13732-3:2008.

5.6 Noise reduction

Noise reduction shall be an integral part of the design process thus specifically taking into account measures at source as given in EN ISO 11688-1:2009. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values (see Annex A) in relation to other machines of the same family.

The major sound sources are: motors and moving parts.

A noise emission declaration shall be given according to Annex A.

5.7 Inhalation of harmful mists and dusts

Machines presenting a risk of emission of harmful mists or dusts (mainly during manually loading of flour and ingredients and the initial stage of kneading) shall be constructed as closed machines. Necessary openings for loading, unloading, adding ingredient etc., shall be equipped with solid lids (without opening).

If it is not possible to prevent dangerous emission of harmful mist and dust (see EN 626-1:1994+A1:2008) the machine shall have provision for the connection of extraction equipment. The manufacturer shall give details of the extraction rate and connection means in the instruction handbook.

5.8 Protective measures against slip, trip and fall

Walkways, work and maintenance platforms shall be in accordance with EN ISO 14122, parts 1 to 4.

5.9 Ergonomic design principles

The design of the machines shall take account of the principles given in EN 614-1:2006+A1:2009.

The force required to open manually operated covers shall not exceed 150 N e. g. by counterbalancing. Awkward body postures during maintenances and cleaning as well as when filling and emptying the bowl shall be avoided. This can be achieved through good ergonomic design and by using automatic loading and discharge equipment.

Under best lifting conditions the use of the machine shall not involve a person lifting more than 25 kg.

For movable machines pushing and pulling with excessive effort shall be avoided e.g. by the use of low-friction castor wheels and provision of ergonomically well designed handles.

Provisions shall be made for easy and safe handling of mobile parts, in accordance with 5.5.5 of EN ISO 12100-2:2003.

5.10 Hygiene requirements

5.10.1 General

Machines for processing fresh and filled pasta shall be designed and manufactured in accordance with the requirements of EN 1672-2:2005+A1:2009 and Annex B of this European Standard give additional information.

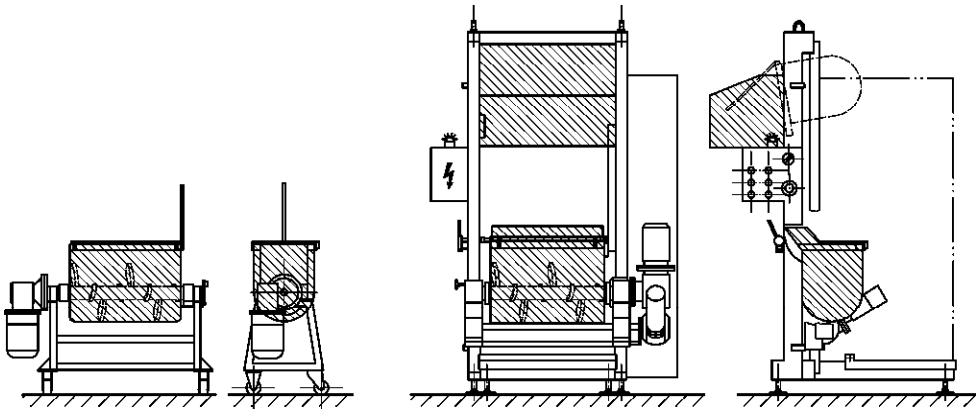
The instructions for use shall include recommendations for cleaning procedures and include advice on suitable (and, if appropriate) unsuitable cleaning materials as well as any means necessary to protect the operator, such as personal protective equipment.

In EN 1672-2:2005+A1:2009 are defined three zones (food area, splash area and non food area). For these kind of machines are usually used only two zones (food area and non food area).

5.10.2 Food area

In general for each type of machine in Figures 31 to 43 are described the areas which are in contact with foodstuff.

The precise boundary between the areas depends on the detailed design of the machine.

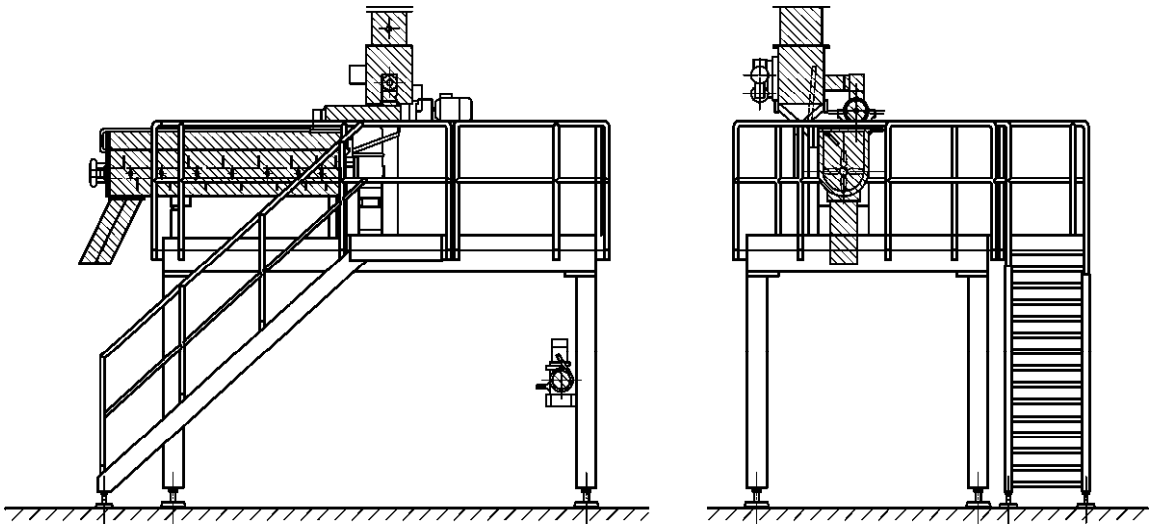


Key

Food Area

Non food Area

Figure 31 — Discontinuous manually loaded kneading machine, without or with lifting and tilting devices

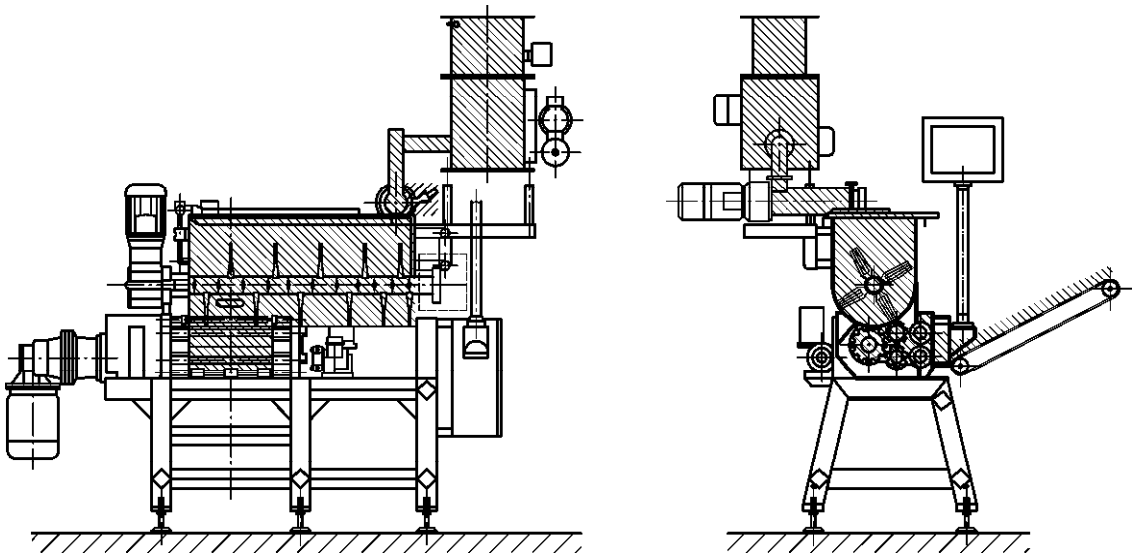


Key

Food Area

Non food Area

Figure 32 — Continuous kneading machine

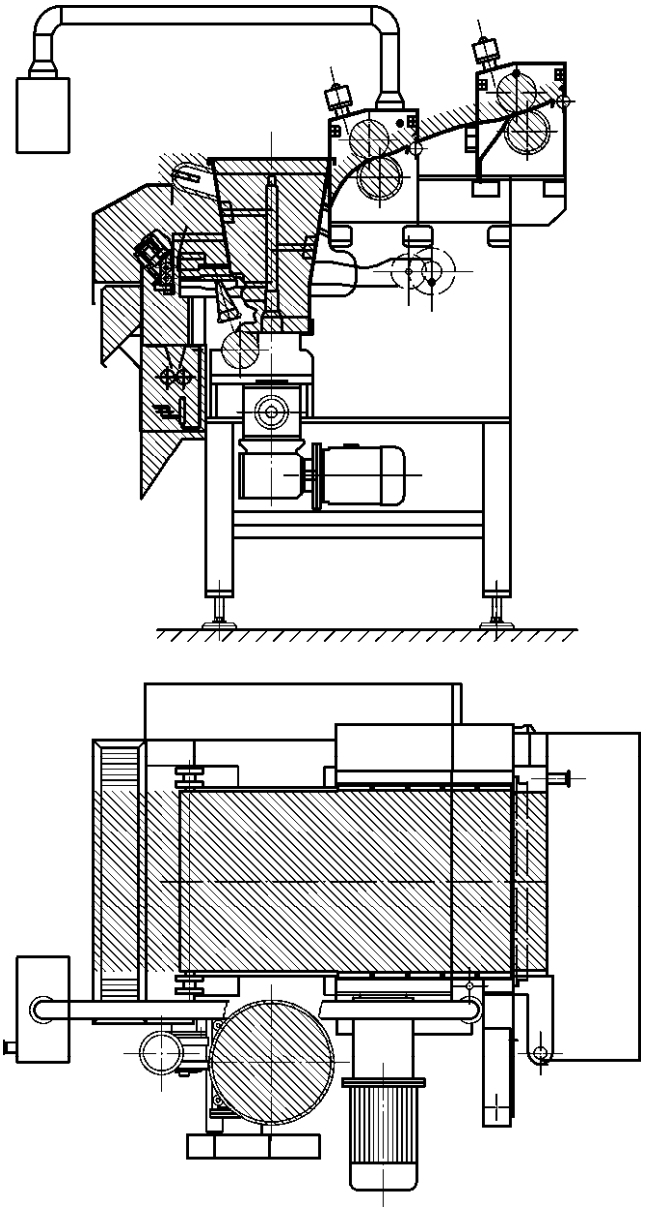


Key

Food Area

Non food Area

Figure 33 — Combination of dough kneading and dough sheet forming machine

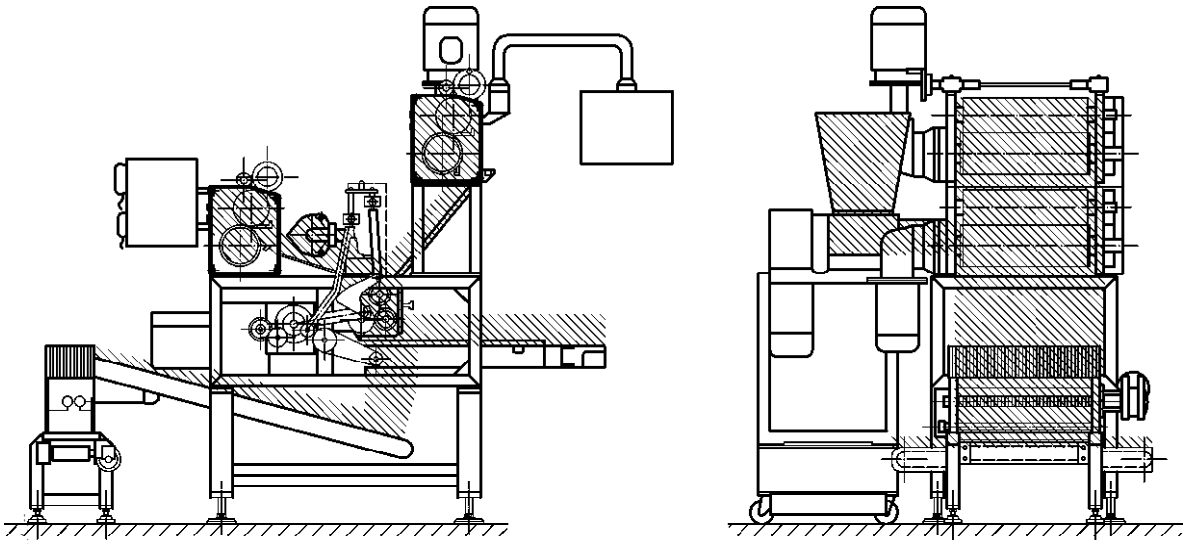


Key

Food Area

Non food Area

Figure 34 — Forming machine processing one single dough sheet

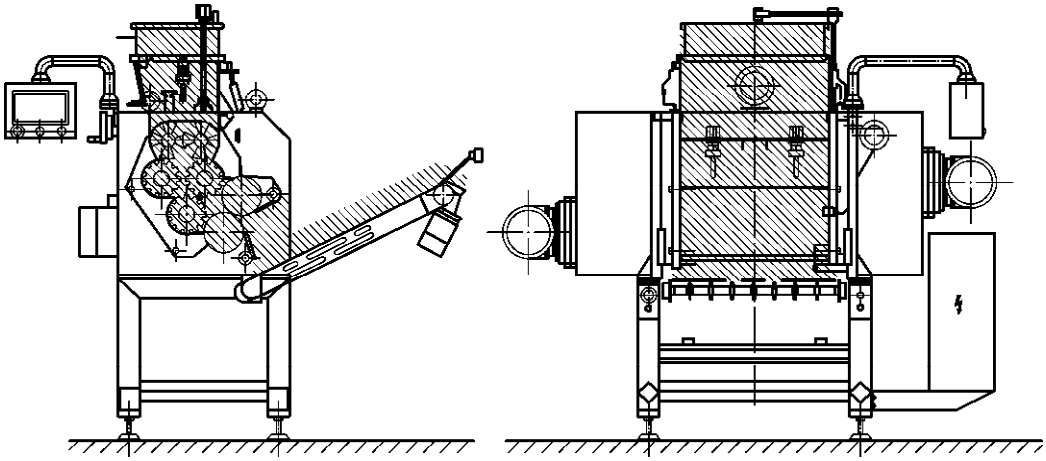


Key

Food Area

Non food Area

Figure 35 — Forming machine processing two dough sheets

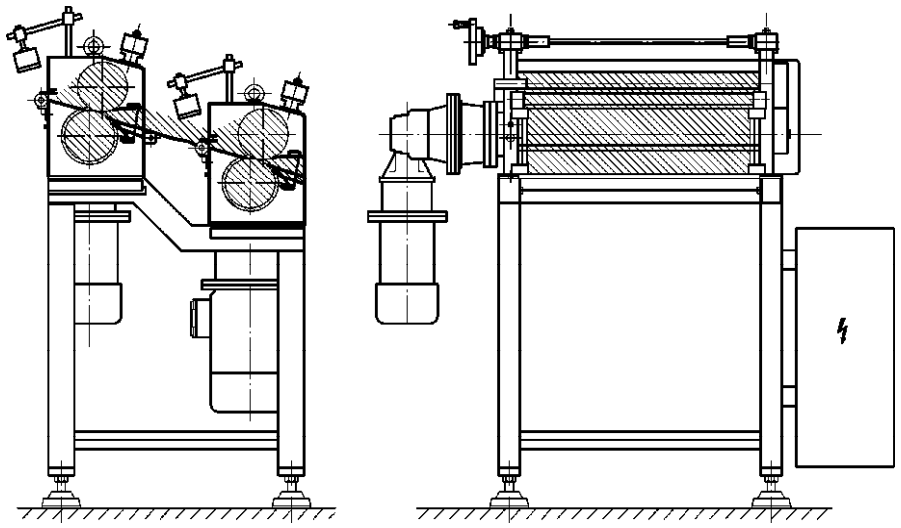


Key

Food Area

Non food Area

Figure 36 — Dough sheet forming machine

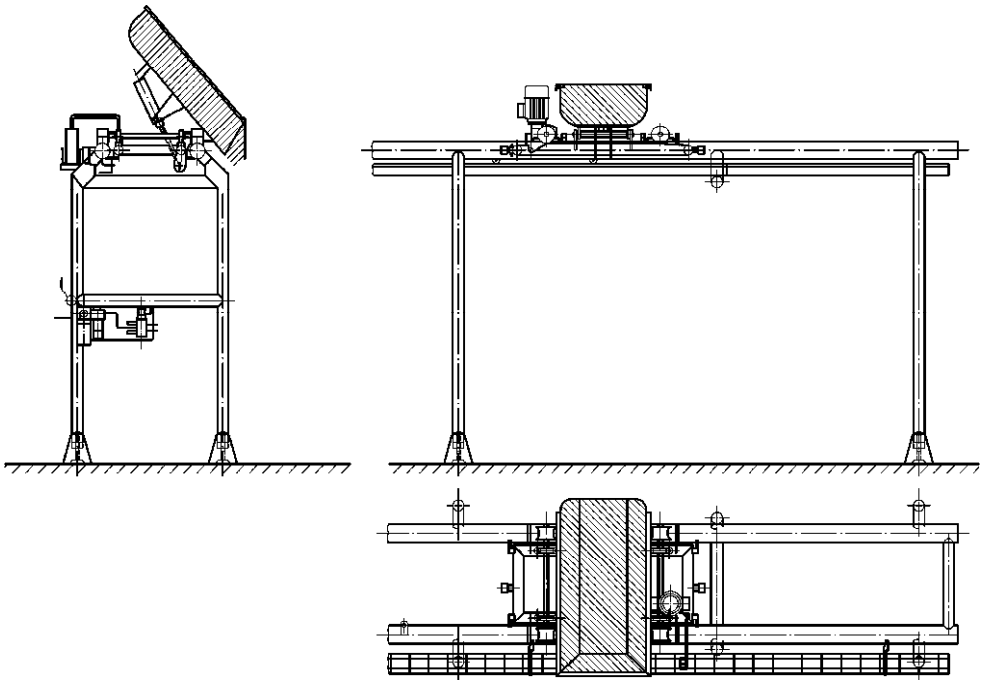


Key

Food Area

Non food Area

Figure 37 — Sizing roller machine

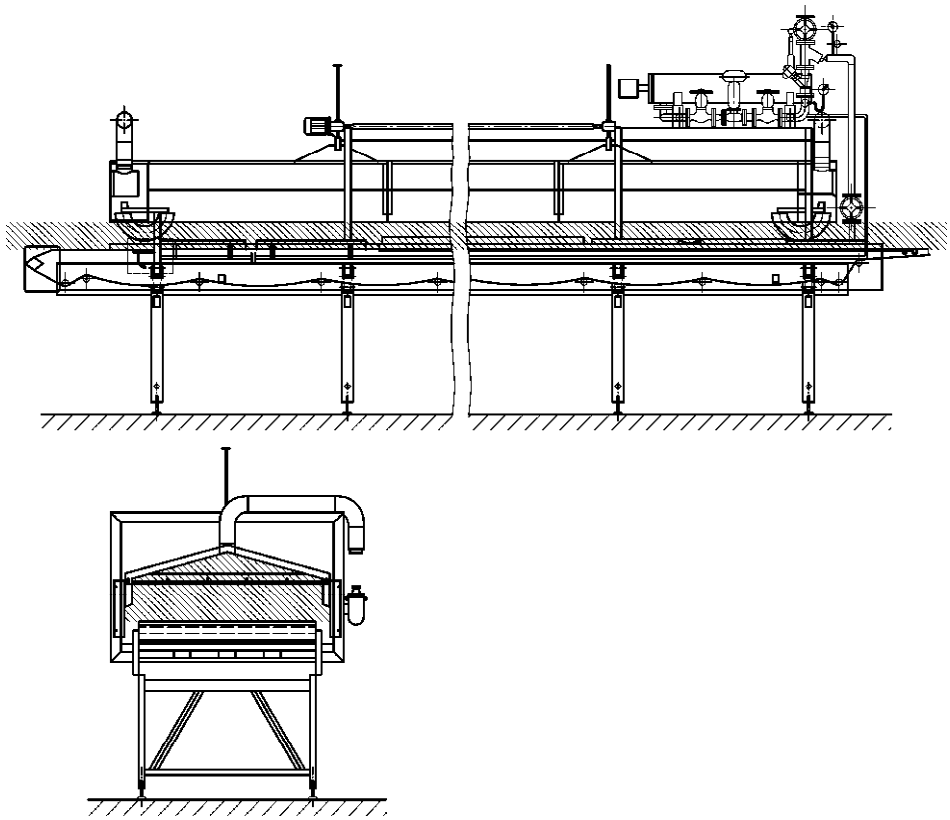


Key

Food Area

Non food Area

Figure 38 — Dough transport shuttle machine

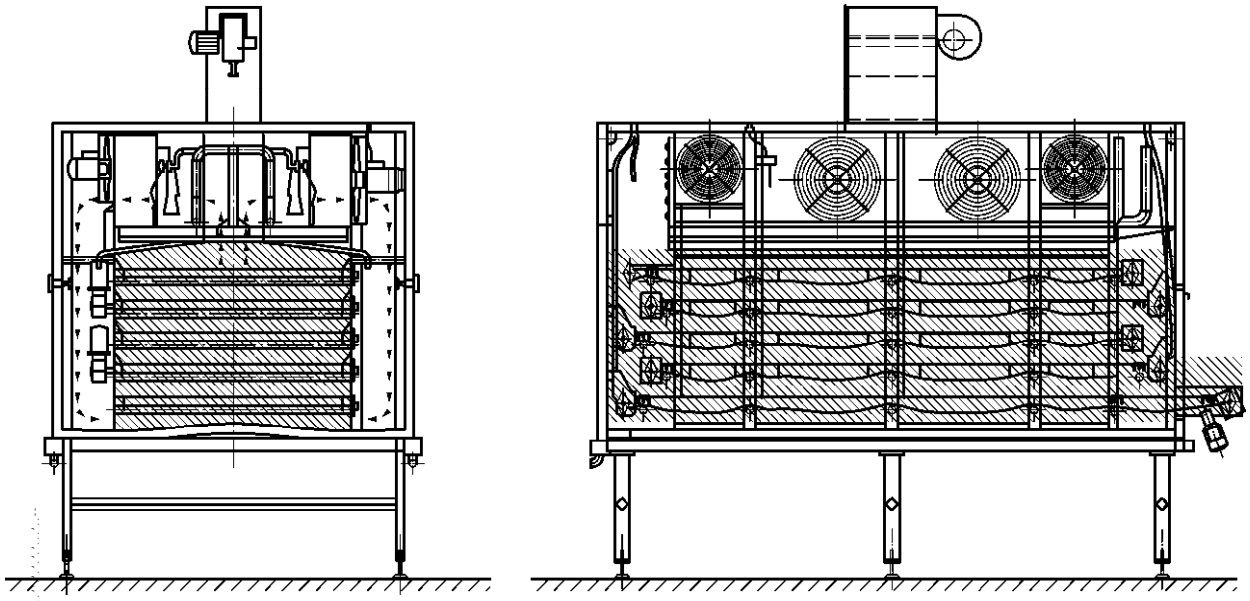


Key

Food Area

Non food Area

Figure 39 — Steam pasteurizer machine

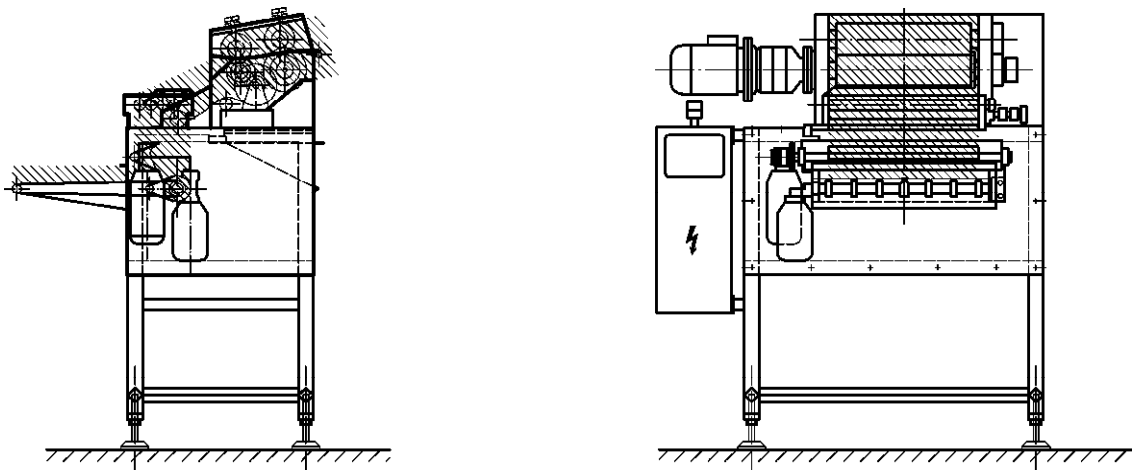


Key

Food Area

Non food Area

Figure 40 — Cooler machine

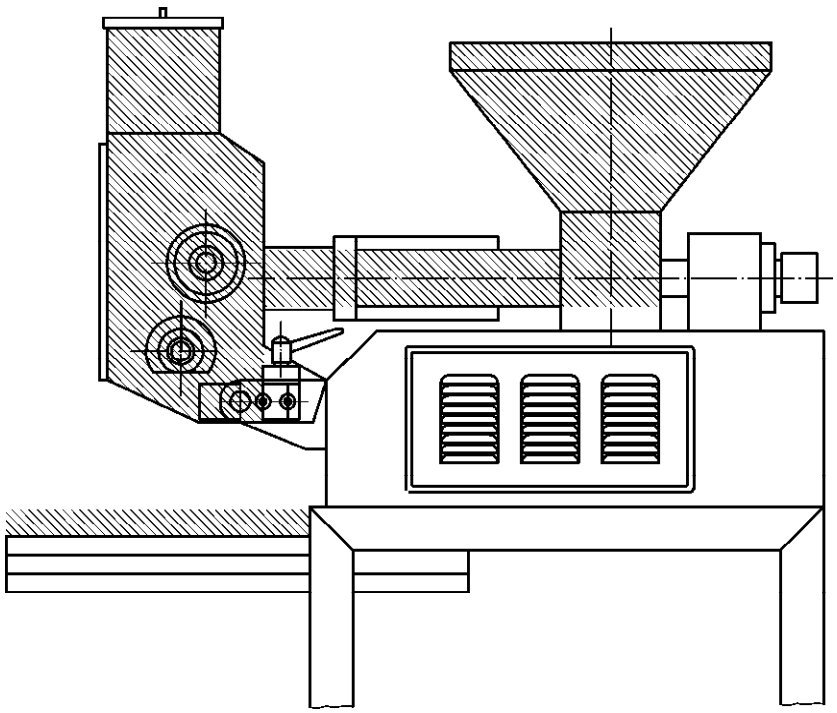


Key

Food Area

Non food Area

Figure 41 — Dough Sheet cutting machine

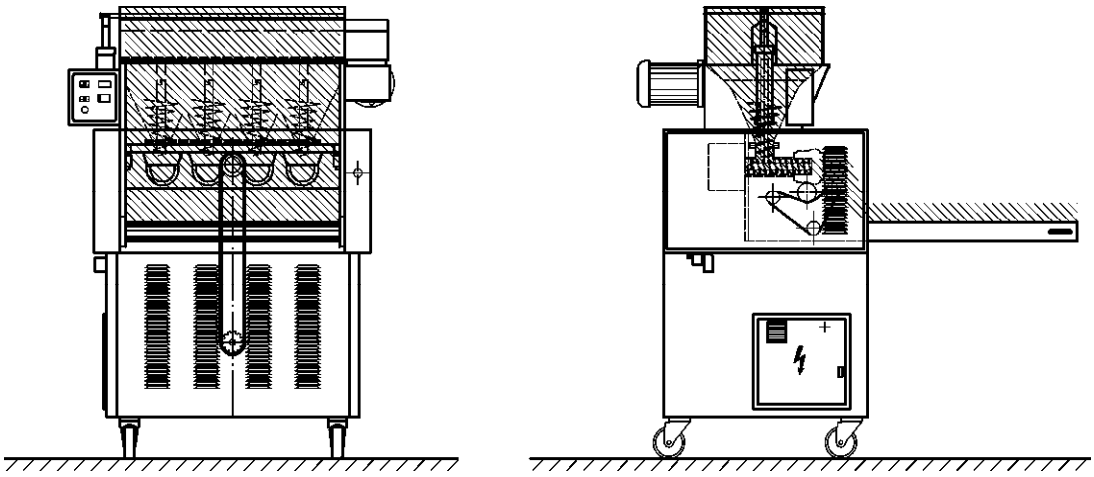


Key

Food Area

Non food Area

Figure 42 — Gnocchi machine



Key

Food Area

Non food Area

Figure 43 — Typical shape pasta machine

6 Verification of safety and hygiene requirements and/or protective measures

This clause contains the methods for verification of the compliance with the safety requirements of this European Standard. The criteria for acceptance and the conditions during verification are contained in Clause 5 or can be found in the Table 1.

Verification of the requirements can be made by means of inspection, calculation, or testing, measurement or design check. These shall be applied to a machine in a fully commissioned condition but partial dismantling may be necessary for the purpose of some checks. Such partial dismantling shall not invalidate the result of verification.

Table 1

Relevant clause	Method of verification
5.2.1	By measurement of the dimensions
5.2.2	By measurement of the dimensions By functional testing of the interlocking device and examination of the electric circuit diagram
5.2.3	By measurement of the dimensions By functional testing of the interlocking device and examination of the electric circuit diagram By calculation of the minimum distance to the hazard zone taking the reaction time of the whole system as a basis (from the actuation of the safety device until the ending of the hazardous movement), functional testing and measurement of the distance.
5.2.4	By functional testing of hold to run control device and examination of the electric circuit diagram By measurement of closing speed and distances to the close position
5.3	In accordance with EN 60204-1:2006
5.4	By visual inspection, functional testing of the control devices and examination of the electric circuit diagram
5.5	By measurement of the temperatures
5.6	In accordance with Annex A
5.7	By visual inspection and verification of the instruction handbook
5.8	In accordance with EN ISO 14122 parts 1 to 4
5.9	By measurement of the forces, by inspection of the visibility of the indications, buttons, etc.
5.10	In accordance with Clause 6 of EN 1672-2:2005+A1:2009, Annex B and visual inspection

7 Information for use

7.1 General

Information for use shall be provided according to Clause 6 of EN ISO 12100-2:2003 and with additional information as required in the following clauses.

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7.2 Operating instructions

An instruction handbook shall be provided in accordance with 6.5 of EN ISO 12100-2:2003. It shall contain at least the following specific information:

a) Information about the machine:

— Detailed description of the machine and its components, its guards and/or protective devices;

— Information on the range of applications for which the machine is intended; including prohibited usage;

— Document attesting that the machine complies with the mandatory requirements;

— Declared noise emission values according to Annex A;

b) Information affecting the installation of the machine:

— Information on the space and requirements for both the operation and maintenance of the machine taking into account any lifting equipment that may be required ;

— Information on permitted environmental conditions;

— Information on how to connect the machine to the electric, hydraulic, pneumatic or gas supply including necessary safety devices;

— Information on the extraction rate and the connection means of the extraction equipment, if relevant (see 5.7);

c) Information relating to transportation and storage of the machine:

— Information on dimensions, weight, position of centre of gravity;

d) Information relating to the use of the machine:

— Instructions for commissioning;

— Instructions for setting and adjustment;

— Information on items which require setting;

— Information on devices which stop the machine;

— Information on the operating method to be followed for clearing blockages when this is likely to occur including safe working procedures.

— For movable machines the instruction handbook shall contain recommended practice, such as, disconnecting the machine from the electrical supply before moving it, and the need to avoid damaging the supply cable during movement.

— Information on residual risks, and recommended personal protective equipment;

— Information on personal protective equipment needed at food machines to deal with residual risks e. g.:

  — wearing gloves while cleaning and removing residual materials;

  — aprons for cleaning;

— gloves to handle hot products.

— Information on particular risks which may arise in certain applications;

e) Information relating to maintenance:

— Information on the safety measures to be taken before interventions and including in principle supply disconnection, measures against reconnection, neutralisation of residual energy and verification of the safe state of the machine.

— Information on the nature and frequency of inspections and maintenance activities;

— Maximum working pressure of hydraulic and pneumatic systems;

— Information on the risks associated with the failure and repair of pressurised systems;

— Information on the types of oils and/or greases to be used for lubrication;

— Drawings and diagrams to enable service personnel to carry out their task;

— The specifications of the spare parts when these affect the health and safety of operators.

f) Information to the cleaning of the machine:

— The manufacturer has to provide information on:

— method of cleaning including the type of water jet (see 5.3.6);

— type of cleaning agents;

— method of disinfecting;

— type of disinfecting agents;

— type of rinsing agents;

7.3 Training of operators

Information about the operators training required in the dangers associated with the use and cleaning of the machines and with the precautions to be observed. Information shall be given in the instruction handbook that specifies the elements of training and the standard of training required.

NOTE It is recommended that operating personnel should be instructed during installation by a representative of the manufacturer or the supplier of the machine.

7.4 Marking

The machines shall be marked visibly, legibly and indelibly in accordance with 6.4 of EN ISO 12100-2:2003, with the following information:

— the business name and full address of the manufacturer and, where applicable, his authorised representative;

— the designation of the machinery;

— designation of series or type;

— year of construction, that is the year in which the manufacturing process is complete;

— the serial number if any;

— mandatory marking[1)];

— electric, pneumatic and water ratings;

— the mass of the machinery;

The mass shall be indicated on the machine parts that have to be handled during use with lifting equipment.

7.5 Signals and warning devices

The following safety pictograms shall be, as minimum, included if relevant:

— high temperature warning (see 16.2.2 of EN 60204-1:2006);

— electrical shock hazard (see 16.2.1 of EN 60204-1:2006);

Safety signals shall comply with the principles of EN 61310-1:2008.

1) For machines and their related products intended to be put on the market in EEA. CE marking as defined in the European applicable directive(s), e.g. Machinery-directive

Annex A
(normative)

Noise test code for machines for processing fresh and filled pasta (tagliatelle, cannelloni, ravioli, tortellini, orecchiette and gnocchi) (Grade 2)

A.1 Definitions

Definitions of noise related technical terms are given in EN ISO 12001:2009.

A.2 Installation and mounting conditions

The test environment suitable for the measurement of the emission sound pressure level and the sound power level shall be a flat outdoor area (for example a car park) or an indoor space that provides an essentially free field over a reflecting plane. This test environment shall be in accordance with the requirements given in Annex A of EN ISO 3744:2009.

Care shall be taken to ensure that any electrical conduits, piping or air ducts which are connected to the machinery do not radiate significant amounts of sound energy thus influencing the determination of the noise emission values of the machine under test. This can be avoided by damping or partially encasing these parts.

A.3 Operating conditions

During the determination of the emission sound pressure level and the sound power level, the operating conditions shall be as follows:

— The machine shall be empty;

— It shall operate at its maximum speed.

A.4 Emission sound pressure level determination

The determination of the A-weighted emission sound pressure level shall be done in accordance with EN ISO 11201:2010.

The measurement time for sound pressure level measurements for the determination of the emission sound pressure level shall be 30 s.

The sound pressure level shall be determined with the microphone positioned at:

— 1,60 ± 0,02 m height above the floor;

— 1,00 ± 0,02 m in front of the machine (in the axis of the machine, in front of the control board).

At first, the background noise measured with A-weighted or in each of the frequency bands of interest, shall be determined. It shall be at least 6 dB (and preferably more than 15 dB) below the level due to the machine under test.

In order to obtain the emission sound pressure level at the specified position, the background noise correction K_1 shall be applied. The determination and use of K_1 shall be made in accordance with EN ISO 11201:2010.

NOTE Emission sound pressure levels using other frequency weightings or in octave or one-third octave frequency bands may additionally also be measured, as required for the purposes of the measurements.

A.5 Emission sound power level determination

The sound power level shall be determined according to EN ISO 3744:2009 by using the parallelepiped measurement surface.

A.6 Measurement uncertainties

A standard deviation of reproducibility from 0,5 dB to 2,5 dB is expected for the A-weighted emission sound pressure level measured according EN ISO 11201:2010 and 0,5 dB to 2,5 dB for the A-weighted sound power level determined according to EN ISO 3744:2009.

A.7 Information to be recorded

The information to be recorded covers all the technical requirements of this noise test code. Any deviations from this noise test code and/or from the basic noise emission standard used are to be recorded together with the technical justification for such deviations.

A.8 Information to be reported

The information to be included in the test report is that which the manufacturer requires to prepare a noise declaration or the user requires to verify the declared values.

As a minimum, the following information shall be included:

a) identification of the manufacturing company, of the machine type, model, serial number and year of manufacture;

b) reference to the basic noise emission standard(s) used;

c) description of the mounting and operating conditions used;

d) microphone positions for the determination of the emission sound pressure level; and the noise emission values obtained.

It shall be confirmed that all requirements of the noise test code and/or the basic noise emission standards used have been fulfilled, or, if this is not the case, any unfulfilled requirements shall be identified; the deviations from the requirements shall be given.

A.9 Declaration and verification of noise emission values

The declaration of the noise emission value shall be made as a dual number noise emission declaration according to EN ISO 4871:2009.

It shall declare the value of the emission sound pressure level L_{pA} and if it is required for the sound power level L_{WA} and the respective uncertainties K_{pA} or K_{WA} according to Annex B of this standard.

The uncertainty K_{pA} and K_{WA} are expected to have values about 3 dB.

The noise declaration shall state that the noise emission value has been obtained according to this noise test code and the basic standard EN ISO 11201:2010 respectively EN ISO 3744:2009. If this statement is not true, the noise declaration shall indicate clearly what the deviations are from this noise test code and/or from the basic standards.

If undertaken, verification shall be done according to EN ISO 4871:2009 by using the same mounting, installation and operating conditions as those used for the initial determination of the noise emission value.

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Annex B
(normative)

Principles of design to ensure the cleanability of machinery

B.1 Definitions

For the purpose of this annex the following definitions apply:

B1.1
easily cleanable
designed and constructed to permit the elimination of soil by simple cleaning methods (e.g. hand and sponge cleaning)

B.1.2
fitted surfaces
surfaces separated by a distance less than or equal to 0,5 mm

B.1.3
joined surfaces
surfaces joined so that no particle of product becomes trapped in small crevices, thus becoming difficult to dislodge and so introduce a contamination hazard

B.2 Material of construction

B.2.1 Type of materials

The materials in contact with foods shall be compatible with this foods[2)]

Generally the most widely used material is stainless steel, grade X5CrNi18-10 (1.4301) EN 10088-1, grade X5CrNiMO17-12-2 (1.4401) EN 10088-1 or grade X2CrNiMO17-12-2 (1.4404) EN 10088-1 (austenitic microstructure);

Cleanability is an important factor in selecting the proper plastic material (i.e. polypropylene PP, polyvinyl chloride unplasticised PVC, acetal copolymer, polycarbonate PC, high density polyethylene HDPE): the use of polytetrafluoroethylene (PTFE) requires particular careful application: PTFE is difficult to clean, PTFE gaskets are not permanently impermeable to micro-organisms.

The design shall prevent contact of lubricants with the foods, or shall take account of the necessary use of compatible lubricants for example based on the following basic oils: paraffin, polyphoalefinic, silicone thickened with aluminium or calcium complex soaps.

B.2.2 Surface conditions

B.2.2.1 General

The surface finish of materials used on surfaces shall permit easy cleaning under satisfactory conditions.

The roughness values (Rz) according to ISO 468[3)] shall comply the values given in Table B.1.

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2) Some materials (e.g. plastics) may be the subject of overall or specific migration tests.

3) ISO 468 is now replaced with ISO 4287 and 4288. The corresponding modification of this document is under study.

B.2.2.2 Surface conditions for food area

Table B.1

Dimensions in micrometers

Technique of construction	Roughness (Rz)
Drawn – rolled –spun	≤ 16
Moulded - cast	≤ 25
Machined	≤ 16
Injected - metal - plastic	 ≤ 16 ≤ 16
Coating - paint (test reservation) - plastic (test reservation) - glass - metal (test reservation)	 ≤ 16 ≤ 16 ≤ 16 ≤ 16

B.3 Design

B.3.1 Connections of internal surfaces

B.3.1.1 General

Connections shall have the same roughness as the connected surfaces. These shall be designed to avoid any dead space, see EN 1672-2:2005+A1:2009.

B.3.1.2 Connections of internal surfaces for food are

Two surfaces shall be connected according to:

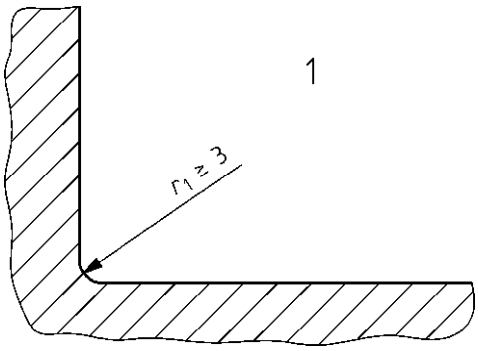
— a rounded edge having a radius (r_1) greater or equal to 3 mm obtained:

  — by machining (cutting into material mass);

  — or by bending the sheet metal (bending and forming);

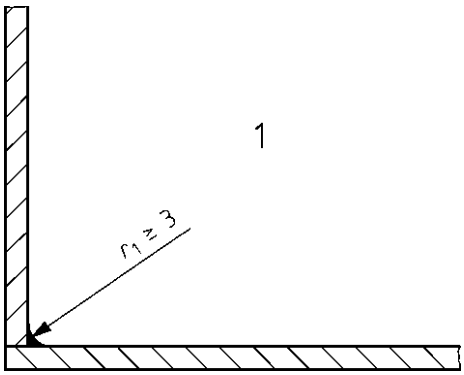
  — or by the design (in moulds, shells of foundry, injection and blasting...) (see Figure B.1);

  — or by welded assembly with grinding and polishing (see Figure B.2);



Key
1 food area

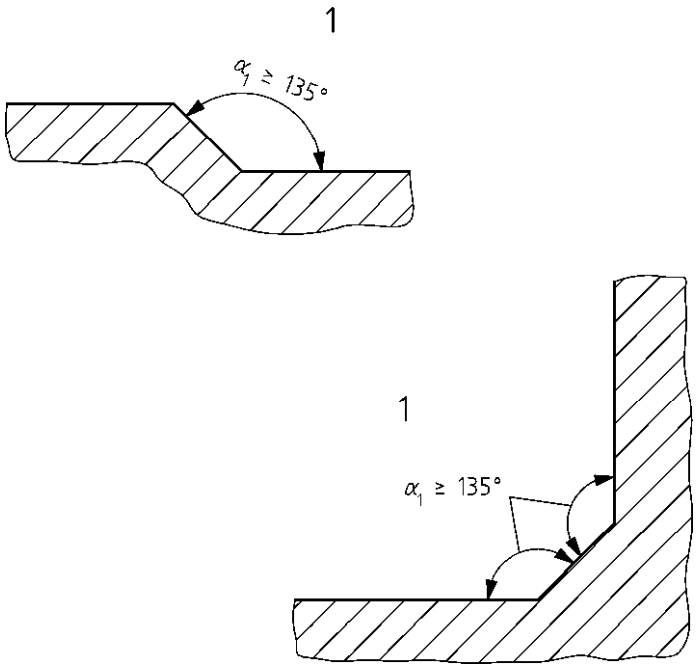
Figure B.1



Key
1 food area

Figure B.2

— for an internal angle (α_1) equal to or greater than 135° there are no special requirements for the radius (see figure B.3).



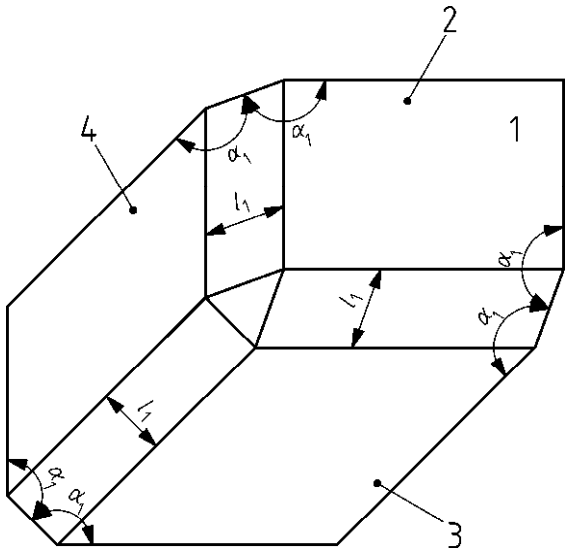
Key
1 food area

Figure B.3

When 3 surfaces are connected:

— by using rounded edges, two rounded edges shall have a radius greater than or equal to 30 mm and the third shall have a radius greater than or equal to 7 mm,

by angles of 135° so that the dimension (l_1) between two bends is then equal to or greater than 7 mm (see Figure B.4).



Key
1 food area

Figure B.4

B.3.1.3 Connections of internal surfaces for non-food area

No particular requirements.

B.3.2 Surface assemblies and overlaps

B.3.2.1 General

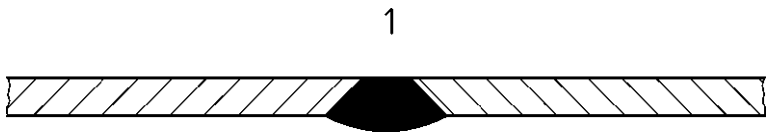
The sheet metal assembly methods shall take into account the expansion or shrinkage phenomena due to temperature variations.

B.3.2.2 Surface assemblies and overlaps for food area

B.3.2.2.1 Surface assembly

Assembled surfaces are considered joined either:

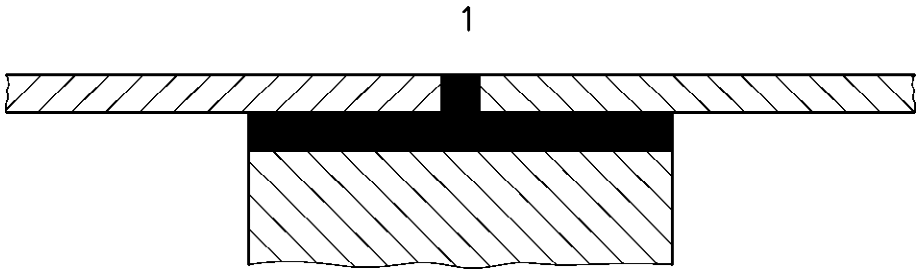
— by a continuous weld (see Figure B.5);



Key
1 food area

Figure B.5

— or a continuous sealed and flushed joint (see Figure B.6)



Key
1 food area

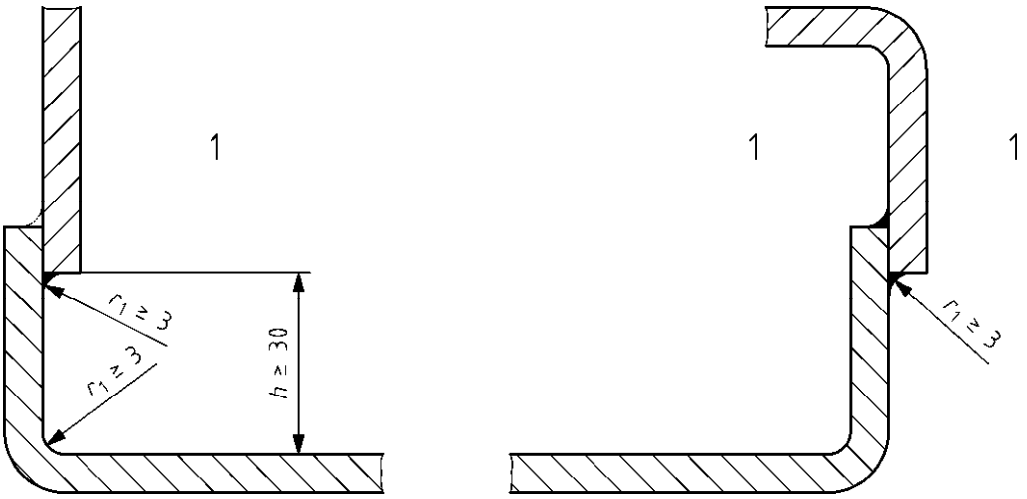
Figure B.6

B.3.2.2.2 Surface overlapping

In the event of mandatory technical constraints (e.g. long sheet metal parts of varying thicknesses), assemblies can be made by the overlapping of sheets in which case the assembled surfaces are joined to each other:

— either by a continuous weld

The upper surfaces shall overlap the lower surfaces in the direction of liquid flow (see Figure B.7).



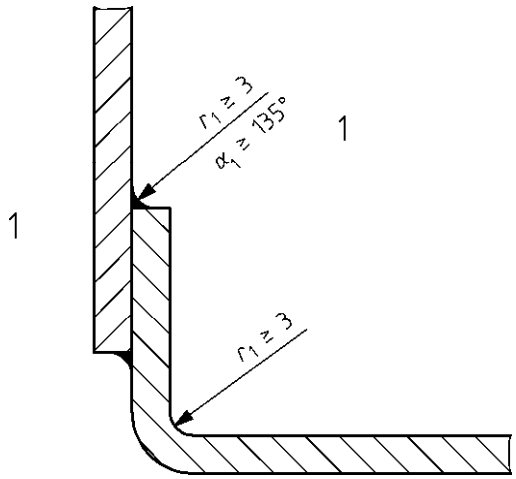
Key
1 food area

Figure B.7

If this is not possible to construct, connections shall be in compliance with the recommendations concerning rounded areas in the food area (see B.3.1.2 and Figure B.8);

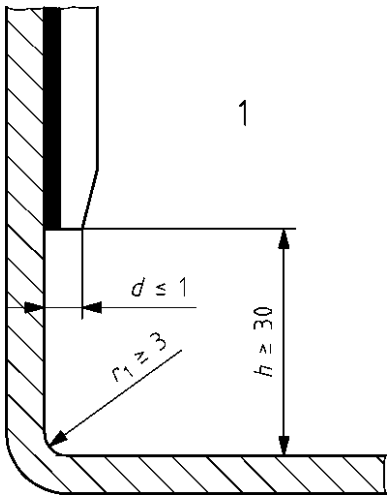
— or by continuous sealed and flushed jointing

When the overall thickness of the overlapping part and joint is more than 1 mm, the upper part shall be chamfered in order to reduce the thickness (*d*) to smaller than or equal to 1 mm (see Figure B.9).



Key
1 food area

Figure B.8



Key
1 food area

Figure B.9

B.3.2.3 Surface assemblies and overlaps for non-food area

No particular requirements

B.3.3 Fasteners

B.3.3.1 Fasteners for food area

B.3.3.1.1 General

See 5.3.1.3 in EN 1672-2:2005+A1:2009.

B.3.3.1.2 Case of spot-facing

If construction requires the use of hexagon socket head screws embedded in a spot face:

— either production shall comply with the Figure B.10. and the manufacturer in his instruction handbook can prescribe suitable cleaning facilities (e.g. high pressure jet);

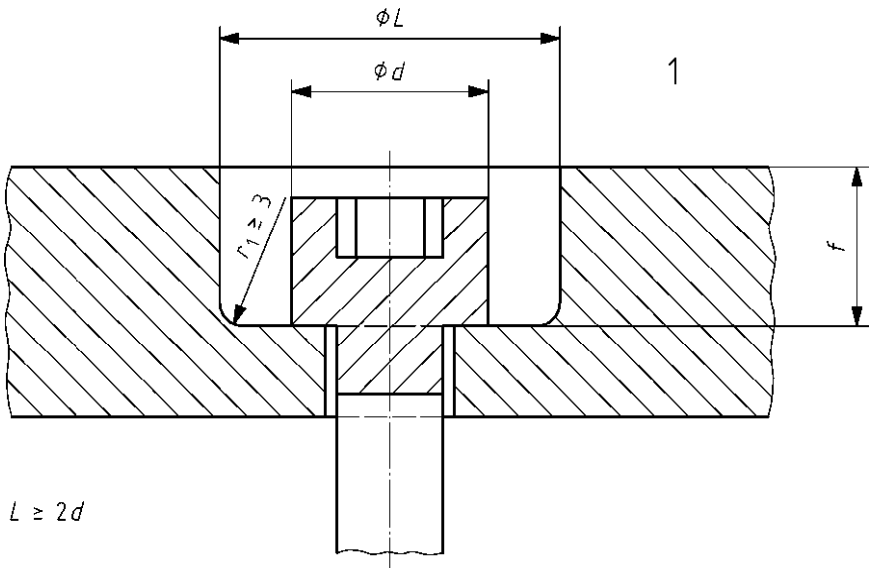


Figure B.10

— or the manufacturer shall take the necessary steps to fill in the spot face by sealed and lasting plugs corresponding to the requirements of the food area.

B.3.3.1.3 Pin drive systems

Pin drive systems shall only be permitted if they are solid and assembled as flush as possible. The manufacturer can establish an inspection procedure to ensure compliance with this requirement.

B.3.3.2 Fasteners for non-food area

No particular requirements.

B.3.4 Machines on the floor

B.3.4.1 Fixed machines with of without a base

B.3.4.1.1 General

Fixed machines with or without a base shall either be based on the floor with an interposed continuous and sealed joint, the instruction handbook shall specify the jointing method (see Figure B.11), or shall have their feet (*H*) higher than or equal to 150 mm.

However, if the space (*L*) to be cleaned is not deeper than *L* = 150 mm, the height *H* can be reduced to 100 mm as long as the various access possibilities are taken into account (see Figure B.12).

If the foot surface is greater than 1 dm^2, the feet shall be considered to be a base (with interposed seal) (see Figures B.13).

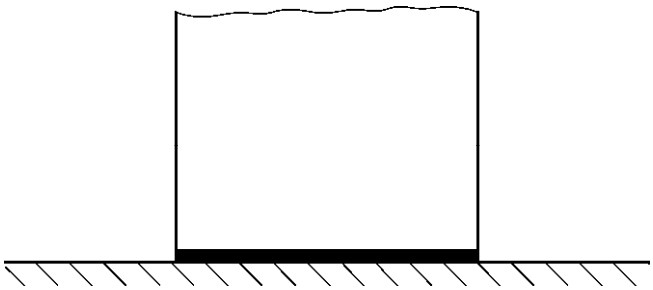


Figure B.11

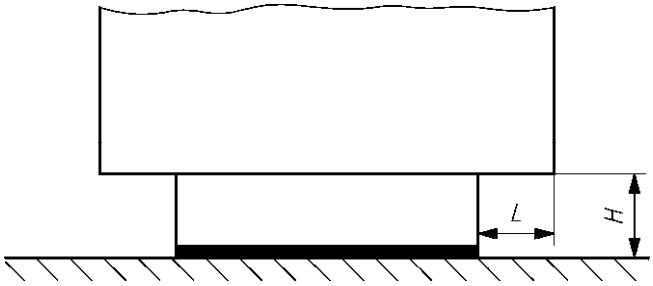


Figure B.12

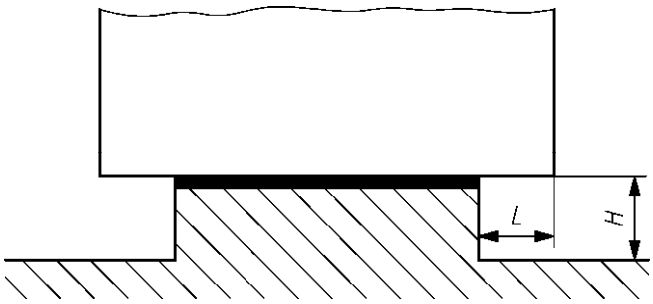


Figure B.13

B.3.4.1.2 Mobile machines

The castors shall be cleanable. An example is given in Figure B.14, where b is the greater width of covering at the circumference of the wheel.

if *b* ≤ 25 mm, then a ≥ 3,5 mm

if *b* > 25 mm, then a ≥ 6 mm

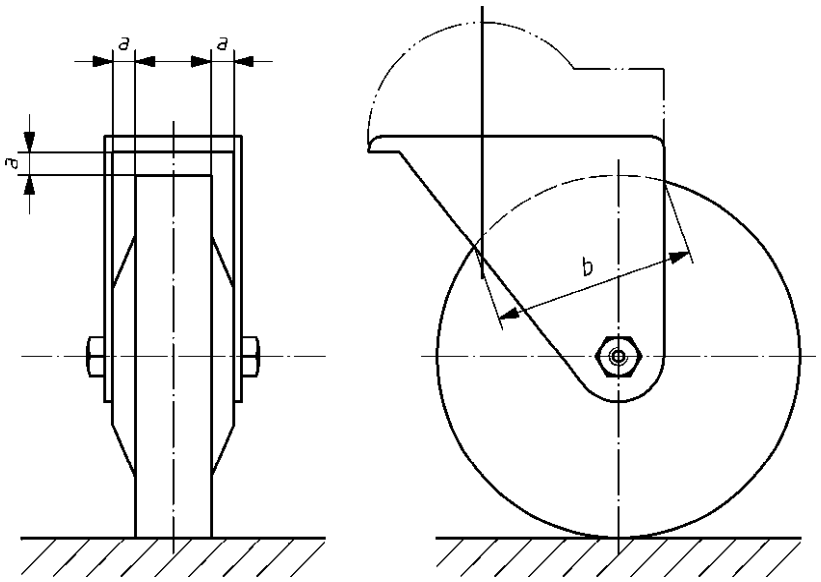


Figure B.14

B.3.5 Ventilation opening

B.3.5.1 Ventilation openings for non-food area

Ventilation openings shall be in the non-food area.

The direction of any fluid flow shall prevent any infiltration or retention in the machine.

Whenever possible, for machines standing on the floor, a guard shall prevent access to rodents in all technical areas of the machine and for this reason the smallest opening shall be less than or equal to 5 mm in dimension.

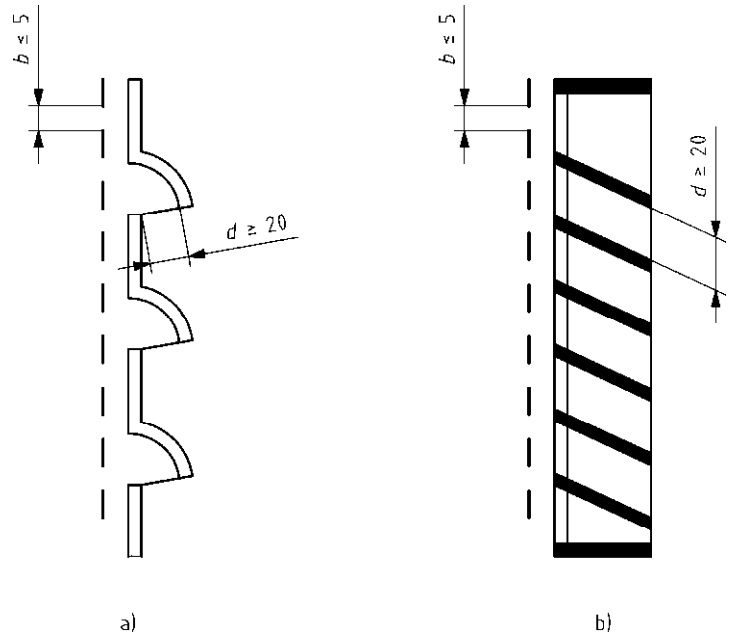


Figure B.15

B.3.6 Hinges

Whenever possible, the manufacturer shall eliminate swivel points from the food area.

If their presence in the food area is technically necessary, then:

— they shall be easily removed;

— if they cannot be removed, all surfaces shall be accessible.

Assembly with a fixed part shall be made by a joint designed to prevent any infiltration. Access to all these areas is acceptable when the passage width (l_3) is greater than or equal to two time the depth (p). In no case should this width (l_3) shall be less than 10 mm (see Figure B.16).

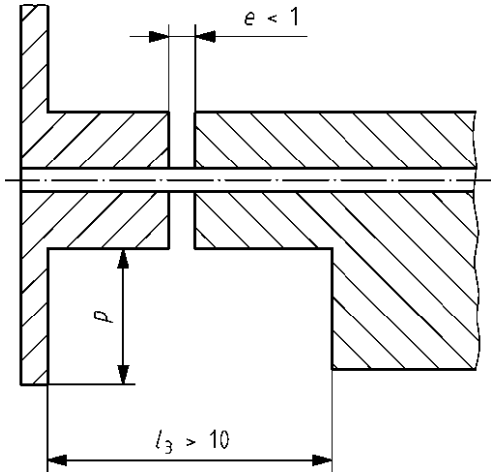


Figure B.16

B.3.7 Control panel

Normally, the control panel shall be in the non-food area and cleanable whenever possible.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] EN 481:1993, *Workplace atmospheres — Size fraction definitions for measurement of airborne particles*

[2] EN 1005-2:2003+A1:2008, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery*

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[5] EN 13288, *Food processing machinery — Bowl lifting and tilting machines — Safety and hygiene requirements*

[6] EN ISO 11688-2:2000, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 2: Introduction to the physics of low-noise design (ISO/TR 11688-2:1998)*

[7] EN ISO 13849-2:2008, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2:2003)*

[8] EN ISO 13855:2010, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body (ISO 13855:2010)*

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