

MINISTRY OF LABOUR AND EMPLOYMENT
SECRETARIAT OF LABOUR INSPECTION

GOVERNMENTAL DECREE No. 1083, OF 18 DECEMBER 2018

(Brazilian Official Journal Dec 19th, 2018 - Section I page 167)

Changes the Regulatory Standard No. 12 - Machinery and Equipment, approved by Governmental Decree No. 3214 of June 8th, 1978.

Be aware this is an unofficial Regulatory Standard NR-12 translation created by Roka Engenharia S/S LTDA, under CC BY-NC-AS 4.0 license.

Further informations related to this license are found at <https://creativecommons.org/licenses/by-nc-sa/4.0/>

NR 12 - SAFETY IN MACHINERY AND EQUIPMENT WORK

General Principles

12.1 This Regulatory Standard and its annexes provides technical references, basic principles and protective measures to ensure the health and physical integrity of workers and establishes minimum requirements for the prevention of accidents and occupational diseases in the design stages and use of machinery and equipment of all kinds, and also to its manufacture, importation, trading, exhibition and cession in any way, in all economic activities, without prejudice to the provisions of all other Regulatory Standards - NR approved by Governmental Decree No. 3214 of June 8th, 1978, in the technical standards and, in the absence or omission thereof, in applicable international standards.

12.1.1 It is understood as using phase the construction, transportation, assembly, installation, adjustment, operation, cleaning, maintenance, inspection, disabling and dismantling of machinery or equipment.

12.2 The provisions of this Standard refer to new and used machinery and equipment, except for the items where there is specific mention about its applicability.

12.2A Machines and equipment proven to be intended for export are exempt from meeting the technical safety requirements of this standard. *(Inserted by MTE Ordinance No. 857, of 06/25/2015)*

12.2B This standard does not apply to machinery and equipment: *(Item and paragraphs inserted by Ordinance MTE No. 857, of 25/06/2015)*

- a) driven or propelled by human or animal force;
- b) exhibited in museums, fairs and events, for historical purposes or considered as antiques and not more employed for productive purposes, provided that measures are taken to ensure the preservation of the physical integrity of visitors and exhibitors;
- c) classified as appliances.

12.2C Safe movement of machinery and equipment outside the company's physical facilities is permitted for repairs, retrofitting, technological modernization, decommissioning, dismantling and disposal. *(Inserted by MTE Ordinance No. 857, of 06/25/2015)*

12.3 The employer shall take protective measures for working on machinery and equipment, capable to ensure the health and physical integrity of workers and appropriate measures whenever there are disabled persons directly or indirectly involved in the work.

12.4 Are considered protective measures to be adopted in this order of priority:

- a) collective protective measures;
- b) administrative measures or of working organization; and
- c) personal protective measure.

12.5 In the application of this Standard and its annexes, the characteristics of machinery and equipment, of process, the risk assessment and the state of the art must be considered. *(Amended by MTPS Ordinance No. 509, of April 29, 2016 - See Technical Note DSST / SIT No. 48/20016)*

12.5A Workers are responsible for: *(Item and paragraphs inserted by MTE Ordinance No. 857, of June 25, 2015)*

- a) comply with all guidelines regarding safe operating, feeding, supply, cleaning, maintenance, inspection, transportation, decommissioning, dismantling and disposal of machinery and equipment;
- b) not make any changes to the mechanical guards or safety devices of machinery and equipment, in such a way as to endanger the health and physical integrity of others or others;
- c) notify your immediate superior if a safety guard or device has been removed, damaged or lost its function;
- d) participate in training provided by the employer to meet the requirements described in this International Standard;
- e) collaborate with the employer in implementing the provisions contained in this International Standard.

12.5.1 It is not obligate observing new requirements from technical standards published after manufacturing, importation or adequate of machinery and equipment, if complying with the Regulatory Standard n.º 12 Ordinance n.º 197/2010, its annexes, amendments and technical standards, in force of the period of manufacturing, importation or adequate. *(Amended by Ordinance n.º 1.111, on September 21st, 2016)*

Physical layout and facilities

12.6 At the installation sites of machinery and equipment, the circulation areas shall be properly marked and in accordance with the official technical standards.

12.6.1 *(Extinct by Ordinance n.º 98, on February 08th, 2018)*

12.6.2 The circulation areas shall be kept unobstructed. *(Amended by Ordinance n.º 98, on February 08th, 2018)*

12.7 The materials in use at the production process shall be allocated in specific areas of storage, duly marked with colored strips indicated by the official technical standards or signalized for outside areas.

12.8 The spaces around the machinery and equipment shall be suitable to their type and to the type of operation in order to prevent accidents and diseases related to work.

12.8.1 The minimum distance between machinery, in accordance with their characteristics and applications, shall ensure workers' safety during operation, maintenance, adjustment, cleaning and inspection, and to permit the movement of body segments, due to the nature of the task.

12.8.2 The circulation and storage areas of materials and the spaces around the machinery shall be designed, sized and maintained so that workers and materials transporters, mechanized and manual, can move safely.

12.9 The floors of workplaces where are installed machinery and equipment and circulation areas shall:

- a) be kept clean and free of objects, tools and any materials that have risks of accidents;
- b) have characteristics to prevent risks from grease, oils and other substances and materials that make them slippery; and
- c) be leveled and resistant to the loads they are subjected.

12.10 The tools used in production process shall be organized and stored or arranged in specific locations for this purpose.

12.11 The stationary machinery shall have preventive measures regarding its stability, so the machines does not swing and does not move unexpectedly due to vibration, shock, predictable external forces, internal dynamic forces or any other accidental reason.

12.11.1 The installation of stationary machinery shall comply with the requirements provided by the manufacturers or, missing these, the project prepared by a legally qualified professional, in particular on the foundation, mounting, cushioning, leveling, ventilation, electrical, pneumatic and hydraulic power, grounding and cooling systems.

12.12 On moveable machines that have rotations, at least two of them shall have locks.

12.13 The machines, the circulation areas, worksites and other locations where there may be workers shall be positioned so that no aerial transport and handling of materials occurs on the workers.

12.13.1 It is allowed load transportation using cable cars at the internal and external mill area, if there aren't any work sites under the route, except those necessary for maintenance and inspections, which must be programmed and performed according with this Regulatory Standard and the Regulatory Standard n.º 35. *(Inserted by Ordinance n.º 326, on May 14th, 2018)*

Installations and electrical devices

12.14 The electrical installation of machinery and equipment shall be designed and maintained in order to prevent, by safe means, the risks of electrical shock, fire, explosion and other accidents, as prescribed in NR-10.

12.15 They shall be grounded, according to current official technical standards, the installations, casings, housings, shielding or conductive parts of machinery and equipment that are not part of electrical circuits, but that may be under voltage.

12.16 The electrical installation of machinery and equipment that are or may be in direct or indirect contact with water or corrosive agents shall be designed with means and measures to assure their shielding, tightness, insulation and grounding, in order to prevent accidents.

12.17 The power supply conductors of machinery and equipment shall meet the following minimum safety requirements:

- a) provide mechanical strength compatible with its use;
- b) have protection against the possibility of mechanical failure, abrasive contacts and contact with lubricants, combustible and heat;

- c) located in way that no segment is in contact with moveable parts or sharp edges;
- d) do not hinder the transit of persons and materials or the operation of machinery; (*Amended by Ordinance n.° 98, on February 08th, 2018*)
- e) does not offer any other types of risks on your location; and
- f) be made of materials that do not propagate the fire. (*Amended by Ordinance n.° 98, on February 08th, 2018*)

12.18 The power enclosure of machinery and equipment shall meet the following minimum safety requirements:

- a) have access door, kept permanently closed;
- b) have signs about the danger of electrical shock and restricting access by unauthorized persons;
- c) be maintained in good conservation state, clean and free of objects and tools;
- d) have protection and identification of circuits; and
- e) meet the appropriate degree of protection as a function of the usage environment.

12.19 The connections and drifts of the electrical leads of machinery and equipment shall be made with appropriate devices and according to current official technical standards, in order to ensure appropriate mechanical strength and electrical contact, with characteristics equivalent to the used electrical leads and protection against risks.

12.20 The electrical installation of machinery and equipment which use electrical energy supplied by external source shall have overcurrent protective device, sized according to consumption demand of the circuit.

12.20.1 The machinery and equipment shall have protective device against overvoltage when the voltage arising can cause risks of accidents.

12.20.2 The machinery and equipment in which the lack or inversion of the power supply's phases may lead to accidents, there shall be a device preventing any occurrence of accidents. (*Amended by Ordinance n.° 1.111, on September 21st, 2016*)

12.21 Are prohibited in the machinery and equipment:

- a) the use of disconnect switch as a start or stop device;
- b) the use of switches such as a knife-type in electrical circuits; and
- c) the existence of exposed live parts of circuits that use electrical power.

12.22 The batteries shall meet the following minimum safety requirements:

- a) located so that their maintenance and replacement can be performed easily from the ground or from a support platform;
- b) setting up and fixing in order to have no accidental displacement; and
- c) positive terminal protection in order to prevent accidental contact and short circuit.

12.23 The services and replacement of batteries shall be performed according to indication shown in the operating manual.

Starting, actuation and stop devices

12.24 The starting, actuation and stop devices of machinery shall be designed, selected and installed so that they:

- a) are not localized in their hazardous areas;
- b) can be activated or turn off in case of emergency by a person other than the operator;
- c) prevent inadvertent actuation or shutdown by the operator or any other accidental way;
- d) do not provide additional risks; and
- e) cannot be juggled.

12.25 The starting or actuation commands of the machinery shall have devices to prevent their automatic operation when energized.

12.26 When actuation devices of bimanual control type are used in order to keep the operator's hands off the danger zone, they shall meet the following minimum requirements for the control:

- a) have synchronous actuation, i.e. an output signal shall be generated only when the two actuation devices of the command - buttons - are actuated with a time delay less than or equal to 0.5 s (half a second) (*Corrected by MTE Ordinance No. 1,893, of December 9, 2013*);
- b) be under automatic monitoring by safety interface;
- c) have a relationship between input and output signal, so that the input signals applied to each of the two actuation devices of the command shall together start and maintain the output signal of the bimanual control device only during the application of the two signals;
- d) the output signal shall end when there is deactivation of any of the control actuation devices;
- e) have control devices that require a deliberate action to minimize the likelihood of accidental command;
- f) have distance and barriers between the control actuation devices to make difficult the juggle of the protective effect of the bimanual control device; and
- g) making possible the restart of the output signal only after the deactivation of the two control actuation devices.

12.27 On machinery operated by two or more bimanual control devices, the synchronous actuation is required only for each of the bimanual control devices and not between different devices that shall maintain concurrency between each other. (*Amended by Ordinance MTb No. 1,110, of September 21, 2016*)

12.28 The bimanual control devices shall be placed at a safe distance from the danger zone, taking into account: (*Amended by Ordinance MTb No. 1,110, of September 21, 2016*)

- a) the shape, arrangement and response time of the bimanual control device (*Amended by Ordinance MTb No. 1,110, of September 21, 2016*);

b) the maximum time required for the machine stoppage or to danger removal, after the end of the output signal of the bimanual control device; and *(Amended by Ordinance MTb No. 1,110, of September 21, 2016)*

c) the projected utilization for the machine.

12.29 The moveable bimanual controls installed on pedestals shall: *(Amended by Ordinance MTb No. 1,110, of September 21, 2016)*

a) remain stable in their working position;

b) have height compatible with the worksite to stay close to the operator in his working position. *(Amended by Ordinance MTb No. 1,110, of September 21, 2016)*

12.30 In machinery and equipment whose operation requires the participation of more than one person, the number of simultaneous actuation devices shall match the number of operators exposed to the dangers arising of its actuation, so that the level of protection is the same for each worker. *(Amended by Ordinance MTb No. 1,110, of September 21, 2016)*

12.30.1 There shall be selector of the number of actuation devices in use with lock that prevents its selection by unauthorized persons.

12.30.2 The drive circuit shall be designed to prevent the operation of the selector-enabled two-hand-drive devices until all other non-enabled commands are disconnected. *(Amended by Ordinance MTb No. 1,110, of September 21, 2016)*

12.30.3 When two or more simultaneous two-hand drive devices are used, they shall have a light indicating their operation. *(Amended by Ordinance MTb No. 1,110, of September 21, 2016)*

12.31 The machinery or equipment designed and manufactured to allow the use of several modes of control or operation that shows different safety levels shall have a selector that meets the following requirements:

a) lock at each position, preventing its change by unauthorized persons;

b) correspondence of each position in a single command or operation mode;

c) control mode selected with priority over all other control systems, with the exception of emergency stop; and

d) the selection shall be visible, clear and easily identifiable.

12.32 The machinery and equipment, whose actuation by unauthorized persons may show a risk to health or safety integrity of any person shall have a system that allows the lock of their actuation devices.

12.33 Both actuation and shut down by a single control from a set of machinery and equipment, or very large machinery and equipment, shall be preceded by an audible or visual alarm signal. *(Amended by Ordinance n.º 98, on February 08th, 2018)*

12.34 Shall be taken, when necessary, additional measures of alertness, such as visual signals and telecommunication devices, considering the characteristics of the productive process and of the workers.

12.35 The machinery and equipment operated by radio frequency shall be protected against accidental electromagnetic interference.

12.36 The starting, stopping, actuation and control components that make up the operating interface of machines and equipment manufactured as of March 24, 2012 must: *(Item and paragraphs amended by Ordinance MTE No. 857, of 25/06/2015)*

- a) enable the installation and operation of the emergency stop system, when applicable, according to items and sub-items of the chapter on emergency stop devices of this standard; and
- b) operate at an extra-low voltage up to 25VAC (twenty-five volts AC) or up to 60VDC (sixty volts DC), or another measure of protection against electric shock, in accordance with current Official Technical Standards.

12.36.1 The starting, stopping, actuation and control components that make up the operating interface of machines and equipment manufactured up to March 24, 2012 shall: *(Item and paragraphs inserted by Ordinance MTE No. 857, of 25/06/06 2015)*

- a) enable the installation and operation of the emergency stop system, when applicable, according to items and sub-items of the emergency stop devices chapter of this standard; and
- b) when the risk assessment indicates the need for protection against electric shock, operate at an extra low voltage of up to 25VAC (twenty five volts AC) or up to 60VDC (sixty volts DC), or other protection, according to the official Technical Standards in force.

12.37 If indicated by the risk assessment the need for redundancy of the unexpected starting prevention devices or safety-related stopping function, depending on the required safety category, the electrical circuit of the motors start switch of machinery and equipment shall: *(Amended by Ordinance MTb n.° 1.083, on December 18th, 2018)*

- a) have redundant structure;
- b) allow faults that compromise the safety function to be monitored; and
- c) be adequately dimensioned in accordance with the established by the national technical standards and, in their absence or omission, by international technical standards.

12.37.1 To comply with the requirements of item 12.37, sub-paragraphs “b”, “c” and “d”, controlled stopping of the motor is permitted, provided that there are no risks arising from non-instantaneous stopping. *(Inserted by MTPS Ordinance No. 509 of April 29, 2016)*

Safety systems

12.38 Danger zones of machinery and equipment shall have safety systems, characterized by fixed protections, moveable protections and interconnected safety devices to ensure protection to health and physical integrity of workers.

12.38.1 The adoption of safety systems, particularly in the areas of operation that shows danger, shall consider the technical characteristics of the machine and the working process and the existing measures and technical choices in order to achieve the necessary safety level provided in this Standard.

12.39 The safety systems shall be selected and installed to meet the following requirements:

- a) have safety category in accordance with previous risk analysis provided in the current official technical standards;
- b) be under the technical responsibility of legally qualified professional;
- c) have technical compliance with the control system to which they are integrated;

- d) installation so that cannot be neutralized or juggled;
- e) remain under automatic surveillance, i.e. monitoring, according to the required safety category, except for exclusively mechanical safety devices; and
- f) stop of dangerous movements and all other risks when occur failures or abnormal conditions of work.

12.40 Safety systems, if indicated by the risk assessment, shall require manual reset. *(Amended by MTPS Ordinance No. 509, of April 29, 2016)*

12.40.1 After a stop command has been initiated by the safety system, the stop condition shall be maintained until safe conditions for resetting exist. *(Inserted by MTPS Ordinance No. 509 of April 29, 2016)*

12.41 For the purposes of applying this standard, is considered protection the element used specifically to provide safety through a physical barrier, where can be:

- a) fixed protection, which shall be kept in its permanent position or by means of fixing elements which allow their removal or opening with the use of specific tools only; and
- b) moveable protection, which can be opened without the use of tools, usually by mechanical elements connected to the machine structure or a near fixed element, and shall be joined with the interlocking devices.

12.42 For the purposes of applying this Standard, the components, alone or connected or associated with protections, that reduce risks of accidents and other health problems are considered as safety devices, being classified as:

- a) electrical controls and safety interfaces: devices responsible to perform the monitoring, which verifies the connection, position and operation of other system devices and prevent the occurrence of a failure that causes the loss of safety function, such as safety relays, safety configurable controllers and safety programmable logic controller - PLC;
- b) interlocking devices: coded electromechanical, magnetic and electronic safety switches, optoelectronics, inductive safety sensors and other safety devices designed to prevent the operation of machine elements under specific conditions; *(Amended by MTPS Ordinance No. 211 of December 9, 2015)*
- c) safety sensors: mechanical and non-mechanical presence sensing devices that act when a person or part of their body enters the detection zone, sending a signal to interrupt or prevent dangerous functions such as light curtains, presence detectors optoelectronics, multi-beam laser, light barriers, area monitors, or scanners, stops, mats and position sensors; *(Amended by MTPS Ordinance No. 211 of December 9, 2015)*
- d) valves and safety blocks or pneumatic and hydraulic systems with the same effectiveness;
- e) mechanical devices, such as: restraint devices, limiters, separators, pushers, inhibitors/deflectors, retractable, adjustable or with self closure; and *(Amended by Ordinance n.° 1.111, on September 21st, 2016)*
- f) validation devices: supplementary hand-operated control devices, that when applied on a permanent mode, enable the actuation device. *(Amended by Ordinance n.° 1.111, on September 21st, 2016)*

12.43 The components related to safety systems and actuation and stop controls of the machines, including the emergency, shall ensure the safe state of the machinery or equipment when there are fluctuations in energy level beyond the limits considered in the design, including the power outage and reestablishing of energy supply.

12.44 The protection shall be moveable when the access to a danger zone is required one or more times per shift, noting that:

- a) the protection shall be associated with an interlocking device when its opening does not allow access to the danger zone before the elimination of risk; and
- b) the protection shall be associated with an interlocking device with lock when its opening allow access to the danger zone before the elimination of risk.

12.45 The machinery and equipment with a moveable protections associated with interlocking devices shall:

- a) operate when the protections are closed only;
- b) stop their hazardous functions when the protections are opened during operation; and
- c) ensure that the closing of the protections alone cannot initiate the dangerous functions.

12.45.1 Interlocked protections associated with start commands, excluding the one foreseen on the paragraph “c”, shall be limited and applied according to the specific requirements relying on technical standards. *(Amended by Ordinance n.° 1.111, on September 21st, 2016)*

12.46 The interlocking devices with lock associated to the moveable protections of machinery and equipment shall:

- a) allow operation while the protection is closed and locked only;
- b) keep the protection closed and locked until the injury risk have been eliminated due to hazardous functions of the machinery or equipment;
- c) ensure that the closure and lock of the protection by itself can not initiate the dangerous functions of the machinery or equipment.

12.46.1 Interlocked protections associated with start commands, excluding the one foreseen on the paragraph “c”, shall be limited and applied according to the specific requirements relying on technical standards. *(Inserted by Ordinance n.° 1.111, on September 21st, 2016)*

12.47 The power transmissions and the moveable components connected to them, accessible or exposed, shall have fixed or moveable protections with interlocking devices, which prevents access from all sides.

12.47.1 When used moveable protections to confine the power transmissions that have inertia, shall be used interlocking devices with lock.

12.47.2 The drive shaft (cardan) shall have adequate protection, in perfect condition in its full length, fixed in the machine power take-off from the cross head to the coupling of the implement or equipment.

12.48 The machinery and equipment that provide a risk of rupture of its parts, projection of materials, particles or substances, shall have protections to ensure health and safety of workers.

12.49 The protections shall be designed and built to meet the following safety requirements:

- a) perform their functions appropriately during the useful life of the machine or permit the replacement of damaged or deteriorated parts;
- b) be built of resistant and suitable materials to contain the projection of parts, materials and particles;

- c) firm fixation and guarantee of stability and mechanical strength compatible with the required stresses;
- d) not create gripping or crushing points with machine parts or other protections;
- e) cannot have ends and sharp edges or other dangerous projections;
- f) withstand the environmental conditions of the place where they are installed;
- g) prevent from being juggled;
- h) provide hygiene and cleanliness conditions;
- i) prevent access to the danger zone;
- j) have their interlocking devices adequately protected from dirt, dust and corrosion, if necessary;
- k) take positive action, i.e. acting in a positive mode; and
- l) not entail additional risks.

12.50 When the protection is made of a discontinued material, shall be noted the safety distances to prevent access to danger zones, as provided in Annex I, Item A.

12.51 When using safety measures, including distance guards, where there is the possibility of someone getting into the danger zone, one of the following additional collective protective measures shall be adopted to prevent starting the machine while there are persons in the area: *(Amended by Ordinance n.º 98, on February 08th, 2018)*

- a) presence sensing safety devices; *(Inserted by Ordinance n.º 98, on February 08th, 2018)*
- b) movable interlocking guards or safety sensors at the access or entry point to the hazardous zone, associated with a manual reset. *(Inserted by Ordinance n.º 98, on February 08th, 2018)*

12.51.1 The manual reset shall be placed in way that the command button allows complete sight of the hazardous zone. *(Inserted by Ordinance n.º 98, on February 08th, 2018)*

12.51.2 When it is not possible to comply with the requirement of item 12.51.1, sensing the presence of people in the danger zones with obstructed view, or the adoption of a system that requires a trip to the unseen danger zone, such as, for example, double reset, must be adopted. *(Inserted by Ordinance n.º 98, on February 08th, 2018)*

12.51.3 Shall be adopted emergency stop devices located inside the hazardous zone and means to free someone trapped inside of it as well. *(Inserted by Ordinance n.º 98, on February 08th, 2018)*

12.52 The protections also used as mean of access by the exigency of the machinery or equipment characteristics shall meet the safety and strength requirements appropriate for both purposes.

12.53 There shall be protection on the bottom of the ladder steps, i.e., in the risers, whenever a protruding part of the foot or hand can contact a hazardous area.

12.54 The protections, devices and safety systems shall integrate the machinery and equipment, and can not be considered optional items for any purpose.

12.55 Due to the risk, can be required design, diagram or schematic representation of the machinery safety systems with respective technical specifications into Portuguese Language.

12.55.1 When the machine does not have the required technical documentation, its owner shall constitute it, under the responsibility of legally qualified professional and with the respective Technical Responsibility Annotation of the Regional Council of Engineering and Architecture - ART/CREA.

Emergency stop devices

12.56 The machinery shall be equipped with one or more emergency stop devices, through which can be avoided latent and existent danger situations.

12.56.1 The emergency stop devices shall not be used as starting or actuation device.

12.56.2 Are excepted from the requirement of sub-item 12.56.1 the manual machines, self-propelled machinery and those in which the emergency stop device does not allow risk reduction.

12.57 The emergency stop devices shall be positioned in locations of easy access and viewing by the operators in their worksites and by other persons, and kept permanently clear.

12.58 The emergency stop devices shall:

- a) be selected, assembled and interconnected to withstand the prescribed operating conditions as well as the environmental influences;
- b) be used as auxiliary measure, and cannot be an alternative to proper protection measures or automatic safety systems;
- c) have triggers designed to be easily activated by the operator or others who may need to use them;
- d) prevail over all other commands;
- e) cause stopping of operation or dangerous process in period as short as Technically possible, without creating additional hazards;
- f) always be available and operational, regardless of the operating mode; and *(Amended by Ordinance n.° 98, on February 08th, 2018)*
- g) be maintained in perfect operating condition

12.59 The emergency stop function shall not:

- a) impair the effectiveness of safety systems or devices with functions related to safety;
- b) prejudice any means designed to rescue accident victims; and
- c) generate additional risk.

12.60 The actuation of the emergency stop device shall also result in the retention of the actuator, so that when the actuator action is discontinued, it remains retained until it is deactivated.

12.60.1 The deactivation shall only be possible as a result of an intentional manual action on the actuator, through appropriate operation;

12.61 When used cable-type actuators, shall:

- a) use emergency-stop switches that work tensioned so as to automatically stops the machinery hazardous functions in case of breakage or loosening of the cables;

b) consider the displacement and the force applied to the actuators, required for the actuation of the emergency stop switches; and

c) follow the maximum distance between the emergency stop switches recommended by the manufacturer.

12.62 The emergency stop switches shall be located so that all the actuator cable is visible from the position of emergency stop deactivation.

12.62.1 If it is not possible to comply with the requirement in item 12.62, it shall ensure that, after the actuation and before the deactivation, the machinery or equipment is inspected throughout the length of the cable.

12.63 The emergency stop shall require reset or manual reset, to be performed only after the correction of the event that caused the emergency stop actuation.

12.63.1 The location of the reset actuators shall allow a full view of the area protected by the cable.

Permanent means of access

12.64 The machinery and equipment shall have accesses permanently fixed and secured at all their points of operation, supply, raw materials insertion and removal of products worked, preparation, maintenance and constant intervention.

12.64.1 Are considered means of access lifts, ramps, walkways, platforms or stairs.

12.64.2 In the technical impossibility of applying the technical means provided on sub-item 12.64.1, may be used a ship-type ladder.

12.64.3 In machinery and equipment, the permanent means of access shall be located and installed to prevent accidents risks and facilitate the access and use by the workers.

12.65 The use of the means of access shall consider the pitch angle as shown in Figure 1 of Annex III.

12.66 The places or worksites above ground level where there is access of workers to operation or any other usual interventions in the machinery and equipment, such as supply, preparation, adjusts, inspection, cleaning and maintenance shall have stable and safe working platforms. (*Amended by Ordinance n.º 1.111, on September 21st, 2016*)

12.66.1 In the technical impossibility of applying the provisions of item 12.66, may be adopted the use of moveable or elevatory platforms.

12.67 The moveable platforms shall be stable, so as not to allow their movement or tipping during the work.

12.68 The catwalks, platforms, ramps and stairs shall provide safe working conditions, circulation, movement and handling of materials and:

a) be sized, built and secured in a safe and resistant manner, in order to withstand the stresses and safe movement of workers;

b) have floors and steps made of slip-resistant materials or coatings;

c) be kept clear; and

d) be located and installed as to prevent risk of falling, slipping, tripping and excessive physical efforts by workers to use them.

12.69 The ramps with slopes between 10° (ten) and 20° (twenty) degrees from the horizontal plane shall have horizontal cross parts securely attached to prevent slipping, spaced with each other 0.40 m (forty centimeters) in all its entire length when the floor is not slip-resistant.

12.69.1 It is prohibited to build ramps with slopes greater than 20° (twenty) degrees from the floor.

12.70 The means of access, except elevator and ship-type ladder, shall have falling protection system with the following characteristics:

- a) be sized, built and secured in a safe and resistant manner, in order to withstand the stresses;
- b) be made of material resistant to weathering and corrosion;
- c) having upper cross member from 1.10 m (one meter and ten centimeters) to 1.20 m (one meter and twenty centimeters) in height from the floor along the entire length on both sides;
- d) the upper cross member shall not have flat surface, in order to prevent the placement of objects;
and
- e) have skirting-board of at least 0.20 m (twenty centimeters) in height and intermediate cross member to 0.70 m (seventy centimeters) in height from the floor, located between the skirting-board and the upper cross member.

12.71 If there is danger of falling objects and materials, the clearance between the skirting-board and the upper cross member of the railing shall receive fixed, full and resistant protection.

12.71.1 The protection cited on item 12.71 may be formed of resistant screen, provided its mesh does not allow the passage of any object or material that can cause injuries to the workers.

12.72 For the falling protection system in platforms used in supply operations or that accumulate dirt is allowed the adoption of the dimensions of Figure 5 of Annex III.

12.73 The catwalks, platforms and ramps shall have the following characteristics:

- a) minimum width of 0.60 m (sixty centimeters);
- b) means of drainage, if necessary; and
- c) can not have skirting-board in the access clearance.

12.74 The stairs without riser shall have:

- a) useful width of 0.60 m (sixty centimeters) (*Amended by Ordinance n.º 1.111, on September 21st, 2016*);
- b) steps with a minimum depth of 0.15 m (fifteen centimeters);
- c) uniform steps and flights leveled and without protrusions;
- d) maximum height between steps of 0.25 m (twenty-five centimeters);
- e) rest platform with 0.60 m (sixty centimeters) to 0.80 m (eighty centimeters) of width and length at intervals of not more than 3.00 m (three meters) in height; (*Amended by Ordinance n.º 1.111, on September 21st, 2016*)

- f) minimum projection of at least 0.01 m (ten millimeters) of one step on the other; and
- g) steps with depth that meets the formula: $600 \leq g + 2h \leq 660$ (dimensions in millimeters) as shown in Figure 2 of Annex III. *(Amended by Ordinance n.º 1.111, on September 21st, 2016)*

12.75 The stairs with riser shall have:

- a) useful width of 0.60 m (sixty centimeters) minimum; *(Amended by Ordinance n.º 1.111, on September 21st, 2016)*
- b) steps with a minimum depth of 0.20 m (twenty centimeters);
- c) uniform steps and flights leveled and without protrusions;
- d) height between the steps of 0.20 m (twenty centimeters) to 0.25 m (twenty-five centimeters);
- e) rest platform with 0.60 m (sixty centimeters) of width and length at intervals of not more than 3.00 m (three meters) in height. *(Amended by Ordinance n.º 1.111, on September 21st, 2016)*

12.76 The fixed ship-type ladders shall have:

- a) dimension, construction and secure and resistant mounting, to withstand the applied stresses;
- b) provision of materials or coatings resistant to weathering and corrosion, if they are exposed to corrosive or external environment;
- c) roll cages, in the event to have a height greater than 3.50 m (three meters and fifty centimeters), installed from 2.0 m (two meters) from the floor, exceeding the rest platform or the top floor in at least 1.10 m (one meter and ten centimeters) to 1.20 m (one meter and twenty centimeters);
- d) handrail or continuation of the stair pillars exceeding the rest platform or the top floor of 1.10 m (one meter and ten centimeters) to 1.20 m (one meter and twenty centimeters);
- e) width of 0.40 m (forty centimeters) to 0.60 m (sixty centimeters), as shown in Figure 3 of Annex III;
- f) maximum total height of 10.00 meters (ten meters), if a single flight;
- g) maximum height of 6.00 meters (six meters) between two rest platforms, if multiple flights, built in consecutive flights with parallel axes, spaced by at least 0.70 m (seventy centimeters), as shown in Figure 3 of Annex III;
- h) spacing between bars of 0.25 m (twenty-five centimeters) to 0.30 meters (thirty centimeters), as shown in Figure 3 of Annex III;
- i) spacing between the floor of the machine or the first bar not exceeding 0.55 m (fifty-five centimeters), as shown in Figure 3 of Annex III;
- j) distance from the structure that is attached to at least 0.15 m (fifteen centimeters), as shown in Figure 4C of Annex III;
- k) bars of 0.025 m (twenty-five millimeters) to 0.038 m (thirty-eight millimeters) in diameter or thickness; and
- l) bars with surfaces, shapes or grooves to prevent slippage.

12.76.1 The protective cages shall have a diameter of 0.65m (sixty-five centimeters) to 0.80m (eighty centimeters), as shown in Figure 4 C of Annex III; and: *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*

a) have vertical bars with a maximum spacing of 0.30m (thirty centimeters) from each other and a maximum distance of 1.50m (one meter and fifty centimeters) between arches, as shown in figures 4A and 4B of Annex III; or *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*

b) spans between arches of a maximum of 0.30 m (thirty centimeters), as shown in Figure 3 of Annex III, with a vertical bar supporting the arches. *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*

Pressurized components

12.77 Shall be adopted additional protection measures of hoses, piping and other pressurized components subject to possible mechanical impacts and other aggressive agents when there is risk.

12.78 Hoses, piping and other pressurized components shall be located or protected so that a situation of rupture of these components and fluid leaks cannot cause accidents of work.

12.79 The hoses used in pressurized systems shall have an indication of the maximum allowable working pressure specified by the manufacturer.

12.80 The machinery pressurized systems shall have means or devices intended to ensure that:

- a) the maximum allowable working pressure in the circuits cannot be exceeded; and
- b) progressive or abrupt pressure drops and vacuum loss can not generate danger.

12.81 When the machine's energy sources are isolated, the residual pressure of reservoirs and similar containers, such as hydropneumatic accumulators, cannot create a risk of accidents.

12.82 The containers containing compressed gases used in machinery and equipment shall remain in perfect condition and operation and be stored in reservoirs well ventilated, protected from falling, heat and accidental impacts.

12.83 In tires assembly and dismantling activities of machinery and equipment wheels not stationary, which have risks of accidents, shall be noted the following conditions:

- a) the tires shall be completely depressurized, removing the calibration valve core before the dismantling and of any intervention that may cause accidents; and
- b) the filling of tires can only be performed inside an enclosure device enclosure or roll cage properly sized until is reached a sufficient pressure to force the bead over the rim and create a pneumatic sealing.

12.84 According to this Standard, it is considered safe and not enough to cause injuries to the physical integrity of workers, exertion of forces on moveable parts until 150 N (Newtons), contact pressure until 50 N/cm² and energy until 10 J (Joules), except in cases where there is prevision of other values in current specific official technical standards. *(Amended by Ordinance n.º 252, on April 10th 2018)*

12.84.1 In pneumatic and hydraulic system which uses two or more stages of movement with different pressures as protective measure, the initial force exerted on the first route or safety circuit – approach -, the contact pressure and energy established on 12.84 shall be respected, except in cases where there is prevision of other values in current specific official technical standards. *(Amended by Ordinance n.º 252, on April 10th 2018)*

Material conveyors

12.85 The hazardous movements of the continuous material conveyors shall be protected, especially at the crushing, gripping and trapping points formed by the tracks, belts, rollers, clutches, brakes, pulleys, samplers, flywheel, drums, gears, racks, chains, guides, aligners, stretching region and counterweight, and other moveable parts accessible during normal operation.

12.85.1 The continuous belt conveyors whose height from the belt edge that carries the load is greater than 2.70 m (two meters and seventy centimeters) from the floor are exempted from the provisions of item 12.85, provided there is no circulation nor permanency of persons in hazardous areas.

12.85.2 The continuous belt conveyors where there is distant fixed protection, coupled with moveable interlocked protection that restricts access to specialized personnel to perform inspections, maintenance and other necessary interventions, are exempted from the provisions of item 12.85, provided that the provisions under item 12.51 are met.

12.86 The continuous belt conveyors, whose height from the belt edge that carries the load is greater than 2.70 m (two meters and seventy centimeters) from the floor, shall have in their entire length, walkways on both sides, if the requirements of item 12.66 are met.

12.86.1 The conveyors whose belt has a width of up to 762 mm (seven hundred sixty-two millimeters or 30 (thirty) inches) can have catwalk on one side only and the use adoption of moveable or elevatory platforms for any interventions and inspections.

12.86.2 The articulated moveable conveyors where there is the possibility to perform any interventions and inspections from the floor are exempted from the requirement in item 12.86.

12.87 The material conveyors shall only be used for the type and load capacity for which they were designed.

12.88 The wire ropes, chains, slings, hooks and other suspension or traction elements and their connections shall be adequate for the type of material and sized to withstand the stresses.

12.89 In the continuous material conveyors that require stoppage during the process is prohibited the reversal of movement for this purpose.

12.90 It is prohibited the permanency and circulation of persons on moveable parts, or that can move, of the material conveyors, when not designed for these purposes.

12.90.1 In situations where there is a technical unfeasibility of compliance with the provisions of item 12.90, shall be taken measures to ensure the stop and blockage of the risk movements, as provided on item 12.113 and sub-item 12.113.1.

12.90.2 The permanency and circulation of persons on the continuous conveyors shall be performed by means of catwalks with falling protection system, according to item 12.70.

~~**12.90.3**~~ *(Reallocated by Ordinance n.º 252, on April 10th 2018 to subitem 12.93.2)*

12.91 The continuous conveyors accessible to workers shall be provided, along its length, of emergency stop devices, so that they can be actuated in all working positions.

12.91.1 The continuous conveyors accessible to workers are exempted from compliance with the requirement on item 12.91 if the risk analysis indicates in that manner.

12.92 Continuous belt conveyors shall have devices to ensure safety in the event of failure during normal operation and to cease operation when safety limits are exceeded as specified in the design, and shall meet at least the following conditions: *(Amended by MTb Ordinance No. 98, on February 08th, 2018)*

- a) abnormal belt misalignment; and
- b) material overload.

12.93 During the transport of suspended materials shall be taken safety measures aiming to ensure that no persons are under the load.

12.93.1 The safety measures provided on item 12.93 shall prioritize the existence of exclusive areas for the circulation of suspended loads properly delimited and signalized.

12.93.2.1 When using cable car as load transportation method inside the mill, it is allowed people circulation, adopting safety measures to ensure that nobody stay under the load. *(Inserted by Ordinance n.º 326, on May 14th, 2018)*

12.93.3 When using cable car as load transportation method outside the mill area, it is not required compliance with item 12.93, 12.93.1 and 12.3.2, if the correct use and applicability of warning signs is guarantee and without jeopardizing the requirements of federal, state and county law. *(Inserted by Ordinance n.º 326, on May 14th, 2018)*

Ergonomic aspects

12.94 The machinery and equipment shall be designed, built and maintained to comply with the following aspects:

- a) meeting of the anthropometric characteristics variability of the operators;
- b) compliance with the postural, cognitive requirements, movement and physical efforts demanded by the operators;
- c) the components such as displays, signals and commands, shall enable the clear and precise interaction with the operator to reduce possibilities for misinterpretation or information feedback errors;
- d) the controls and indicators shall represent, whenever possible, the direction of movement and all other corresponding effects;
- e) the interactive systems, such as icons, symbols and instructions shall be consistent in its appearance and function;
- f) facilitate the performance and reliability of operations, reducing the likelihood of failures in the operation;
- g) reduction of requirement for power, pressure, deflection, extension or twisting of the body segments;
- h) the illumination shall be adequate and be available in emergency situations when required to enter in its interior.

12.95 The machinery and equipment controls shall be designed, built and maintained in compliance with the following aspects:

- a) location and distance in order to allow easy and safe handling;
- b) installation of the commands used in positions more accessible to the operator;
- c) visibility, identification and marking that permits to be distinguished from each other;

- d) installation of the hand or pedal actuation elements in order to facilitate the execution of the maneuver taking into account the biomechanical and anthropometric characteristics of operators; and
- e) ensuring the safe and quick maneuvers and protection to prevent unintended movements.

12.96 The machinery and equipment shall be designed, built and operated taking into account the necessity of adapting for working conditions to the psychophysiological characteristics of workers and the nature of the works to be performed, offering comfort and safety conditions at work, in compliance with NR 17.

12.97 The seats used in the machinery operation shall have cushion and be adjustable to the nature of work performed, beyond that provided on sub-item 17.3.3 of NR 17.

12.98 The worksites shall be designed to allow the alternation of posture and adequate movement of body segments, ensuring enough space for operation of the installed controls.

12.99 The worksites surfaces shall not have sharp edges, rough and sharp surfaces and corners in acute angles or burrs on the points of contact with the operator's body segments, and the fixing elements such as nails, rivets and screws, shall be kept so as not to add risk to the operation.

12.100 The machinery and equipment worksites shall allow the full support of the soles on the floor.

12.100.1 Shall be provided footrests support when the operator's feet do not reach the floor even after the seat adjustment.

12.101 The dimensions of the machinery and equipment worksites shall:

- a) meet the biomechanical and anthropometric characteristics of the operator, with respect to the reaches of the body segments and vision;
- b) ensure the proper posture, in order to assure comfortable positions of the body segments in the working position; and
- c) avoid torso deflection and twist in order to observe the angles and natural paths of body movements during the tasks.

12.102 The locations intended for the material handling in processes on machinery and equipment shall have height and be positioned to ensure good posture conditions, visualization, movement and operation.

12.103 The machinery and equipment worksites shall have permanent lighting system that allows good visibility of the work details, to avoid shadow or penumbra areas and stroboscopic effect.

12.103.1 The illumination of the inner parts of machinery and equipment that require adjustment operations, inspection, maintenance and other periodic interventions shall be appropriate and be available in emergencies situations, when is required the entry of persons observing the specific requirements for classified areas.

12.104 The work rhythm and the machinery and equipment speed shall be compatible with the physical ability of operators in order to prevent health problems.

12.105 The filler neck of fuel tank and other materials shall be located no more than 1.50 m (one meter and fifty centimeters) above the floor or support platform for the task.

Additional risks

12.106 For the purposes of this Standard, shall be considered the following additional risks:

- a) any hazardous substances, whether chemical or biological agents in solid, liquid or gaseous state, which shows a risk to health or physical integrity of workers through inhalation, ingestion or contact with skin, eyes or mucous membranes;
- b) ionizing radiations generated by machinery and equipment or from radioactive substances used, processed or produced by them;
- c) non-ionizing radiations that could cause damage to health or physical integrity of workers;
- d) vibrations;
- e) noise;
- f) heat;
- g) fuels, flammables, explosives and substances that react dangerously; and
- h) accessible heated surfaces that shows a risk of burns caused by contact with skin.

12.107 Shall be adopted measures to control the additional risks from the emission or release of chemical, physical and biological agents by machinery and equipment, with priority to its removal, reduction of its emission or release and reduction of workers' exposure, in that order.

12.108 Machinery and equipment which use, process or produce fuels, flammables, explosives or substances which react dangerously shall provide protective measures against its emission, release, combustion, explosion and accidental reactions, as well as the occurrence of fire.

12.109 Shall be adopted measures to protect against burns caused by skin contact with hot surfaces of machinery and equipment, such as reducing the surface temperature, insulation with suitable materials and barriers, whenever the surface temperature is greater than the threshold of burns of the material of which is constituted for a certain period of contact.

12.110 Shall be developed and applied safety procedures and work permission to ensure the safe use of machinery and equipment for work in confined spaces.

Maintenance, inspection, preparation, adjustments and repairs
(Amended by Ordinance n.° 1.111, on September 21st, 2016)

12.111 The machinery and equipment shall be subjected to preventive and corrective maintenance in the manner and frequency determined by the manufacturer according to current official national technical standards and, missing those, international technical standards.

12.111.1 The preventive maintenances with the potential to cause accidents at work shall be subject to planning and management performed by a legally qualified professional.

12.112 The preventive and corrective maintenance shall be recorded in own book, index card or information system, with the following data:

- a) maintenance schedule;
- b) interventions performed;
- c) date of completion of each intervention;
- d) service performed;

- e) parts repaired or replaced;
- f) safety equipment conditions;
- g) conclusive indication for the machine safety conditions; and
- h) name of the person responsible for performing of interventions.

12.112.1 The record of maintenance shall be available to the workers involved in operation, maintenance and repairs, as well as the Internal Commission of Accident Prevention, CIPA, to the Service of Safety and Occupational Medicine - SESMT and to the supervision of the Ministry of Labour and Employment.

12.113 The maintenance, inspection, repairs, cleaning, adjustments and other interventions that are necessary shall be performed by trained, qualified or legally skilled professionals, formally authorized by the employer, with machinery and equipment stopped and adoption of the following procedures:

- a) insulation and discharge of all energy sources of machinery and equipment, in a visible manner or easily identifiable by means of the control devices;
- b) electrical and mechanical lock in "off" or "closed" position of all cut devices of energy sources, in order to prevent re-energizing, and signaling with lock card or tag containing the time and date of locking, the reason for the maintenance and the name of the person responsible;
- c) measures to ensure that downstream of the cut energy points there is no possibility of generating risk of accidents;
- d) additional safety measures, when is performed maintenance, inspection and repairs of equipment or machinery supported by hydraulic and pneumatic systems only; and
- e) restraints systems with mechanical lock to prevent accidental back movement of tilted or articulated open parts of the machinery and equipment.

12.113.1 For special situations of setting, adjustment, cleaning, troubleshooting and non-conformances, where it is not possible the accomplishment of conditions established on item 12.113, and in other situations involving the safety level reduction of machinery and equipment and there is a need to access the danger zones shall be possible to select a mode of operation that:

- a) becomes inoperative the automatic control mode;
- b) allow the completion of services with the use of actuation device of continued action associated to speed reduction or control devices by limited movement;
- c) prevent the change by unauthorized workers;
- d) the selection corresponds to a single command or operation mode;
- e) when selected, has priority over all other control systems, with the exception of emergency stop; and
- f) makes the selection visible, clear and easily identifiable.

12.114 The maintenance of machinery and equipment will include, among other items, the attainment of non-destructive testing - NDT, in the structures and components subject to forces and whose breakage or wear can cause accidents.

12.114.1 The non-destructive testing - NDT, when performed, shall conform to current official national technical standards and, missing those, international technical standards.

12.115 In maintenance of machinery and equipment, whenever a defect is detected in the part or component which implicates the safety, shall be provided its repair or immediate replacement with another original part or component or equivalent, to ensure the same characteristics and use safe conditions.

Signs

12.116 The machinery and equipment, as well as the facilities where they are, shall have safety signs to warn workers and others about the risks they are exposed to, the operation and maintenance instructions and other information necessary to ensure the physical integrity and health of workers.

12.116.1 The safety signs include the use of colors, symbols, markings, luminous or audible signals, among other forms of communication with the same efficiency.

12.116.2 The signs, including colors, of machinery and equipment used in the food, medical and pharmacist sectors shall obey the current sanitation law, without prejudice to the safety and health of workers or third parties.

12.116.3 The safety signs shall be adopted at all phases of use and life of machinery and equipment.

12.117 The safety signs shall:

- a) be emphasized on the machine or equipment;
- b) be in clearly visible location; and
- c) be of easy understanding.

12.118 The symbols, markings and luminous or audible signals shall follow the standards established by the current national technical standards and, missing those, by international technical standards.

12.119 The markings of the machinery and equipment shall:

- a) be written in Portuguese Language - Brazil;
- b) be legible.

12.119.1 The markings shall clearly indicate the risk and the part of the machinery or equipment to which they relate, and shall not be used the marking "danger" only.

12.120 The markings and symbols shall be used in machinery and equipment to indicate its specifications and technical limitations.

12.121 Shall be adopted, where appropriate, active warning or alert signs, such as intermittent luminous and audible signals, indicating the imminence of a hazardous event, such as starting or overspeed of a machine, so that:

- a) be emitted before the hazardous event occurs;
- b) are not ambiguous;
- c) be clearly understood and distinguished from all other signals used; and
- d) can be positively recognized by the workers.

~~12.122~~ (Extinct by Ordinance n.º 1.111, on September 21st, 2016)

12.123 Machinery and equipment manufactured from the effective date of this Standard (24/12/2011) shall have, in a visible place, the indelible information: (Amended by Ordinance n.º 98, on February 08th, 2018)

- a) legal name, corporate identity number (CNPJ) and address of manufacturer or importer;
- b) information on type, model and capacity;
- c) serial number or identification number and year of manufacture;
- d) registration number of the manufacturer or legally qualified professional in the CREA; and (Amended by Ordinance n.º 98, on February 08th, 2018)
- e) weight of the machinery or equipment;

12.123.1 Machinery and equipment manufactured prior to the effective date of this Standard (24/12/2011) shall have, in a visible place: (Inserted by Ordinance n.º 98, on February 08th, 2018)

- a) information on type, model and capacity;
- b) serial number or identification number

12.124 To warn workers about possible hazards shall be installed, if necessary, indicator devices of qualitative and quantitative reading or safety control.

12.124.1 The indicators shall be easy to read and distinguishable from each other.

Manuals

12.125 The machinery and equipment shall have instruction manuals supplied by the manufacturer or importer with information relating to safety at all stages of use.

12.126 When missing or misplaced, the manual of hazardous machinery or equipment should be reconstituted by the employer or his designee under the responsibility of a qualified or legally qualified professional. (Amended by MTPS Ordinance No. 211 of December 9, 2015)

12.126.1 Micro and small businesses that do not have an instruction manual for machines and equipment manufactured before June 24, 2012 must prepare information sheet containing the following items: (Item and sub-paragraphs inserted by Ordinance MTE no. 857, 06/25/2015)

- a) type, model and capacity;
- b) description of the intended use of the machinery or equipment;
- c) indication of existing security measures;
- d) instructions for safe use of the machine or equipment;
- e) frequency and instructions for inspections and maintenance;
- f) procedures to be adopted in emergency situations, when applicable.

12.126.1.1 The information sheet indicated in item 12.126.1 may be prepared by the employer or his designee. (Inserted by MTE Ordinance No. 857, of 06/25/2015)

12.127 The manuals shall:

- a) be written in Portuguese Language - Brazil, with characters of type and size to allow the better readability possible, followed by explanatory illustrations;
- b) be objective, clear, unambiguous and easy understanding language;
- c) have signs or warnings regarding to safety; and
- d) remain available to all users in the workplaces.

12.128 The manuals of machinery and equipment manufactured or imported from the date of this standard shall contain, at least, the following information:

- a) legal name, corporate identity number (CNPJ) and address of manufacturer or importer;
- b) type, model and capacity;
- c) serial number or identification number and year of manufacture;
- d) observed standards for design and construction of machinery or equipment;
- e) detailed description of the machinery or equipment and their accessories;
- f) diagrams, including electrical circuits, especially the schematic representation of the safety functions;
- g) definition of the intended use of the machinery or equipment;
- h) risks where the users are exposed, with the respective quantitative assessments of emissions generated by the machinery or equipment at their full capacity utilization;
- i) definition of existing safety measures and those to be adopted by the users;
- j) technical specifications and limitations for its use with safety;
- k) risks that can result from tampering or removal of protections and safety devices;
- l) risks that can result from uses other than those prescribed in the design;
- m) technical information to support the preparation of work and safety procedures during all phases of use; (*Amended by MTPS Ordinance No. 211 of December 9, 2015*)
- n) procedures and schedule for inspections and maintenance;
- o) procedures to be adopted in emergencies;
- p) indication of the useful life of the machinery or equipment and components related to safety.

12.129 In the case of reconstituted manuals, these shall contain the information provided for in points “b”, “e”, “g”, “i”, “j”, “k”, “m”, “n” and “o” item 12.128, as well as safety system diagrams and single-wire or three-wire electrical system diagrams, as appropriate. (*Amended by MTPS Ordinance No. 211 of December 9, 2015*)

12.129.1 In the case of machinery and equipment whose manufacturers are no longer in operation, item “j” of item 12.128 may be replaced by the procedure provided for in item 12.130, subject to the machine limits. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

Work and safety procedures

12.130 Shall be developed specific, standardized work and safety procedures, with detailed description of each task, step by step, from the risk analysis.

12.130.1 The Work and safety procedures cannot be the only protective measures adopted to prevent accidents and are considered supplements and not substitutes for collective protective measures needed to ensure the safety and health of workers.

12.131 At the beginning of each work shift or after a new preparation of the machinery or equipment, the operator shall perform routine inspection of operational and safety conditions and, if detected abnormalities that affect the safety, the activities shall be discontinued, with the communication for his superior.

12.132 The services in machinery and equipment that involve risk of accidents at work shall be planned and performed in accordance with the work and safety procedures, under supervision and express consent of a qualified and skilled professional, since authorized.

12.132.1 Services involving the risk of accidents at work in machinery and equipment, except operation, shall be preceded by specific work orders (OS) containing at least: *(Amended by Ordinance MTPS no. 509, April 29, 2016)*

- a) a description of the service;
- b) the date and place of work performance;
- c) the name and role of workers; and
- d) the persons responsible for the service and for the issue of the OS, according to work and safety procedures.

12.132.2 Companies that do not have their own maintenance service of their machines are not required to elaborate work and safety procedures for this purpose. *(Amended by MTPS Ordinance No. 509, of April 29, 2016)*

Design, manufacture, import, sale, lease, auction, assignment of any title and exhibition.

(Amended by Ordinance MTE No. 857 of June 25, 2015)

12.133 The design shall take into account the safety of machinery or equipment during the construction, transport, assembly, installation, adjustment, operation, cleaning, maintenance, inspection, deactivation, dismantling and scrapping phases through the technical references listed in this standard, to be observed to ensure the health and physical integrity of workers.

12.133.1 The design of the machinery or equipment shall not allow errors in assembly or reassembly of certain parts or elements that can create hazards during its operation, especially regarding the speed direction or displacement.

12.133.2 The design of the machinery or equipment manufactured or imported after the entry into force of this standard shall provide adequate means for their lifting, loading, installation, removal and transportation.

12.133.3 Shall be foreseen safe means for the installation, removal, dismantling or transportation activities, even in parts, of machinery and equipment manufactured or imported before the entry into force of this standard.

12.134 The manufacture, importation, sale, auction, lease, assignment of any title and exposure of machinery and equipment that do not comply with the provisions of this Standard is prohibited. *(Amended by Ordinance MTE No. 857, of 06/25/2015)*

Technical training

12.135 The operation, maintenance, inspection and all other interventions in machinery and equipment shall be performed by skilled, qualified, trained or authorized workers for this purpose.

12.136 The workers involved in the operation, maintenance, inspection and all other interventions in machinery and equipment shall receive technical training provided by the employer and compatible with their roles that cover the risks they are exposed and the protective measures available and necessary, in accordance with this Standard, for the prevention of accidents and diseases.

~~**12.137**~~ *(Extinct by Ordinance MTPS No. 509 of April 29, 2016)*

12.138 The technical training shall:

- a) occur before the employee assumes the roles;
- b) be performed at no cost to the worker; *(Amended by Ordinance MTE No. 857, of 06/25/2015)*
- c) have minimum workload assuring the workers to perform their activities safely, being distributed in a maximum of eight daily hours and performed during normal working hours;
- d) have a content of training program as set out in Annex II of this standard; and
- e) be given by qualified professionals or workers for this purpose, supervised by legally qualified professional who will be responsible for the suitability of the content, form, workload, instructors qualification and assessment of qualified persons.

12.138.1 The training of micro and small business workers may be provided by a company employee who has been trained in accordance with item 12.138 in an official vocational education institution. *(Inserted by MTE Ordinance No. 857, of 06/25/2015)*

12.138.1.1 The employer is responsible for the training provided under item 12.138.1. *(Inserted by MTE Ordinance No. 857, of 06/25/2015)*

12.138.1.2 The training of micro and small business workers, as provided for in item 12.138.1, shall include the provisions of item 12.138, except item “e”. *(Inserted by MTE Ordinance No. 857, of 06/25/2015)*

12.138.2 A micro and small business worker who submits a statement or certificate issued by an official vocational education entity is considered qualified, provided that it complies with the provisions of item 12.138. *(Inserted by MTE Ordinance No. 857, of 06/25/2015)*

12.139 The teaching material in written or audiovisual used on training and that provided to the participants, shall be produced in suitable language to the workers, and be kept available for inspection, as well as the attendance list or certificate, the curriculum vitae from the teachers and assessment of qualified persons.

12.140 It is considered a qualified worker or professional who can prove completion of specific course in the area, recognized by the official educational system, compatible with the course to be taught.

12.141 It is considered a legally qualified professional to supervise the technical training who can prove completion of specific course in the area, compatible with the course to be taught, with registration in competent class council.

12.142 The training will only be valid for the employer who performed it and under the conditions established by the legally qualified professional responsible for supervising the training, except for the trained workers under the terms of item 12.138.2. *(Amended by Ordinance MTE No. 857, of 06/25/2015)*

12.142.1 It is exempted from the requirement of item 12.142 the plastic injector machine operators with technical training course as provided on item 12.147 and its sub-items.

12.143 Are considered authorized the skilled, qualified workers or legally qualified professionals, with authorization given by a formal document of the employer.

12.143.1 Until the effective date of this standard, will be considered skilled the worker who has evidence, through registration in the Labour Evidence Booklet, CTPS or employee registration of at least two years of experience in the activity and who receives recycling as required on item 12.144 of this standard.

12.144 Technical training shall be performed for recycling of the worker whenever significant changes occur in the facilities and in operation of machinery or changes in methods, processes and work organization.

12.144.1 The content of training program for recycling shall meet the needs of the situation that motivated, with minimum workload assuring the workers to perform their activities safely, being distributed in a maximum of eight daily hours and performed during normal working hours.

12.145 The role of the employee who operates and performs interventions on machinery shall be noted on the employee registration, recorded in book, index card or electronic system and in his Labour Evidence Booklet, CTPS.

12.146 The self-propelled machinery operators shall carry identification card with name, role and photo in a visible place, renewed with intervals not exceeding one year upon a medical examination, according to provisions of the NR 7 and NR 11.

12.147 The technical training course for plastic injector machine operators shall have a minimum workload of eight hours per machine type cited in Annex IX of this Standard.

12.147.1 The technical training course shall be specific to the machine type where the operator will exercise its functions and meet the following content of training program:

- a) history of safety regulation on the specified machinery;
- b) description and operation;
- c) risks in the operation;
- d) main danger zones;
- e) measures and safety devices to prevent accidents;
- f) protections - doors, and safety distances;
- g) minimum safety requirements set out in this Standard and in NR 10;

- h) safety measures for electrical and hydraulic injection machinery of manual control; and
- i) practical demonstration of the hazards and safety devices.

12.147.2 The technical training course instructor for injection machinery operators shall have at least:

- a) technical training in high school;
- b) technical knowledge of machinery used in the plastic material processing;
- c) knowledge of technical standardization related to safety;
- d) specific technical training.

Other specific safety requirements

12.148 The tools and materials used in interventions in machinery and equipment shall be appropriate to operations performed.

12.149 The accessories and tooling used by the machinery and equipment shall be appropriate to operations performed.

12.150 It is prohibited carrying of hand tools in pockets or places not suitable for that purpose.

12.151 The tractive machinery and equipment shall have standardized coupling systems for towing by the drive system, in order to ensure the easy and safe coupling and decoupling, as well as to prevent the accidental decoupling during use.

12.151.1 The indication for use of standardized coupling systems cited on item 12.151 shall be in place for easy visualization and fixed in a place near the connection.

12.151.2 The tractive equipment, if the weight of the tow bar so requires, shall have support device that enables the reduction of efforts and the safe connection to the drive system.

12.151.3 The coupling operation shall be performed in an appropriate place with the equipment in traction, safely immobilized with chock or similar.

12.152 For the purposes of this Standard, the Annexes contain obligations, special provisions or exceptions that apply to a particular type of machine or equipment, in priority to the other requirements of this Standard, without prejudice to the provisions of a specific Regulatory Standard. *(Amended by Ordinance MTE No. 857, of 06/25/2015)*

12.152.1 In situations where the items in the Annexes conflict with the items in the general part of the Standard, the requirements of the annex shall prevail. *(Inserted by MTPS Ordinance No. 509 of April 29, 2016)*

Final provisions

12.153 The employer shall maintain an updated inventory of machinery and equipment with identification by type, capacity, safety systems and location represented by a layout drawing, prepared by a qualified or legally qualified professional. *(Amended by Ordinance n.° 98, on February 08th, 2018)*

12.153.1 The inventory information shall subsidize the management actions to apply this standard.

12.153.2 The item 12.153 do not apply: *(Item and paragraphs inserted by Ordinance n.° 857, on June 25th, 2015)*

- a) micro and small businesses, which are exempted from drawing up inventory of machines and equipment;
- b) self-propelled, automotive machines, and stationary machines and equipment used in work fronts;
- c) manual tools and transportable tools. *(Inserted by Ordinance n.º 98, on February 08th, 2018)*

12.154 All documentation referred to in this standard, including the inventory referred to on item 12.153, shall be available for the SESMT, CIPA or Internal Commission of Accident Prevention in Mining - CIPAMIN, union representatives of the professional category and supervision of the Ministry of Labour and Employment.

12.155 The self-propelled agricultural, forestry and construction machinery in agroforestry applications and its implements shall meet the provisions of Annex XI of this Standard.

12.156 The self-propelled machinery not covered on item 12.155 shall meet the requirements of items and sub-items 12.1, 12.1.1, 12.2, 12.3, 12.4, 12.5, 12.22, 12.23, 12.38, 12.38.1, 12.47, 12.47.2, 12.48, 12.49, 12.52, 12.53, 12.54, 12.64, 12.64.3, 12.66, 12.77, 12.78, 12.94, 12.95, 12.96, 12.101, 12.105, 12.107, 12.108, 12.111, 12.112, 12.115, 12.116, 12.116.3, 12.117, 12.118, 12.121, 12.130, 12.130.1, 12.131, 12.132, 12.132.1, 12.133, 12.133.1, 12.133.2, 12.133.3, 12.134, 12.135, 12.136, 12.137, 12.138, 12.139, 12.140, 12.141, 12.142, 12.143, 12.144, 12.144.1, 12.145, 12.146, 12.151, 12.151.1, 12.151.2, 12.151.3, and items and sub-items 14, 14.1 and 14.2 of Annex XI of this Standard.



ANNEX II
SAFETY DISTANCES AND REQUIREMENTS FOR USE OF
OPTOELECTRONICS PRESENCE DETECTORS

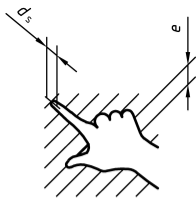
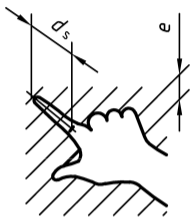
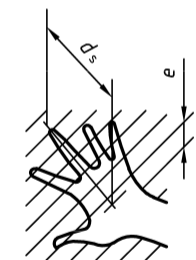
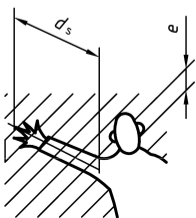
This annex provides references to safety distances and requirements for machinery and equipment in general and the provisions contained in the annexes and specific standards shall be observed, as appropriate.

(Text inserted by MTPS Ordinance No. 509 of April 29, 2016)

A) Safety distances to prevent access to danger zones when used physical barrier

TABLE I

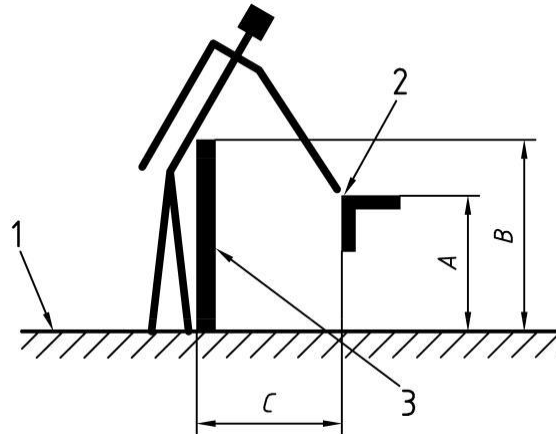
Safety distances to prevent access to danger zones by upper limbs (dimensions in millimeters - mm)

Part of body	Illustration	Opening	Safety distance, d_s		
			Slot	Square	Round
Finger tip		$e \leq 4$	≥ 2	≥ 2	≥ 2
		$4 < e \leq 6$	≥ 10	≥ 5	≥ 5
Finger up to knuckle joint or hand		$6 < e \leq 8$	≥ 20	≥ 15	≥ 15
		$8 < e \leq 10$	≥ 80	≥ 25	≥ 20
		$10 < e \leq 12$	≥ 100	≥ 80	≥ 80
		$12 < e \leq 20$	≥ 120	≥ 120	≥ 120
Arm up to junction with shoulder		$20 < e \leq 30$	≥ 850 ¹⁾	≥ 120	≥ 120
		$30 < e \leq 40$	≥ 850	≥ 200	≥ 120
Arm up to junction with shoulder		$40 < e \leq 120$	≥ 850	≥ 850	850

¹ If the length of the slot opening is ≤ 65 mm, the thumb will act as a stop and the safety distance may be reduced to 200 mm.

Source: ABNT NBR NM-ISO 13852:2003 - Safety of Machinery - Safety distances to prevent danger zones being reached by the upper limbs

Figure 1: Reach on protective structures. For use of Table II, note the key of Figure 1 below.



Legend:

A: height of danger zone

B: height of protective structure

C: horizontal distance to danger zone

1: reference plane

2: danger zone

3: protective structure

TABLE II
Reach on protective structures – High risk (dimensions in mm)

	Height of protective structure b ¹⁾									
	1000	1200	1400 ²⁾	1600	1800	2000	2200	2400	2500	2700
Height of danger zone a	Horizontal distance to the danger zone "c"									
2700 ³⁾	-	-	-	-	-	-	-	-	-	-
2600	900	800	700	600	600	500	400	300	100	-
2400	1100	1100	900	800	700	600	400	300	100	-
2200	1300	1200	1000	900	800	600	400	300	-	-
2000	1400	1300	1100	900	800	600	400	-	-	-
1800	1500	1400	1100	900	800	600	-	-	-	-
1600	1500	1400	1100	900	800	500	-	-	-	-
1400	1500	1400	1100	900	800	-	-	-	-	-
1200	1500	1400	1100	900	700	-	-	-	-	-
1000	1500	1400	1100	800	-	-	-	-	-	-
800	1500	1300	900	600	-	-	-	-	-	-
600	1400	1300	800	-	-	-	-	-	-	-
400	1400	1200	400	-	-	-	-	-	-	-
200	1200	900	-	-	-	-	-	-	-	-
0	1100	500	-	-	-	-	-	-	-	-

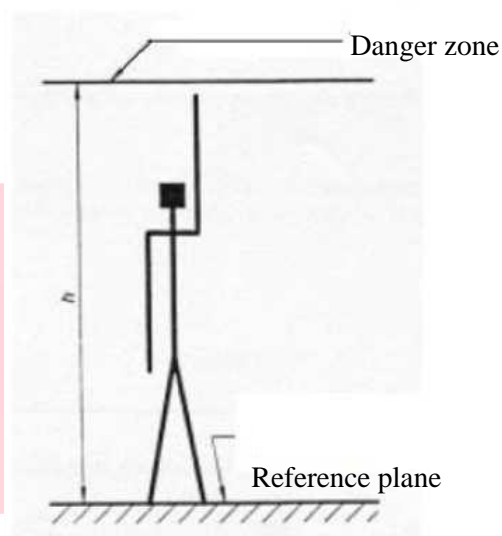
¹⁾ Protective structures less than 1000 mm (one thousand millimeters) in height are not included because they do not sufficiently restrict access of the body.

- 2) Protective structures less than 1400 mm (one thousand four hundred millimeters) in height shall not be used without additional safety measures.
- 3) For danger zones greater than 2700 mm (two thousand and seven hundred millimeters) in height, see Figure 2.

NOTE Shall not be made value interpolations of this Table, thus, when the known values of "a", "b" or "c" are between two values of this Table values, the values to be used will be those that provides better safety.

Source: ABNT NBR NM-ISO 13852:2003 - Safety of Machinery - Safety distances to prevent danger zones being reached by the upper limbs.

Figure 2: Reach of upper danger zones



Legend:

h: height of danger zone

If the danger zone offers low risk, it shall be located at a height "h" equal to or greater than 2500 mm (two thousand and five hundred millimeters), for which no protections are needed.

If there is a high risk in the danger zone:

- the height "h" of the danger zone shall be at least 2700 mm (two thousand and seven hundred mm);
- or
- shall be used other safety measures.

Source: ABNT NBR NM-ISO 13852:2003 - Safety of Machinery - Safety distances to prevent danger zones being reached by the upper limbs.

TABLE III

Reach around the danger - Fundamental movements (dimensions in mm)

Limitation of movement	Safety distance d^s	Illustration
Limitation of movement only at shoulder and armpit	≥ 850	
Arm supported up to elbow	≥ 550	
Arm supported up to wrist	≥ 230	
Arm and hand supported up to knuckle joint	≥ 130	
<p>1 Range of movement of arm. ¹⁾ Diameter of a round opening, the side of a square opening or the width of a slot opening.</p>		

Source: ABNT NBR NM-ISO 13852 - Safety of Machinery - Safety distances to prevent danger zones being reached by the upper limbs

B) Calculation of minimum safety distances for the installation of optoelectronics presence detectors - ESPS using light curtain - AOPD.

1. The minimum distance at which ESPS using light curtain - AOPD shall be positioned in relation to the danger zone, will observe the calculation according to ISO 13855. To a perpendicular approach, the distance can be calculated in accordance with the general formula shown in section 5 of ISO 13855, such as follows:

$$S = (K \times T) + C$$

Where:

S: is the minimum distance in millimeters, from danger zone to the point, line or plane of detection;

K: is a parameter in millimeters per second, derived from data of the approach speed of the body or body parts;

T: is the stop performance of the entire system - total response time in seconds;

C: is the additional distance in millimeters, based on the intrusion against the danger zone before the actuation of the protective device.

1.1 In order to determine K, an approach speed of 1600 mm/s (one thousand six hundred millimeters per second) shall be used for light curtains arranged horizontally. For light curtains arranged vertically, shall be used an approach speed of 2000 mm/s (two thousand millimeters per second) if the minimum distance is equal to or less than 500 mm (five hundred millimeters). An approach speed of 1600 mm/s (one thousand six hundred millimeters per second) can be used if the minimum distance is greater than 500 mm (five hundred millimeters).

1.2 The light curtains shall be installed so that its detection area covers the access to the danger zone, being careful not to provide spaces for the dead zone, i.e. space between the curtain and the machine body where can stay a worker without being detected.

1.3 In respect to the detection capacity of the light curtain, shall be used at least an additional distance C in Table IV when calculating the minimum distance S.

TABLE IV
Additional distance C

Detection capacity mm	Additional distance C mm
≤ 14	0
$> 14 \leq 20$	80
$> 20 \leq 30$	130
$> 30 \leq 40$	240
> 40	850

1.4 Other light curtain installation characteristics, such as a parallel approach, approach in angle and dual-position equipment shall meet the specific conditions provided on ISO 13855. The light curtain application in hydraulic press brakes shall meet EN 12622 standard.

Source: ISO 13855, Safety of machinery - The positioning of protective equipment in respect of approach speeds of parts of the human body.

C) Requirements for the use of multizone detection safety systems - multizone AOPD in hydraulic benders. (*Wording given by Ordinance MTb No. 873, of July 6, 2017*)

1. The hydraulic press brakes can have AOPD laser of multiple beams since is accompanied by detailed work procedure that meets the manufacturer's recommendations, to EN 12622 and to the tests foreseen in this Annex.

1.1 The tests must be performed at every tool change or maintenance, and must be performed by the operator at each work shift start or extended machine removal..

2. On hydraulic press brakes provided with AOPD laser using descending actuation pedal, it shall be safe and have the following positions:

- a) 1st (first) position = stop;
- b) 2nd (second) position = operate; and
- c) 3rd (third) position = stop in an emergency.

2.1 The tool opening can be activated, since controlled the falling risk of the product in process, with the pedal actuation to the 3rd (third) position or releasing it to the 1st (first) position.

2.2 After driving the actuator until the 3rd (third) position, the restart is only possible with your return to the 1st (first) position. The 3rd (third) position can be actuated through a pressure point; the required force shall not exceed 350 N (three hundred and fifty Newtons).

ANNEX II CONTENT OF TRAINING PROGRAM

1. Training for safe machine operation shall cover the theoretical and practical steps, in order to provide the appropriate operator competence for safe work, containing at least: *(Amended by Ordinance MTb n.º 1.083, on December 18th, 2018)*

- a) identification and description of risks associated with each machine and equipment and the specific protections against each of them;
- b) protections operation, how and why they shall be used;
- c) how and under what circumstances a protection can be removed, and by whom, being in most cases, performed by the inspection or maintenance personal only;
- d) what to do, for example, contact the supervisor, if a protection was damaged or failed in its function, not ensuring an adequate safety;
- e) the safety principles in use of machinery or equipment;
- f) safety for mechanical and electrical risks and other relevant;
- g) safe work method;
- h) work permission; and
- i) locking system of the machine and equipment operation during inspection, cleaning, lubrication and maintenance operations.

1.1 The technical training for operators of self-propelled machinery, shall consist of theoretical and practical steps and have the minimum technical content described in paragraphs of item 1 of this Annex and also:

- a) notions about traffic laws and safety and occupational health laws;
- b) notions about accidents and diseases resulting from exposure to existing risks in machinery, equipment and implements;
- c) risk control measures: EPC and EPI;
- d) safe operation of machinery or equipment;
- e) safe inspection, adjustment and maintenance;
- f) safety signs;
- g) procedures in emergencies; and

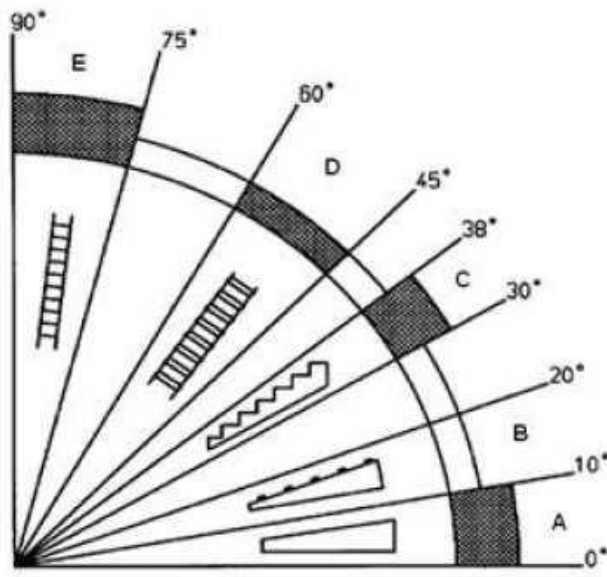
h) notions about first aids.

1.1.1 The practical step must be supervised and documented and can be performed on the machine to be operated.

**ANNEX III
PERMANENT MEANS OF ACCESS**

(Amended by Ordinance MTE No. 1,893, of December 9, 2013)

Figure 1: Means of access choice according to the slope – Pitch angle

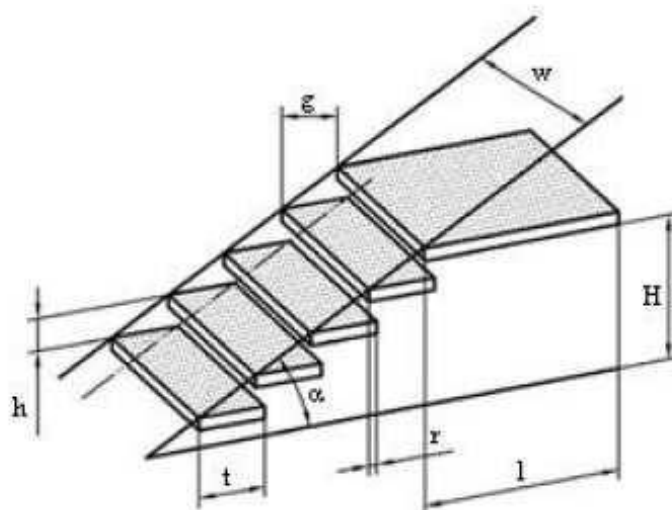


Legend:

- A: ramp
- B: ramp with cross pieces to prevent slipping
- C: stair with riser
- D: stair without riser
- E: ship-type ladder

Source: EN 14122 - Safety of machinery - Permanent means of access to machinery.

Figure 2: Example of stair without riser



Legend:

w: ladder width
 h: height between steps
 r: projection between steps
 g: free depth of the step
 α : ladder inclination - pitch angle
 l: rest platform length
 H: ladder height
 t: total depth of the step

Figure 3: Example of fixed ship-type ladder.

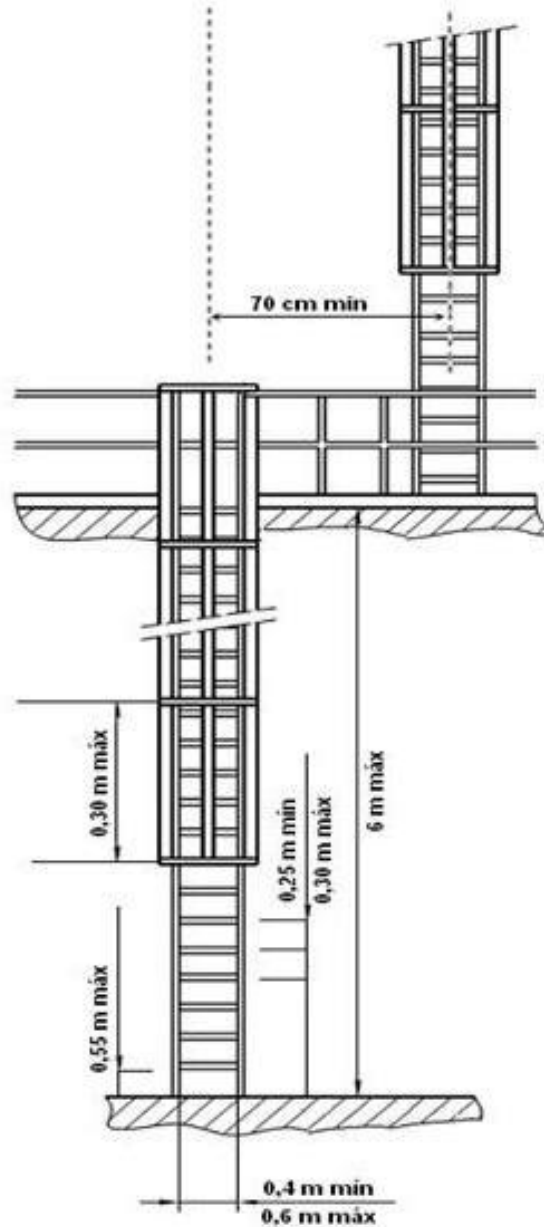


Figure 4A, 4B and 4C: Example detail of the sailor type fixed ladder cage.

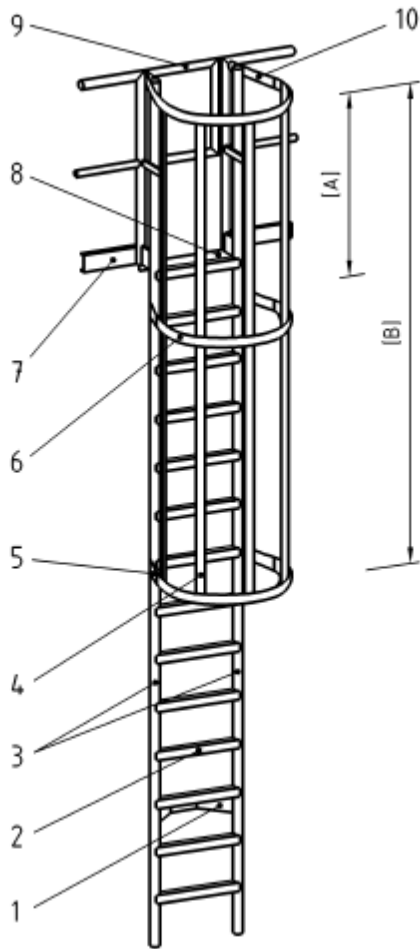


Figura 4A

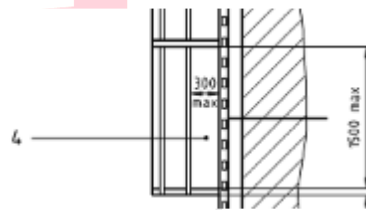


Figura 4B

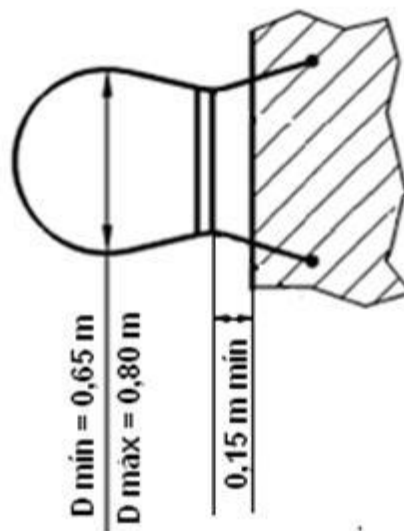
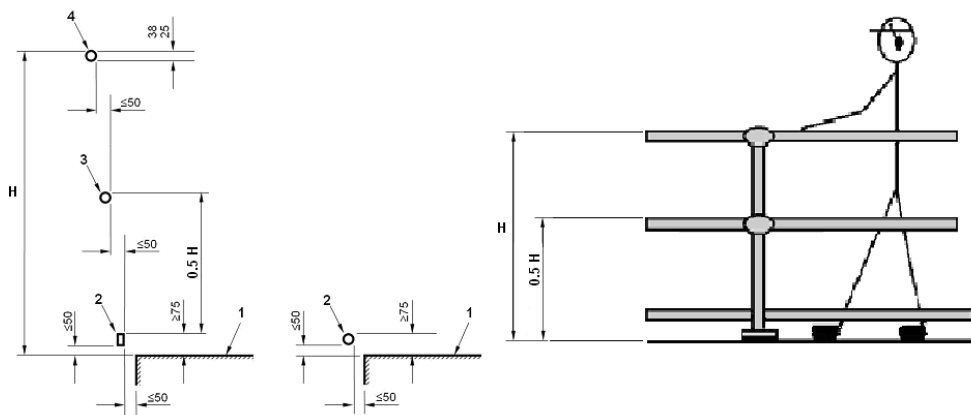
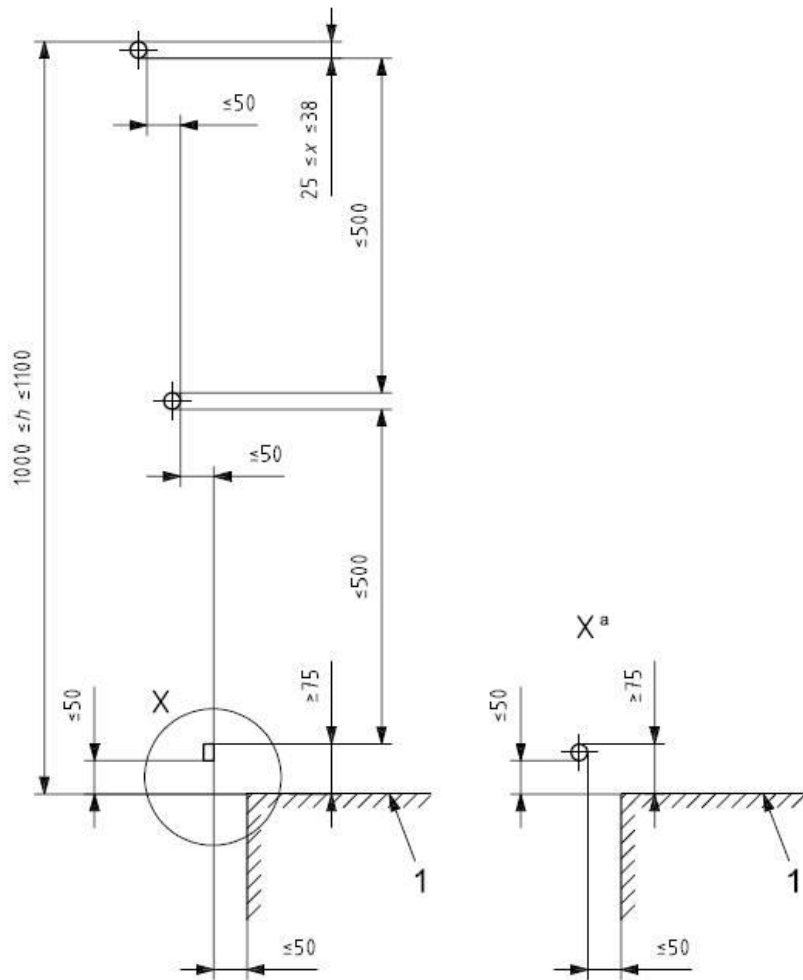


Figura 4C



Legend:

H: top bar height, between 1000 mm (one thousand millimeters) and 1100 mm (one thousand hundred millimeters)

- 1: platform
- 2: skirting board-bar
- 3: intermediate bar
- 4: top bar – handrail

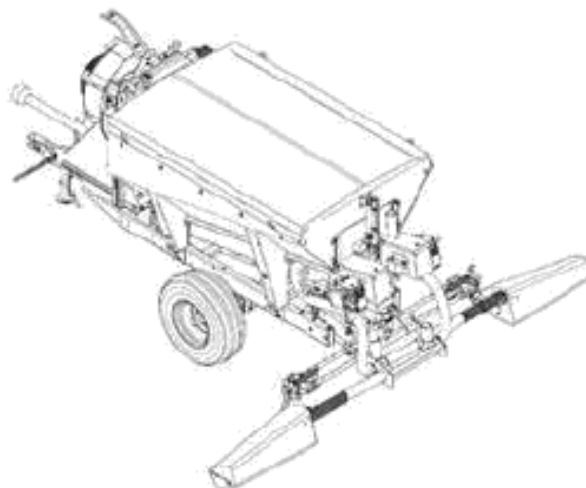
ANNEX IV GLOSSARY

Positive action: when a moveable mechanical component inevitably moves another component with it, by direct contact or by rigid elements, the second component is said as actuated in a positive manner, or positively, by the first one.

Self-propelled fertilizer: machine intended for applying granulated solid fertilizer and developed for the sugar cane sector.



Tractive fertilizer: agricultural implement which, when coupled to a tractor, can perform the operation to apply powder or granulated solid fertilizers.



Meat tenderizers: machine with two or more tractive parallel toothed cylinders that rotates in reverse direction, where are passed pre-cut steak parts. It is composed by: structure, feeding neck, tractive toothed cylinders and discharge area. The softening operation comprises the introduction of the steak through the neck, passing it through the toothed cylinders, being collected from the discharge area.

Kneader: machine designed for industrial or commercial use to obtain a homogeneous mixture for pasta. Basic Composition: structure, actuation, mixer, bowl and protections. For its operation, the actuation system transmits power to the mixer that performs rotational movement without translation movement, making it to rotate and mix the ingredients for pasta production. The actuation system can transmit power to the mixer and to the bowl, simultaneously, keeping both in rotational movement. In some cases, the bowl rotates by the mechanical action of the mixer over the pasta. Both the mixer and bowl can have constant or variable rotational speed.

Risk Analysis: Combination of machine limit specification, hazard identification and risk estimation. (NBR 12.100) *(Inserted by Ordinance MTb No. 98 of 08 and February 2018)*

Pitch angle: angle formed between the means of access inclination and the horizontal plane.

Risk Assessment: Complete process comprising risk analysis and risk assessment. (NBR 12.100) *(Inserted by Ordinance MTb No. 98 of 08 and February 2018)*

AOPD (Active Optoelectronic Protective Device): device used to detect the interruption of the optical emission by an opaque object present at specified detection zone, as light curtain, laser presence detectors of multiple beams, laser area monitor, and safety photocells for access control. Its function is performed by sensors and optoelectronic receivers.

Multizone AOPD: Active optoelectronic presence detection device for use in hydraulic bending, consisting of a set of sender / receiver beams aligned on more than one column or line (or image monitoring system) installed to monitor the movement of the mobile tool (punch) of the machine, providing a monitoring zone of the area where the direct bonding occurs between the tooling and the plate to be bent. Its correct application is determined by the harmonized standard EN 12622 - Safety of machine tools - Hydraulic press brakes, whose main requirements are transposed in items 4.1.2.1.1 and its sub-items, 4.1.2.4 and 4.1.2.5 of Annex VIII - Presses and Similar - of this Standard. *(Inserted by Ordinance MTb No. 873, of July 6, 2017)*

Trainer seat: seat of self-propelled machinery designed for instructional purposes only.

Self-test: functional test performed automatically by the device itself, at system startup and during certain periods, for verification of faults and defects, leading the device to a safe condition.

Risk Assessment: Judgment based on the risk analysis of how far the risk reduction objectives have been met. (NBR 12.100) *(Inserted by Ordinance MTb No. 98 of 08 and February 2018)*

Low speed or reduced speed: speed less than the operation speed, consistent with the safe work.

Rocker of moveable manual arm: machine intended for leather cutting and similar materials, operated by a worker, having a non-moveable cut surface corresponding to the total useful area available and one arm containing the moveable impact surface i.e., press base, which is capable of moving in a horizontal arc movement on the cutting surface.

Rocker of manual bridge type - Rocker bridge: machine intended for leather cutting and similar materials, operated by a worker, in which the impact surface is connected or secured to the bridge that moves horizontally and vertically on a non-moveable cutting surface.

Trick: act of simply cancel the normal and safe operation of machine devices or systems, using for actuation any available objects, such as, screws, needles, pieces in metal plate, objects for daily use, such as, keys and coins or tools necessary for normal usage of the machine.

Category: Classification of safety-related parts of a control system with respect to their resistance to defects and their subsequent defect behavior, which is achieved by combining and interconnecting the parts and / or by their reliability. The safety-related performance of a safety-related part of a control system is divided into five categories (B, 1, 2, 3 and 4) according to ABNT NBR 14153 - Machine Safety - Parts Safety related control systems - General design principles, equivalent to EN 954-1 - Safety of machinery - Safety related parts of control systems, which takes into account qualitative principles for their selection. The European standard EN 954 has been replaced by the international standard ISO 13849 after a period of adaptation and coexistence, and ABNT is working to publish the version of the standard ABNT ISO 13849 parts 1 and 2. ISO 13849-1 provides requirements for The design and integration of safety-related components of control systems, including some aspects of software, is expressed by performance level (PL) which is rated from “a” to “e”. The category concept is retained, but there are additional requirements to be met before a level of performance can be claimed by a system or component, and the reliability of the data that will be employed in a quantitative security system analysis is critical. Imported machines and components that already use the PL concept should not be considered, for this reason alone, in disagreement with NR-12, as there is a correlation, although not linear, between the PL concepts and category (see Technical Note No. 48/2016). *(Amended by Ordinance MTb No. 98, of February 8, 2018)*

Category B: Mainly characterized by component selection. The occurrence of a defect may lead to the loss of the safety function 33 (Inserted by Ordinance MTb No. 98 of February 8, 2018)

Category 1: The occurrence of a defect may lead to the loss of the safety function, but the probability of occurrence is lower than for category B. *(Inserted by Ordinance MTb No. 98 of February 8, 2018)*

Category 2: The safety function is checked at intervals by the system: *(Inserted by Ordinance MTb No. 98 of February 8, 2018)*

- a) the occurrence of a defect may lead to loss of safety function between checks; and
- b) the loss of the safety function is detected by the verification.

Category 3: When system behavior allows:

- a) when the isolated defect occurs, the safety function is always fulfilled;
- b) some, but not all, defects are detected; and
- c) the accumulation of undetected defects leads to loss of safety function.

Category 4: When safety-related parts of control systems shall be designed in such a way that:

- a) an isolated failure in any of these safety-related parts does not lead to the loss of safety functions, and
- b) The isolated fault is detected before or during the next actuation of the safety function, such as immediately when the command is switched on, at the end of the machine operating cycle. If such detection is not possible, the accumulation of defects should not lead to the loss of safety functions.

Safety switch: component associated with the protection used to stop the danger movement and keep the machine stopped while the protection or door is open, with physical-mechanical contact, such as, electromechanical, or without contact, such as optical and magnetic. It shall have positive break, dual channel, normally closed contacts and be monitored by safety interface. The safety switch shall not allow its manipulation - trick by simple means, such as screwdrivers, nails, tapes, etc.

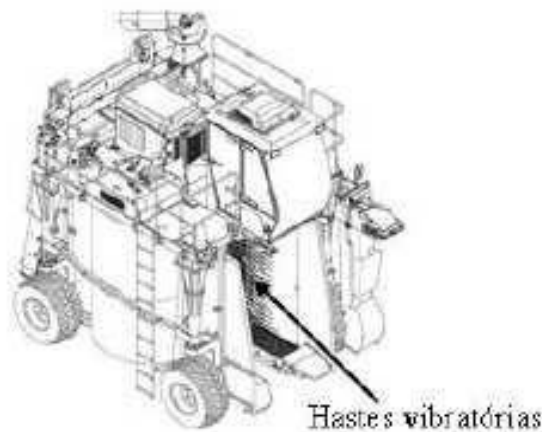
Electromechanical safety switch: component associated with a protection used to stop the danger movement and keep the machine shutdown while the protection or door is open. Its operation is through physical contact between the switch body and the actuator - key or by contact between their key elements

into a single body, as the limit of safety. It is subject to mechanical wear and shall be used in a redundant manner, when the risk analysis requires, in order to prevent a mechanical failure, such as, the actuator breakage inside the switch, leads to the loss of the safety condition. It shall also be monitored by safety interface for electrical fault-detection and shall not allow its manipulation - trick by simple means, such as, screwdrivers, nails, tapes, etc. It shall be installed using the principle of action and positive break in order to ensure the stop of the electrical control circuit, while maintaining their contacts normally closed - NF - connected rigidly, when the protection is opened.

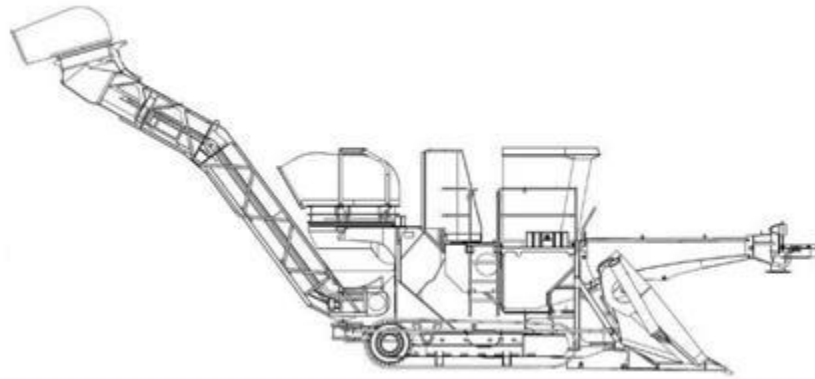
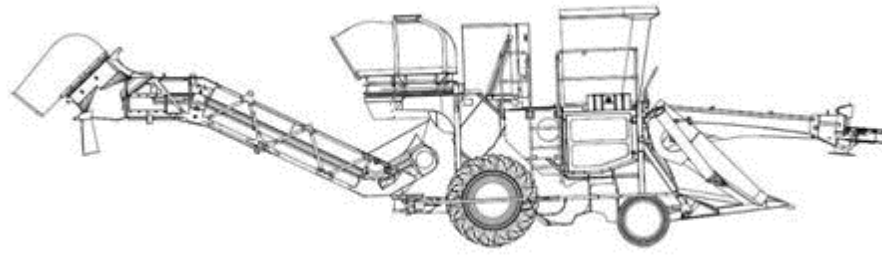
Cotton harvester: the cotton harvester has a rotating spindle system that remove the cotton fiber without damaging the vegetative part of the plant, i.e., stems and leaves. Certain models are characterized by the separation of fiber and seed, concurrent with the harvesting operation.



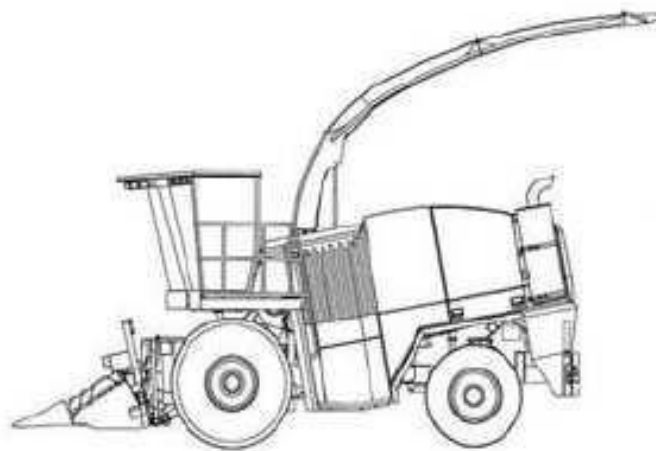
Coffee harvester: self-propelled agricultural equipment that performs the "detachment" and the coffee harvesting.



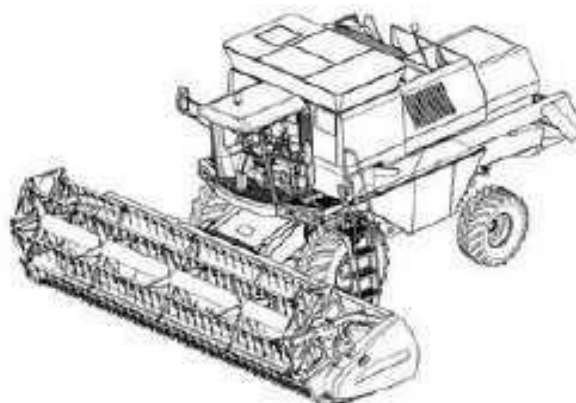
Sugar cane harvester: Equipment that allows the harvesting of sugar cane in a uniform manner, by having a cutting base system able to cut the sugar cane following the soil profile. It has an elevator system that moves the cut cane to the transfer unit.



Forage harvester or self-propelled forager: self-propelled agricultural equipment suitable for the crop and forage of corn, sorghum, sunflower and others. It performs the cut of plant, being able to harvest or collect, triturate and collect the cut tillage in separate containers or vehicles for transfer.



Grain harvester: machine designed to harvest grains, such as, wheat, soybeans, corn, rice, bean, etc. The product is collected by means of a cutting platform and conducting to the threshing and separation area, where the grain is separated from the straw, which is expelled, while the grain is transported to the grain tank.



Orange harvester: self-propelled agricultural machine that makes the harvest of orange and other similar citrus.



Safety Configurable Controller - CCS: computerized electronic equipment - hardware, which uses configurable memory to store and run internally interlocking of specific functions of program - software, such as, sequencing, timing, counting and safety blocks by controlling and monitoring through safety inputs and outputs, several types of machines or processes. It shall have three basic operation principles: redundancy, diversity and self-test. The installed software shall ensure its effectiveness so as to reduce the possibility of errors from human failure in design, in order to avoid compromising any function related to safety as well as not allow changing the specific safety function blocks.

Logic Programmable Controller – Safety CLP: computerized electronic equipment - hardware, which uses programmable memory to store and run internally specific instructions and functions of program - software, such as, logic, sequencing, timing, counting, arithmetic and safety block by controlling and monitoring through safety inputs and outputs, several types of machines or processes. The safety CLP shall have three basic operation principles: redundancy, diversity and self-test. The installed software shall ensure its effectiveness so as to reduce the possibility of errors from human failure in design, in order to avoid compromising any function related to safety as well as not allow changing the specific safety function blocks.

Bimanual control device: device that requires, at least, the simultaneous action by the use of both hands, aiming to initiate and maintain, while there is a dangerous condition, any machine operation, providing a measure of protection to the person which it operates only.

Control device of continued action: manual controlled device that initiates and maintains operation in parts of the machinery or equipment while is actuated only.

Control device by limited movement step by step: control device whose actuation allows only a limited displacement of a machine or equipment element, so reducing the risk as much as possible, excluding any further movement until the command is disabled and actuated again.

Interlocking Device: Device associated with a twisting used to interrupt hazardous movement or other hazards arising from the operation of the machine while the guard or door is or is opened, actuated by mechanical or physical contact, such as electromechanical safety switches, or without mechanical or physical contact, such as magnetic, electronic and optoelectronic safety switches, and inductive safety sensors. They should not allow swindling by simple means such as screwdrivers, nails, wires, ribbons, ordinary magnets etc. (*Amended by Ordinance MTb No. 98, of February 8, 2018*)

Mechanical restraint device: device that has the function to insert in a mechanism a mechanical obstacle, as a wedge, seam, spindle, chock, pad, etc., capable of opposing for its own resistance to any dangerous movement, for example, falling of a sliding situation in the event of failure of normal restraint system.

Inhibitor or baffle device: physical obstacle that without completely prevent access to a danger zone, reduce its probability, restricting the access possibilities.

Limiting device: device which prevents a machine or part of a machine exceeds a given limit, for example, space limit, pressure limit, etc.

Safety distance: distance that protects persons from reach of danger zones, under specific conditions for different access situations. When used protections, i.e. physical barriers that restrict access to the body or part thereof, shall be noted the minimum distances listed in section A of Annex I of this Standard, which shows the main charts and tables of ABNT NBR NM-ISO 13852 - Safety of Machinery - Safety distances to prevent danger zones being reached by the upper limbs. The safety distances to prevent access of the lower limbs are determined by ABNT NBR NM-ISO 13853 and shall be used only when there is a risk for the lower limbs only, because when there is a risk for the upper and lower limbs, the safety distances provided in the standard for upper limbs shall be met. The ABNT NBR NM-ISO 13852 and ABNT NBR NM-ISO 13853 were joined into a single standard, EN ISO 13857:2008 - Safety of Machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs, without translation in Brazil yet.

Starting device: combination of all maneuvering devices required to start and stop a motor. *(Amended by Ordinance MTb n.º 1.083, on December 18th, 2018)*

Diversity: application of components, devices or systems with different principles or types, thus reducing the probability of a dangerous condition.

Mechanical coupling by key or similar: type of coupling which, once in operation or activated, can not be uncoupled until the hammer has performed a complete cycle. The concept also includes certain types of coupling that can only be uncoupled in certain positions of the operating cycle. Presses with this type of coupling are extremely dangerous, and its manufacture is prohibited.

Tractive equipment: equipment that develops the activity for which it was designed, by the displacement through the propulsion system on another machine conducting it.

Stairs with riser: permanent means of access with a pitch angle of 20° (twenty degrees) to 45° (forty-five degrees), whose horizontal elements are steps with riser.

Stairs without riser: means of access with a pitch angle of 45° (forty-five degrees) to 75° (seventy-five degrees), whose horizontal elements are steps without riser.

Ship-type ladder: permanent means of access with a pitch angle of 75° (seventy-five degrees) to 90° (ninety degrees), whose horizontal elements are bars or crossbar.

Slippage: crankshaft, eccentric movement, beyond a defined stop point.

Hydraulic excavator in forestry application: excavator designed to perform construction work, which can be used in forestry application by installing of special devices that allow cutting, delimiting, processing or loading logs.



Confined space: any area or environment not designed for continuous human occupancy, which has limited means of entrance and exit, with insufficient ventilation to remove contaminants or where there might be deficiency or enrichment of oxygen.

Specification and technical limitation: for the purposes of this Standard are detailed information in the machine or manual, such as: capacity, rotational speed, maximum dimensions of tools, mass of disassembly parts, adjustment data, need to use EPI, inspections and maintenance frequency, etc.

ESPS (Electro-Sensitive Protective Systems): system composed of devices or components operating together, with the purpose of sensing and protection of human presence, comprising at least: sensing device, monitoring or control device and switching device of the output signal.

Cognitive requirement: requirement linked to mental processes such as perception, attention, memory, reasoning, mental agility, language and interpretation. It involves the need to absorb information, of memorization through sensitive capture, i.e., vision, hearing, tactile sense, etc. to interpret, understand, evaluate, discriminate and then react, take a decision or perform an action on interaction between the humans and other system or machine elements.

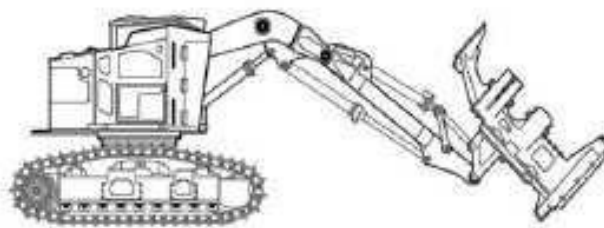
Worker fatigue: manifestation, mental or physical, local or general, not pathological, of an excessive work stress, completely reversible by rest.

Fail safe: the failsafe principle requires that a system enters in a safe state, when a failure occurs of a component relevant to safety. The main pre-condition for the application of this principle is the existence of a safe state in which the system can be designed to enter in this state when failures occur. The typical example is the train protection system (safe state = stopped train). A system may not have a safe state, for example, an airplane. In this case, shall be used the principle of safe life, which requires the redundancy application and of high reliability components to be sure that the system always work.

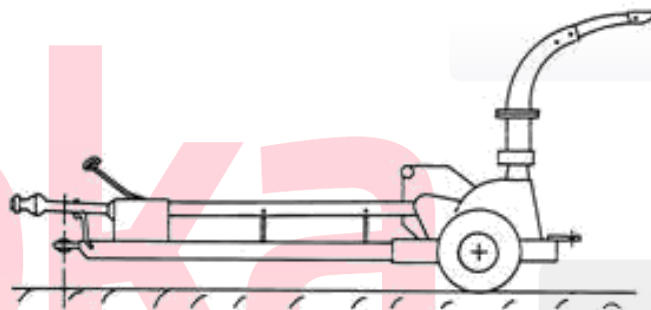
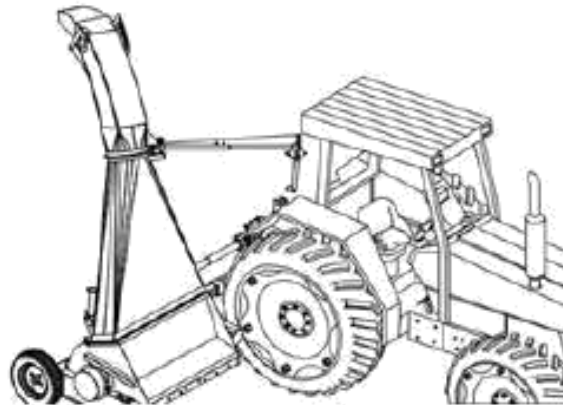
Utilization phase: phase that includes all stages of construction, transport, assembly, installation, adjustment, operation, cleaning, maintenance, inspection, deactivation and dismantling.

Cold cuts slicer: machine with tractive blade in disc format used for slicing cold cuts. The most common type has a rotating blade in disc-shaped with adjustable protection to cover it, as disc edge and cold cuts-holder carriage. The slicing operation is performed by back and forth movement of the cold cuts-holder carriage, which leads the material to be processed on the rotating blade. This type of machine offers accident risk to workers during the operation, manual adjustment of protection to expose the blade for cutting, cleaning and sharpening operation. More modern machines have rotating blades in disc-shaped with back and forth movement on a horizontal table without access to workers to the blade movement area. The cutting zone is accessed through a vertical cold cuts-holder chute, which works as feeder, and interlocked moveable protection, which prevents the access to the blade. The discharge of the processed material occurs by conveyor belt or tray.

Feller buncher: skidder tractor to logging for whole feeling tress through the use of cutting implements with disc or circular saw and claws to secure and bundling several logs simultaneously.



Tractive forage: agricultural implement which, when coupled to a tractor, can perform the operation of harvesting or gathering and tritulating of fodder plant, being the material tritulated as forage, stored in separate containers or vehicles for transfer.



Degree of protection – IP: numerical representation with two-digit that identifies the characteristics of the envelope for the penetration of solid or liquid objects, as described below.

1st (first) digit - determines the degree of protection of the equipment, for the solid objects:

0 - unprotected;

1 - Protected against solid objects with diameter larger than 50 mm (fifty millimeters);

2 - Protected against solid objects with diameter larger than 12 mm (twelve millimeters);

3 - Protected against solid objects with diameter larger than 2.5 mm (two millimeters and half);

4 - protected against solid objects with diameter larger than 1 mm (one millimeter);

5 - protected against dust;

6 - totally protected against dust;

2nd (second) digit - determines the degree of protection of the equipment, for the water inlet:

0 - unprotected;

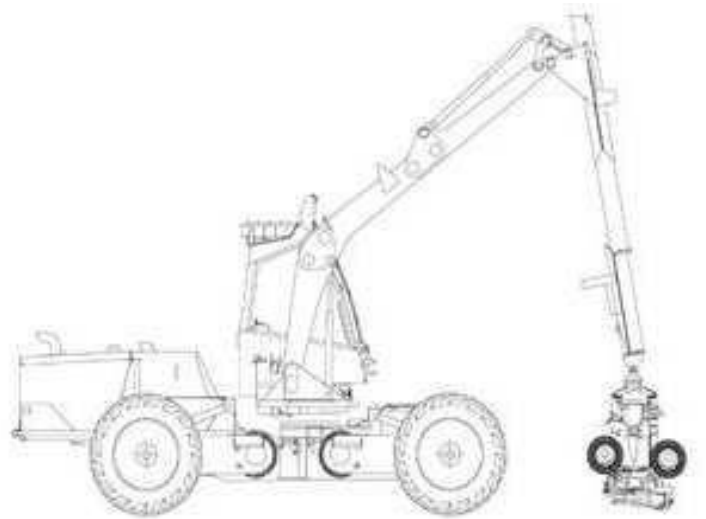
1 - protected against vertical falling of water drops;

2 - protected against vertical falling of water drops to a maximum tilt of 15° (fifteen degrees);

3 - protected against water sprayed at an angle of $\pm 69^\circ$ (plus or minus sixty-nine degrees);

- 4 - protected against water splashing;
- 5 - protected against water jets;
- 6 - protected against sea waves or powerful jets;
- 7 - protected against immersion;
- 8 - protected against submersion.

Harvester: skidder tractor to cut logs for felling trees, using a processing head that cut logs at a time, and that has the capacity to process the branches cleaning and subsequent cut into logs of standardized size.



Agricultural and forestry implement: device without drive power that is connected to a machine and that, when pulled, dragged or operated, allows the execution of specific operations aimed for agriculture, livestock and forestry, such as soil preparation, cultivation, planting, harvesting, trenching for irrigation and drainage, transportation, distribution of feed or fertilizer, pruning and felling trees, etc.

Indelible information or symbol: that applied directly on the machine, which shall be kept in a legible and integral manner during all time to use the machine.

Safety interface: device responsible to perform monitoring, verifying the connection, location and operation of other devices in the system, preventing the occurrence of a failure that causes the loss of safety function, such as safety relays, configurable safety controllers and safety CLP.

Interlocking with blockage: protection associated with an interlocking device with locking device, such that:

- the hazardous functions covered by the protection cannot operate while the machine is not closed and locked;
- the protection remains locked in the closed position until the risk of accidents has gone due to hazardous machinery functions; and
- when the protection is locked in the closed position, the hazardous machinery functions can operate, but the protection closure and blockage by themselves do not initiate the operation of these functions.

Generally is presented in the form of electromechanical safety switch of two parts: body and actuator - latch.

Rolling machine: machine designed for professional use in the food industry. It is intended to roll the pasta by passing in a back and forth movement between tractive rotating rollers with height adjustment. It can have interchangeable cut rotating rolls, offering the option to press and cut the pasta.

Rear position lamp: device designed to emit a light signal to indicate the presence of a machine.

Burns threshold: surface temperature that defines the boundary between the absence of burns and a burn of partial superficial thickness caused by skin contact with a heated surface for a specific period of contact.

Handle or handgrip: auxiliary device, incorporated to the machine structure or affixed on it, which is intended to allow access.

Self-propelled agricultural and forestry machinery: machine designed for agricultural and forestry activities that travels on land environment with its own propulsion system.

Self-propelled machinery: for the purposes of this standard, a machine that moves on land environment with its own propulsion system.

Construction machinery in agroforestry application: machine originally designed to carry out work related to construction and earth movement and that receives specific devices to perform work related to agroforestry activities.

Machinery and equipment: for the purposes of applying this Standard, this includes machinery and equipment for non-domestic use and moved by non-human force only.

Stationary machinery: machine that remains fixed in a workstation, i.e., transportable for use in workbench or in another stable surface where it can be fixed.

Manual machinery or equipment: hand-held machine or equipment.

Designed machinery or implement: every device or equipment designed, built, sized and constructed by a qualified professional, for the proper and safe use.

Meat grinder - Mincer: machine that uses worm to grind meat. It is composed by neck installed in tray for meat passage and worm into the duct conducting it towards the cutting blade and then to the perforated nozzle - discharge zone.

Monitoring: intrinsic function of the component design or carried out by safety interface that provides the functionality of a safety system when a component or device has its function reduced or limited, or when there is a hazard situation due to changes in process conditions.

Power cultivators or microtractor: self-propelled two-wheeled equipment used to pull several implements, from soil preparation to harvesting. It is characterized by the fact the operator to walk behind the equipment during the work.



Pole chain saw: machine similar to chainsaw, equipped with extender cable for longer reach in pruning operations.

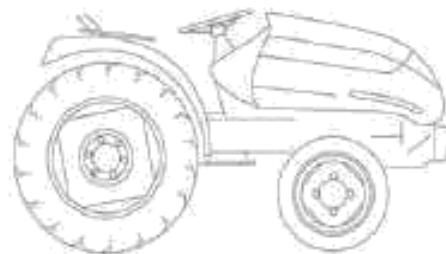
Chainsaw: powered saw with manual grip mainly used for cutting and pruning of trees compulsorily equipped with:

- a) manual or automatic brake of chain, which consists of a safety device that stops the rotation of the chain, triggered by the left hand of the operator;
- b) catch-chain pin, which consists of a safety device that reduces the chain course in the event of breakage, preventing it from striking the operator;
- c) right hand protector, which consists of rear protection to prevent the chain from reaching the hand of the operator in case of breakage;
- d) left hand protector, which consists of front protection to prevent the operator's hand involuntarily reach the chain during the cutting operation; and
- e) throttle safety lock, which consists of device that prevents unintended acceleration.

Muting: automatic and temporary deactivation of a safety function through safety components or control circuits responsible for safety during normal operation of the machine.

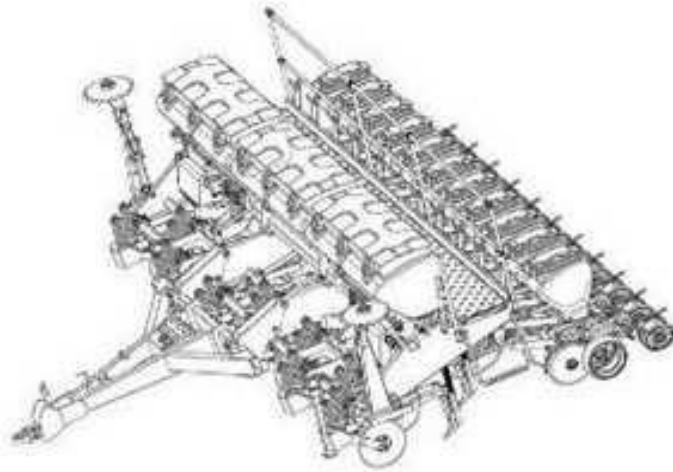
Optional: device or system not provided in this Standard, such as auxiliary headlamps.

Another type of microtractor and self-propelled lawnmower: small machine intended for general services and maintenance of residential or commercial gardens. Its total gross weight without attachments does not exceed 600 kg (six hundred kilograms).



Work permission - Work order: written document, specific and auditable, than has, at least, the service description, date, location, name and role of workers and responsible persons by the service and by its issue and the work and safety procedures.

Tractive planter: agricultural implement which, when coupled to a tractor, can perform the operation of planting crops, such as seeds, seedlings, tubers or other.



Platform or external stairs for self-propelled agricultural, forestry and construction machinery in agroforestry applications: support device not fixed permanently on the machine.

Operator station: machine or equipment place where the worker operates the machine.

Workstation: any machinery and equipment place where is required the intervention of the worker.

Eccentric servo-powered mechanical press: machine that uses torque motor or servomotor mechanically connected to the drive shaft of the machine. The servoactuation shall be interlocked with the safety system. This type of actuation shall have a restraint of the hammer, which can be incorporated in the motor itself. The redundant braking system shall be sized so that it can block the movement of the hammer at any angle of the eccentric, in case of emergency or in case of intervention for maintenance. The system shall be interlocked to the safety electrical control system and designed to meet the level of category 4 (four) of protection.

Qualified professional for the technical training supervision: professional certifying completion of specific courses in the area of operation, compatible with the course being taught, with registration in the relevant class council, if necessary.

Legally qualified professional: employee previously qualified and with registration on the competent class council, if necessary.

Technically trained professional or worker: who has received technical training under the guidance and responsibility of a qualified professional.

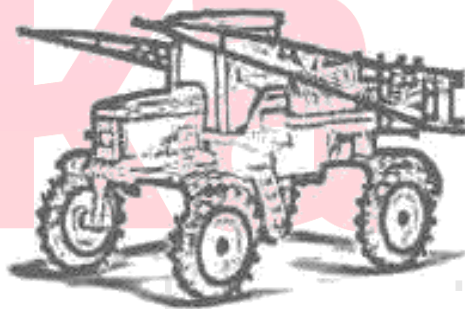
Qualified professional or worker: who that proves completion of specific course to his area and recognized by the official educational system.

Distant fixed protection: protection that do not completely covers the danger zone, but which prevents or reduces access due to its size and its distance from the danger zone, for example, perimeter grid or protection tunnel.

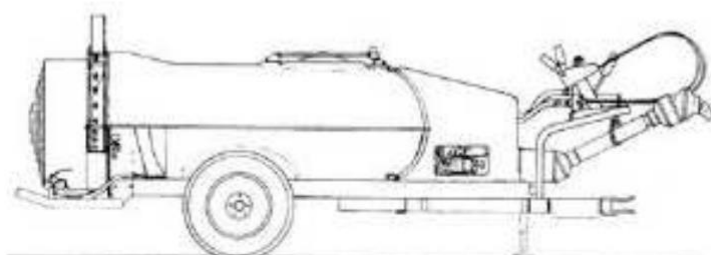
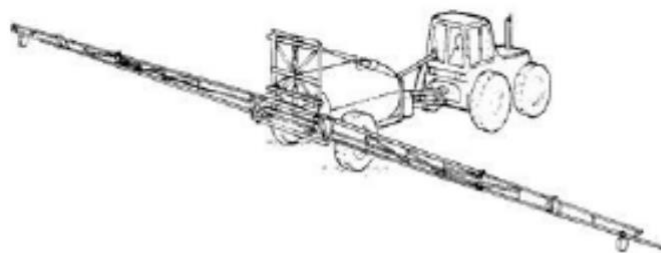
Psychophysiological: characteristic that encompasses what constitutes the distinctive character, particular of a person, including their sensory, motor, psychological and cognitive capabilities, emphasizing, among

others, issues related to reflexes, posture, balance, motor coordination and the execution mechanisms of movements which vary within and between individuals. It includes, at least, anthropological, psychological, physiological knowledge relative to human. It also covers issues such as levels of vigilance, sleep, motivation and emotion, memory and learning.

Self-propelled sprayers: instrument or machine used in agriculture in the fight against crop pests, weeds and insects. Its greater function is to allow the control of the dosage in the application of pesticides or fertilizers on certain areas.



Tractive sprayer: agricultural implement which, when coupled to a tractor, can perform the operation to apply pesticides.



Superficial partial thickness burn: burn in which the epidermis is completely destroyed, but the hair follicles and sebaceous glands and sweat glands, are spared.

Ramp: permanent means of access, continuous and tilted, in a pitch angle of 0° (zero degrees) to 20° (twenty degrees).

Redundancy: application of more than one component, device or system, to ensure that, if there is a failure in one of them in the execution of its function, the other will be available to perform this function.

Safety relay: component with redundancy and dedicated electronic circuit to actuate and supervise specific safety functions, such as safety switches, sensors, emergency stop circuits, ESPEs, valves and contactors, ensuring that in case of failure or defect or its wiring, the machine stop the operation and do not allow the startup of a new cycle until the defect is fixed. It shall have three basic operating principles: redundancy, diversity and self-test.

Positive break – Positive opening operation of a contact element: effective separation of contact as a direct result of a specific movement of the actuator of switch key through no resilient parts, i.e., not dependent on the springs action.

Selector - Selector switch, validation device: selector switch or command mode selector with access restricted or password so that:

- a) can be locked in each position, preventing the change of position by unauthorized workers;
- b) each position corresponds to a single command or mode of operation;
- c) the control mode selected has priority over all other systems of control, with the exception of emergency stop; and
- d) makes the selection visible, clear and easily identifiable.

Band saw for cutting meat at retail: machinery used in butcher for cutting meat, especially with bone, consisting of two pulleys that guide the serrated band, and the movement of the lower pulley is pulled. It is operated by a single worker located in front of the machine, leaving the sides and rear free. There is a constant exposure to the operator in the cutting area to handle the piece of meat to be cut.

Symbol - Pictogram: standardized schematic drawing, intended to represent some single indications.

Falling protection system: structure fixed to the machine or equipment, designed to prevent the fall of persons, objects or materials.

Mechanical braking system: mechanical system used to safely stop the movement of risk, ensuring a return to the braked position when there is an interruption of power supply.

Bead: most rigid part - reinforced of the tire that comes in contact with the rim, ensuring their fixation.

Work stress - Work strain: internal response of the worker to be exposed to pressure in work, dependent on their individual characteristics, for example, size, age, ability, skill, dexterity, etc.

Superimposed tractor: agricultural tractor which, due to the limited size, the operating platform consists of a small floor at the sides for the support feet and operation only.

Agricultural tractor: self-propelled medium to large machinery, designed to pull or drag agricultural implements. It has a wide range of applications in agriculture and livestock, and it is characterized by having at least two axes for tires or tracks and weight, without ballast or implements, greater than 600 kg (six hundred kilograms) and minimum tread between the rear tires, with the largest tire specified, more than 1280 mm (one thousand two hundred eighty millimeters).



Narrow agricultural tractor: small tractor intended for the production of fruits, coffee and other applications where the space is restricted and used for small implements. It has minimum tread between the rear tires, with the largest tire specified, less than or equal to 1280 mm (one thousand two hundred eighty millimeters) and total gross weight above 600 kg (six hundred kilograms).



Valve and safety block: component connected to the machine or equipment in order to allow or block, when activated, the passage of liquid or gaseous fluids such as compressed air and hydraulic fluids in order to initiate or cease the functions of the machine or equipment. It shall have monitoring for verification of their interconnection, position and operation, preventing the occurrence of failure causing the loss of safety functions.

Danger zone: Any area inside or around a machine or equipment where a person can be exposed to risk of injury or harmful to health.

Mirror contacts: A normally closed auxiliary contact (NC) that cannot be in the closed position at the same time as one of the main (power or power) contacts on the same contactor. Thus, mirror contacts is a feature that concerns the mechanical connection between the auxiliary contacts and the main contacts of a contactor. *(Inserted by Ordinance MTb No. 98, of 08 and February 2018)*

Mechanically linked contacts: A combination of normally open contacts (NO) and normally closed contacts (NC) designed so that they cannot be simultaneously in the closed (or open) position. Applies to auxiliary contacts of control devices where the actuation force is internally provided, such as contactors. *(Inserted by Ordinance MTb No. 98, of 08 and February 2018)*

Controls: Devices that make up the human-machine operator interface, including start, start, and stop devices, such as buttons, pedals, levers, joysticks, touchscreens, and more. visible. Controls generate command signals from the machine or equipment. *(Inserted by Ordinance MTb No. 98, of 08 and February 2018)*

Devices responsible for the prevention of unexpected starting or safety-related stopping function: These are devices designed to establish or interrupt current in one or more electrical circuits, for example: contactors, remotely controlled disconnecting devices via undervoltage release; drives and frequency converters, softstarters and other starters. *(Inserted by Ordinance MTb No. 1,083, of December 28, 2018)*

Interlock protection with start command: Special form of interlocking rotation which, once closed, generates a command to initiate hazardous machine functions without the need for additional command. The limitations and requirements for its application are set forth in ISO 12.100 and other specific “c” standards. *(Inserted by Ordinance MTb No. 1,110, of September 21st, 2016)*

Manual reset: Safety function used to manually restore one or more safety functions before restarting a machine or part of it. *(Inserted by MTPS Ordinance No. 509 of April 29, 2016)*

Servodrive: Electronic control device used to control servomotors, can be connected to PLCs, CNC or computers to perform automated servo controlled systems. Its operation is similar to common frequency inverters, but have precision and positioning control. *(Inserted by Ordinance MTb No. 873, of July 6, 2017)*

Servomotor: Electromechanical device that presents motion proportional to a command generated by a servo drive operating in closed loop checking the current position and going to the desired position. Widely used in CNC machines, robotic equipment and precision demanding conveyor systems. *(Inserted by Ordinance MTb No. 873, of July 6, 2017)*

Type: In the context of Active Opto-electronic Protective Device (AOPD) - active optoelectronic presence detection devices, “type” refers to specific requirements for design, construction and testing as defined by international standard IEC 61496-1. / 2, which establishes optical and fail-safe conditions. AOPDs / light curtains, by type, are classified into type 4 light curtains and type 2 light curtains. Type 2 light curtains have only one microprocessor and use the fault exclusion method to ensure integrity of the safety function; Type 4 light curtains achieve high levels of fault tolerance through redundancy and monitoring. Compared to the optics, type 2 light curtains have a larger effective aperture angle (AAS) or sender / receiver field of view and are therefore more susceptible to short optical circuits. The amendment of the 2013 International Standard IEC61496, harmonized in 2014, which was in line with the concepts provided in the ISO 13849 International Standard, determined that Type 2 light curtains can meet PL “c” maximum and Type 4 light curtains. can meet PL “e”. Safety laser scanners are type 3 active optoelectronic presence detection (AOPD) devices, with a maximum of PL “d”. *(Inserted by Ordinance MTb No. 873, of July 6, 2017)*

Machine and equipment life: is that estimated by the manufacturer as a time limit in accordance with ISO 12.100: 2015. For the purposes of applying the information provided for in item 12.128, item “p”, the expiration of the useful life of machinery and equipment and / or their safety-related components, by itself, does not mean the prohibition of their continued use. Technical resources can be used to determine

continued use of the machine or equipment safely. (*Inserted by MTPS Ordinance No. 509 of April 29, 2016*)

ANNEX V CHAINSAWS

1. Chainsaws shall have the following safety features:

- a) manual or automatic chain brake;
- b) chain pin;
- c) right hand protector;
- d) protector of the left hand; and
- e) throttle safety lock.

1.1 Moto pruning and the like shall comply, as appropriate, with the provisions of item 1 and points of this Annex.

2. Manufacturers and importers of chainsaws and the like shall inform in the catalogs and instruction manuals of all models the noise and vibration levels and the methodology used for the measurement.

3. Chainsaws and similar manufactured and imported shall be marketed with an instruction manual containing information on safety and health at work, in particular:

- a) health and safety hazards during handling;
- b) safety instructions for working with the equipment, as provided for in the ILO's Practical Recommendations;
- c) noise and vibration specifications; and
- d) warnings about misuse.

4. The manufacturers and importers of chainsaws and similar installed in the country should make available, through their dealers, training and educational material for users, according to the syllabus related to the use contained in the instruction manual.

4.1 Employers shall provide all chainsaw operators and the like with training in the safe use of the machine, with a minimum workload of eight hours and according to the syllabus related to the use contained in the instruction manual.

4.2 Machine warranty certificates must have a specific field, to be signed by the consumer, confirming the availability of training or being responsible for training the workers who will use the machine.

5. All chainsaw models and the like must contain indelible and sturdy warning signs in a user-readable location with the following information: Improper use can result in serious injury and health damage.

6. The use of chainsaws and the like for internal combustion in closed or insufficiently ventilated places is prohibited.

ANNEX VI BAKERY AND CONFECTIONERY MACHINES

(Inserted by Ordinance MTE No. 197 of December 17, 2010)

(Wording given by Ordinance MTb No. 1,111, of September 21st, 2016)

1. This Annex lays down specific safety requirements for bakery and confectionery machines, namely kneading machines, mixers, rollers, shaping machines, rolling mills, bread slicers and breadcrumbs.

1.2 Bakery and confectionery machines not specified by this Annex and certified by INMETRO are excluded from the application of this Regulatory Standard as regards the technical construction requirements related to machine safety.

1.2.1 Bakery and confectionery machines not specified or excluded by this Annex and manufactured prior to the existence of an INMETRO conformity assessment program shall comply with the technical safety requirements for the protection of hazardous areas laid down by the assessment program. specific compliance for these machines.

1.3 Modelers, rolling mills, bread slicers and breadcrumbs are exempt from having the operating interface (control circuit) in extra-low voltage.

1.4 Micro and small businesses in the bakery and confectionery sector are exempt from the item 12.6 of the general part of NR-12 which deals with the physical arrangement of the facilities.

1.5 For the purposes of this Annex and the applicable Official Technical Standards, the safety systems described here for each machine are the result of the risk assessment.

1.6 The electrical circuit of the electric motor start and stop command of the machines specified in this annex shall comply with the provisions of item 12.37 and sub-item 12.37.1 of the general part of this Regulatory Standard.

2. Spiral Kneading Machine (See deadlines of Ordinance MTb no. 1,111, of September 21st, 2016)

2.1 For the purposes of this Annex:

a) Class 1 kneader: Kneaders whose bowls have a volume of 13 liters (thirteen liters) or less than 70 liters (seventy liters);

b) class 2 kneaders: kneaders whose bowls have a volume of 70 liters or more (seventy liters);

c) kneaders whose basins have a volume of less than 13l (thirteen liters) and are certified by INMETRO are excluded from the application of this Regulatory Standard;

d) bowl: means a container for receiving ingredients which become dough after mixing by the whisk, and may also be referred to as a pot or pan;

e) bowl volume: maximum bowl volume, usually measured in liters;

f) Bowl hazardous zones: zone of contact between the bowl and the support rollers, if any;

g) whisk: a device designed to, by rotational movement, mix the ingredients and produce the dough, which may have different geometries and may be called, in the case of kneaders, a fork or arm;

h) beater dangerous zone: region in which the movement of the beater poses a risk to the worker, and the risk may be entrapment or crushing.

2.2 Access to the scout zone shall be prevented by means of movable protection interlocked by at least one dual channel safety switch monitored by safety interface classified as Category 3 or higher according to items 12.38 to 12.55 and its sub-items. and Annex I to this Regulatory Standard.

2.3 Dangerous areas between the bowl and the rollers, where fitted, shall be fitted with fixed guards or movable guards interlocked by at least one dual channel safety switch monitored by safety interface classified as category 3 or higher, according to items 12.38 to 12.55 and its sub-items and Annex I of this Regulatory Standard.

2.4 Where the bowl has protruding fasteners which present a risk of accident, it shall be fitted with fixed guard or movable guard interlocked by at least one double-channel safety switch monitored by a safety interface classified as Category 3 or higher; items 12.38 to 12.55 and its subitems and Annex I of this Regulatory Standard.

2.5 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55 and its sub-items of this Regulatory Standard.

2.6 Kneaders shall be designed to cease hazardous movement within a maximum of two seconds when the movable guard is operated with the bowl empty, or the provisions of paragraph 12.44 (b) of this Regulatory Standard shall be complied with.

2.6.1 Depending on the natural wear and tear of operating components, existing and already installed kneaders may cease hazardous movement at a different time, provided it does not exceed 2.5 seconds.

2.7 Kneaders shall be provided with an emergency stop device in accordance with items 12.56 to 12.63 and its sub-items of this Regulatory Standard, meeting:

- a) Class 1 kneaders shall have an emergency stop button;
- b) Class 2 kneaders shall have at least two emergency stop buttons.

2.7.1 Monitoring of the interlocking of the movable guard and emergency stop devices may be carried out by a single safety interface classified at least as Category 3, or emergency stop devices may be connected to cut off the safety interlock. power supply to the safety interface responsible for monitoring mobile protection, without the need for a specific safety interface for monitoring emergency stop devices.

3. Mixers (See terms of Ordinance MTb No. 1,111, of September 21, 2016)

3.1 For the purposes of this Annex:

- a) Class 1 mixer: Mixers whose bowls have a volume greater than five liters and less than or equal to eighteen liters.
- b) Class 2 mixer: Mixers whose bowls have a volume greater than 18 liters (18 l).
- c) Mixers whose basins have a volume of 5 liters or less and are certified by INMETRO are excluded from the application of this Regulatory Standard.
- d) bowl: a container for receiving ingredients which will become dough after mixing by the whisk, and may also bear the following names: pot or pot;
- e) basin volume: maximum basin volume, usually measured in liters;

f) beater: a device designed to, by rotational movement, mix the ingredients and produce the dough; Depending on the work to be done, it may have several geometries, and may also be called hook, fan or palette, globe or wire;

g) beater hazardous zone: region in which the movement of the beater poses a risk to the user, the risk of which may be entrapment or crushing.

3.2 Access to the scout zone shall be prevented by means of movable protection interlocked by at least one dual channel safety switch monitored by safety interface classified as Category 3 or higher according to items 12.38 to 12.55 and its sub-items. and Annex I to this Regulatory Standard.

3.3 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55 and its sub-items of this Regulatory Standard.

3.4 Dangerous movements shall cease within two seconds when the movable guard is operated with the empty bowl, or the provisions of item 12.44, sub-paragraph “b” of this Regulatory Standard shall be complied with.

3.5 Class 2 mixers, as defined in sub-item 3.1 (b) of this annex, shall have a hand-trolley-type or similar device for bowl displacement to reduce the operator's physical effort.

3.6 Class 1 mixer bowls, as defined in sub-item 3.1 (a) of this Annex, which do not have a hand trolley or similar handling device for their displacement, must have a handle or handles.

3.7 Mixers class 1 and 2 shall have an emergency stop button as per items 12.56 to 12.63 and its sub-items of this Regulatory Standard.

3.7.1 Monitoring of the movable guard interlock and the emergency stop device may be performed by a single safety interface classified at least as category 3, or the emergency stop device may be switched to cut power supply to the safety interface responsible for monitoring mobile protection without the need for a specific safety interface for monitoring the emergency stop device.

3.8 Mixers equipped with a fuel-fired heating system shall comply with the provisions of item 12.108 of this Regulatory Standard and the requirements of the official technical standards in force on the date of manufacture of the machine or equipment.

3.9 The maximum surface temperature accessible to workers shall comply with the provisions of item 12.109 of this Regulatory Standard and the requirements of official technical standards in force on the date of manufacture of the machine or equipment.

3.10 The device for vertical movement of the pelvis must be sturdy to withstand the required stresses and should not generate any risk of entrapment or compression of the workers' body segments during their activation and movement of the pelvis.

3.11 Class 2 mixers, as defined in sub-item 3.1 (b) of this Annex, if necessary, shall have a manual or automated vertical movement device for removal from the bowl.

3.11.1 There must be a guarantee that the beater will move only with the bowl in the working position.

3.11.2 Automated vertical movement devices shall have a continuous action command for their activation.

4. Kneading Cylinder

4.1 For the purposes of this Annex, the use roller is considered to be an industrial machine designed for kneading regardless of the capacity, length and diameter of the cylindrical rollers.

4.1.1 The pusher cylinder consists mainly of two parallel pull cylinders that rotate in the reverse direction, low table, rear extension board, motor and pulleys, being used to give mass point by homogenizing fermentation gases and texture.

4.1.2 The concepts and definitions used here take into account the current technology used in the segment, ie manual feeding.

4.2 For rollers with a conveyor belt leading the mass to the roll zone, the definitions and protections required are the same as for bread rollers, it being understood that the dangerous movement of rollers provided for in clause 6.2.1.2 of this annex must cease. within two seconds when the movable guard is activated, or the provisions of item 12.44, item “b” of this Regulatory Standard shall be complied with.

4.2.1 Definitions Applicable to Sovereign Cylinders

- a) low table means a horizontal plank used as a support for the operator to handle the dough;
- b) rear extension board: board inclined to the base. Used to support and route the mass to the cylinders;
- c) upper and lower cylinders: parallel pull cylinders that rotate in the reverse direction and compress the mass, making it uniform and of the desired thickness. Located between the low table and the rear extension board;
- d) safety distance: minimum distance required to make it difficult to access the danger zone;
- e) Hazardous movement: movement of machine parts that may cause personal injury;
- f) obstructive roller: free-moving untraced cylindrical roller positioned over the upper cylinder to prevent operator access to the danger zone;
- g) Inter-cylinder gap closing plate: protection that prevents the operator from accessing the convergence zone between cylinders;
- h) visual indicator: dial with graduated ruler that indicates the distance between the upper and lower cylinders and determines the thickness of the mass;
- i) lateral protection: fixed protection on the sides or in conjunction with the rear extension board;
- j) Cylinder cleaning blades: Blades parallel to the axis of the cylinders and of the same length, kept tensioned to obtain contact with the surface of the cylinders, removing the mass residues;
- k) blade closing plate: fixed protection that prevents access to the gap between the lower cylinder and the lower table, helping to clean the residue of the lower cylinder;
- l) Hazardous zone: region in which the movement of the cylinder poses a risk to the worker, which may be a risk of entrapment or crushing.

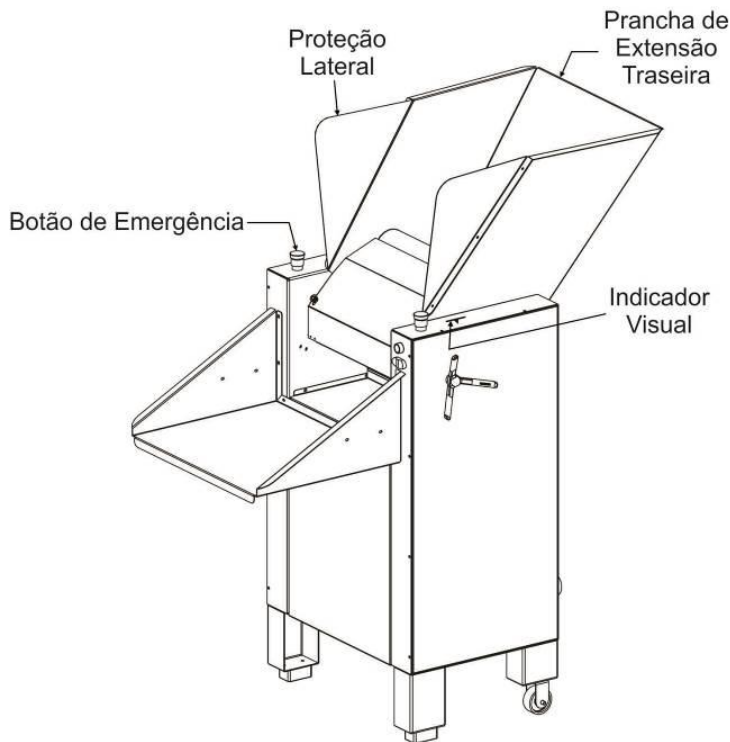
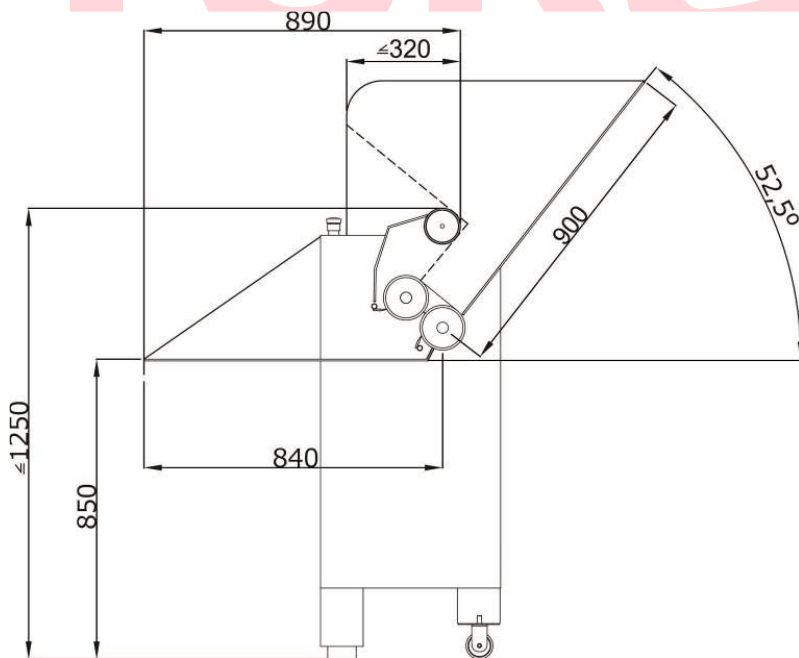


Figure 1: Schematic representation of the kneading cylinder.

4.3 The kneading cylinder shall have minimum safety distances as shown in figure 2.

Tolerance on the linear dimensions of the guards $\pm 25\text{mm}$.

Tolerance on the angular dimensions of the $\pm 2.5^\circ$ protections.



Legend - tolerance dimensions of 25.00 mm (twenty-five measurements)

Figure 2: Schematic drawing with safety distances of the pusher cylinder.

4.4 There shall be a movable interlocked protection - interlock cylinder locking plate - between at least one obstructive roller and the upper drive cylinder by at least one double channel safety switch monitored by the safety interface rated category 3 or higher as 12.38 to 12.55 and its subitems and Annex I of this Regulatory Standard.

4.4.1 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55. and its subitems of this Regulatory Standard.

4.4.2 Access to the area between the obstructive roller and the upper drive cylinder, protected by the inter-cylinder gap closing plate, shall only be allowed when the movement of the upper drive cylinder has ceased completely by means of a braking system which ensures the immediate stop when the interlocked movable protection is opened, or the provisions of item 12.44, item “b” and Annex I of this Regulatory Standard shall be complied with.

4.5 When the connection is three phase, the reversal of the direction of rotation of the pull cylinders must be prevented by a mechanical, electrical or electromechanical safety system that makes it difficult to circumvent.

4.6 Flush cylinders shall have two emergency stop buttons as per items 12.56 to 12.63 and their sub-items of this Regulatory Standard.

4.6.1 Monitoring of the interlocking of the movable guard and emergency stop devices may be performed by a single safety interface classified at least as category 3, or emergency stop devices may be connected to cut off the safety interlock. power supply to the safety interface responsible for monitoring mobile protection, without the need for a specific safety interface for monitoring emergency stop devices.

5. Laminating Cylinder

5.1 For the purposes of this annex, the rolling mill is a non-domestic machine designed for rolling dough, including baking.

5.1.1 INMETRO-certified (Pastry) rolling cylinders are exempt from the requirements set forth in this annex for the pusher roller and must comply with INMETRO regulations.

6. Modelers (See terms of Ordinance MTb No. 1,111, of September 21, 2016)

6.1 For the purposes of this Annex:

- a) shaping conveyor belt: a belt that carries the rolling portion of dough;
- b) winding conveyor belt: a belt which, by pressing the mass portion against the shaping conveyor belt and having different speeds, winds the already flattened mass through the passage in the roller assembly;
- c) elongating conveyor belt: a belt which, by pressing the mass portion against the shaping conveyor belt, elongates or shapes the already rolled mass;
- d) set of rollers: set of cylindrical bodies which, when in operation, have rotational motion about their axis of symmetry, observing that the relative positions of some of them can be changed by changing the distance between their axis of rotation, so altering the thickness of the flat mass by the passage between them, which will then be rolled and lengthened; and
- e) Roller hazardous area: region in which the movement of the rollers presents a risk of entrapment or crushing to the worker.

6.2 Access to the danger zone of the rollers as well as the conveyor belts of the conveyor belts shall be prevented by means of guards other than the entry and exit of the grease at which safety distances must be respected in order to prevent workers' hands and fingers reach the danger zones according to items 12.38 to 12.55 and Annex I of this Regulatory Standard.

6.2.1 Access to the danger zone of the feed rollers via the conveyor belt shall have movable protection interlocked by at least one double channel safety switch monitored by a safety interface as per items 12.38 to 12.55 and sub-items of this Regulatory Standard.

6.2.1.1 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55. and its subitems of this Regulatory Standard.

6.2.1.2 In shaping machines, the dangerous movement of the rollers shall cease within a maximum of two seconds when the movable guard is activated, or the provisions of item 12.44 (b) of this Regulatory Standard shall be complied with.

6.3 Modelers shall have at least one emergency stop button as per items 12.56 to 12.63 and its sub-items of this Regulatory Standard.

6.3.1 Monitoring of the movable guard interlock and the emergency stop device may be carried out by a single safety interface classified at least as category 3, or the emergency stop device may be switched on to cut the power supply to the safety interface responsible for monitoring mobile protection without the need for a specific safety interface for monitoring the emergency stop device.

7. Laminator

7.1 For the purposes of this Annex:

- a) conveyor belt: belt that conveys the portion of dough in the process of forming, having a direction controlled by the operator and extending from the front table, through the area of the rotating rollers responsible for forming the dough , to the back table;
- b) front table: conveyor belt on which the dough is placed at the beginning of the process;
- c) rear table: conveyor belt on which the mass has already been formed on the tensioned rotating rollers;
- d) set of traction rotating rollers: set of cylindrical bodies that, when in operation, present rotational movement about their axis of symmetry, being able to vary their positions, changing the distance between their axes, in order to change the thickness of the mass, as well as as for printing and cutting dough;
- e) Roller hazardous area: region in which the movement of the rollers presents a risk of entrapment or crushing to the worker.

7.2 Access to the danger zone of the rollers as well as to the conveyor belt transmission elements shall be prevented on all sides by means of guards except the entry and exit of the grease, which shall comply with the safety distances of to prevent workers' hands and fingers from reaching danger zones, as per items 12.38 to 12.55 and its sub-items and Annex I of this Regulatory Standard.

7.2.1 Access to the hazardous area of the rollers by the conveyor belt on the front and rear tables shall have movable protection interlocked by at least one dual channel safety switch monitored by safety interface as per items 12.38 to 12.55 and its sub-items of this Regulatory Standard.

7.2.1.1 If electromechanical switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55 and its sub-items of this Regulatory Standard.

7.2.1.2 In rolling mills, dangerous movements shall cease within a maximum of two seconds when the movable guard is activated, or the provisions of item 12.44, item “b” of this Regulatory Standard shall be complied with.

7.3 Rolling mills shall have at least one emergency stop button, as per items 12.56 to 12.63 and its sub-items of this Regulatory Standard.

7.4 The emergency stop device shall be monitored by a specific safety interface or may be performed by one of the safety interfaces used for monitoring the interlocking of movable guards classified as category 3 or higher.

8. Bread Slicer

8.1 For the purposes of this Annex:

- a) cutting device: a set of parallel straight serrated knives which cut by oscillatory motion or one or more parallel continuous saws which cut by movement in one direction only;
- b) unloading region: region located after the cutting device, in which the already sliced products are collected manually or automatically;
- c) loading region: region located before the cutting device, in which the products to be sliced are deposited manually or automatically;
- d) feeding device: device that receives the products to be sliced and guides them to the cutting site, which may have automatic operation, using, for example, conveyor belt, or be a manually operated device;
- e) unloading device: a device that receives the products already sliced and makes them available for the rest of the production process and may have automatic operation, using, for example, a conveyor belt, or be a manually operated device, or just a fixed support that receives the product, which is removed manually.

8.2 Access to the cutting device must be prevented on all sides by means of guards except the entry and exit of breads, which must be within safe distances to prevent workers' hands and fingers from reaching the hazard zones, according to items 12.38 to 12.55 and its sub-items and Annex I of this Regulatory Standard.

8.2.1 When the interlocking movable guard for the entry of bread is used, it shall be provided with at least one double channel safety switch monitored by safety interface according to items 12.38 to 12.55 and its sub-items of this Standard. Regulatory

8.2.1.1 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55. and its subitems of this Regulatory Standard.

8.2.2 In the area of bread unloading, the provisions of items 12.38 to 12.55 and Annex I of this Regulatory Standard shall not apply when the distance between the blades is less than or equal to 12 mm.

8.2.3 When movable guards are used, dangerous movements shall cease within two seconds when the guard is activated, or the provisions of item 12.44, sub-paragraph "b" of this Regulatory Standard shall be complied with.

8.3 The bread slicer does not require an emergency stop button.

9. Breadcrumbs Mill

9.1 For the purposes of this Annex:

- a) grinding device: a set of fins that mechanically reduce toasted bread to breadcrumbs granulation;

b) unloading region: region of the milling device in which breadcrumbs are collected manually or automatically;

c) loading region: region of the grinding device in which toasted bread is deposited manually or automatically.

9.2 Access to the grinding device shall be prevented on all sides by means of fixed or movable interlocked guards to prevent workers' hands and fingers from reaching the danger zones according to items 12.38 to 12.55 and their sub-items and Annex I to this Regulatory Standard.

9.2.1 Access to the grinding device through the loading area may be protected by means of distancing and / or constructional geometry that the workers' hands and fingers are not inserted into the danger zones.

9.2.2 When movable guards are used, they must be interlocked by at least one double-channel safety switch monitored by safety interface, according to items 12.38 to 12.55 and its sub-items of this Regulatory Standard.

9.2.2.1 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55. and its subitems of this Regulatory Standard.

9.3 The nozzle, if movable, shall be interlocked with the base by at least one double-channel safety switch monitored by safety interface as per items 12.38 to 12.55 and its sub-items of this Regulatory Standard, preventing the movement of the fins. with the machine disassembled.

9.3.1 If electromechanical safety switches, ie with mechanical actuator, are used in the interlocking of the movable guards, two must be installed per guard, monitored by a safety interface classified as category 3 or higher, according to items 12.38 to 12.55. and its subitems of this Regulatory Standard.

9.4 The breadcrumb mill does not require an emergency stop button.

ANNEX VII
BUTCHER SHOP AND GROCERY MACHINES
(Wording given by Ordinance MTb No. 1,111, of September 21st, 2016)

1. This Annex sets out specific safety requirements for new, used and imported butcher, grocery, bar and restaurant machines, namely: band saw, steak tenderizer and meat grinder.

1.1 Butchery, grocery, bar and restaurant machines not specified by this Annex and certified by INMETRO are excluded from the application of this Regulatory Standard as regards the technical construction requirements related to machine safety.

1.1.1 Butchery, grocery, bar and restaurant machinery not specified or excluded by this Annex and manufactured before the existence of a conformity assessment program within the framework of INMETRO shall comply with the technical safety requirements for the protection of hazardous zones laid down in conformity assessment program specific to these machines.

1.2 Microenterprises and small butchers, grocers, bars and restaurants are exempt from compliance with item 12.6 of this Regulatory Standard which deals with the physical arrangement of the premises.

1.3 The steak tenderizer and meat grinder are not required to have the extra-low voltage operating interface (control circuit).

1.4 For the purposes of this Annex and the applicable Official Technical Standards, the safety systems described here for each machine are the result of the risk assessment.

1.5 The electric circuit of the starting and stopping command of the electric motor of the machines specified in this annex shall comply with the provisions of item 12.37 and sub-item 12.37.1 of the general part of this Regulatory Standard.

2. Retail meat cutting band saw.

2.1 For the purpose of this annex, a band saw is a machine used for retail meat cutting, mainly with bone.

2.2 The movement of the tape around the pulleys and other dangerous parts shall be protected with fixed guards or interlocking movable guards, according to items 12.38 to 12.55 and its subitems of this Regulatory Standard, except for the operational area necessary for cutting meat, where a sliding adjustable groove, or otherwise, should enclose the perimeter of the serrated tape in the cutting region, releasing only the minimum area of serrated tape for operation.

2.3 A vertical pivoting arm should be adopted, with pivoting movement relative to the saw, which serves to guide and push the meat and prevent hand access to the cutting area.

2.3.1 The articulated arm shall be securely fastened to the machine frame and shall not have a safety-compromising lateral clearance and be rigid so as not to allow deformation or flexion.

2.4 The fixed table shall have an adjustable guide parallel to the band saw used to limit the thickness of the meat cut.

2.5 Cutting tables on machines manufactured from 6/24/2011 shall have a movable part to facilitate the movement of the meat, except for saws with a cutting height not exceeding 250 mm.

2.5.1 The mobile table shall have a travel limiting device so that the hand guard does not touch the tape.

2.5.2 The movable table shall have a guide that allows the meat to be supported on the table and its cutting motion.

2.6 The movable table and the pivoting arm - pusher - shall have handles - wrists - with hand protectors.

2.7 A hand-held device shall be used to push the meat laterally against the adjustable guide and perpendicular to the band saw for cutting small pieces or for finishing meat cutting.

2.8 The band saw shall have at least one emergency stop button as per items 12.56 to 12.63 and its sub-items of this Regulatory Standard.

2.9 Hazardous movements shall cease within two seconds at the most when movable protection is triggered, or the provisions of paragraph 12.44 (b) of this Regulatory Standard shall be complied with.

2.10 The emergency stop device shall be monitored by a specific safety interface or may be performed by one of the safety interfaces used for monitoring the interlocking of movable guards classified as category 3 or higher.

3. Steak tenderizer (See deadlines of Ordinance MTb No. 1,111, of 21 September 2016)

3.1 For the purposes of this Annex, a steak tenderizer is a machine with two or more parallel pull toothed cylinders which rotate in the reverse direction through which pre-cut steak pieces are passed.

3.2 The movements of the toothed cylinders and their mechanisms shall be enclosed by fixed guards or interlocking movable guards, according to items 12.38 to 12.55 and their sub-items of this Regulatory Standard.

3.3 The feed nozzle shall prevent the upper limbs from accessing the toothed cylinder area by acting as an interlocking movable guard equipped with at least one double channel safety switch, monitored by safety interface, double channel according to item 12.38. 12.55 and its subitems and Annex I to this Regulatory Standard.

3.3.1 When the toothed cylinders are removed together with the protection, the application of sub-item 3.3 of this annex is not required.

3.4 The opening of the discharge zone shall prevent the upper limbs from reaching the junction of the toothed cylinders according to Annex I of this Regulatory Standard.

3.5 The steak tenderizer does not require an emergency stop.

4. Meat Grinder - Mincer (See terms of Ordinance MTb No. 1,111, of 21 September 2016)

4.1 For the purposes of this Annex, a meat grinder is considered to be a machine which uses endless thread to grind meat.

4.2 The movements of the endless screw and its mechanisms shall be enclosed by fixed guards or interlocking movable guards, according to items 12.38 to 12.55 and their sub-items of this Regulatory Standard.

4.3 The feed nozzle or tray shall prevent the upper limbs from entering the worm zone, depending on their geometry, acting as a fixed guard or as an interlocked movable guard, monitored by a safety interface, according to items 12.38 to 12.55 and its subitems and Annex I to this Regulatory Standard.

4.4 Opening the unloading zone shall prevent the upper limbs from reaching the hazardous area of the endless thread as per Annex I of this Regulatory Standard.

ANNEX VIII PRESSES AND SIMILAR EQUIPMENT

(Wording given by Ordinance MTb No. 873, of July 6, 2017)

1. Presses

1. Presses are machines used in shaping and cutting of several materials, in which the movement of the hammer - punch, is from a hydraulic or pneumatic system - hydraulic or pneumatic cylinder, or a mechanical system, in which the rotary movement is transformed into linear through connecting rods, cranks, levers or spindles systems.

1.1 The presses are divided into:

- a) eccentric key engaging mechanics or equivalent coupling;
- b) eccentric brake-clutch mechanics;
- c) spindle driven friction;
- d) servoed;
- e) hydraulic;
- f) pneumatic;

g) hydropneumatic.

1.2 For the purposes of this Annex, the following machines are considered similar:

- a) guillotines, shears and shears;
- b) folding machines;
- c) hydraulic and / or pneumatic devices;
- d) repressors;
- e) forging hammers;
- f) baling presses.

1.2.1 The provisions of this Annex do not apply to the so-called hand swing arm - alligator rocker - and hand bridge type rocker machines that must meet the requirements of Annex X - Footwear and Related Machinery - of this Standard.

1.3 For the purposes of this Annex, tools, tooling, dies or dies are elements that are attached to the hammer and table of presses and the like, with function of cutting or shaping of materials, and may incorporate the feeding or extraction systems listed in sub-item 1.4 of this Annex.

1.3.1 Tools should:

- a) be designed in such a way as to prevent material projection onto operators, or be used in presses whose safety system provides protection against material projection onto operators;
- b) be stored in safe and proper places;
- c) be fixed to machinery properly without improvisation;
- d) offer no additional risks.

1.4 Feeding or extraction systems are means used to feed the raw material and remove the processed part from the die and can be:

- a) manuals;
- b) by drawer;
- c) by rotating tray or revolver drum;
- d) by gravity, whatever the means of extraction;
- e) by mechanical hand;
- f) by robots;
- g) continuous - automatic feeders; and
- h) other systems not listed in this subitem.

1.5 Winders, unwinders, straighteners and other power equipment shall be provided with protections throughout the perimeter, preventing access and movement of persons in hazardous areas in accordance with items 12.5, 12.38 to 12.55 and their subitems of this International Standard.

1.6 For the purposes of this Annex and the applicable Official Technical Standards, the safety systems described herein for each machine are the result of the risk assessment.

2. Safety Requirements for Presses

2.1 The safety systems in the permitted press or work zones are:

- a) enclosure of the pressing zone, with cracks or passages that do not allow fingers and hands to danger zones, according to item A, of Annex I, of this Standard, which shall consist of fixed or movable protections with interlocking, according to items 12.38 to 12.55 and their sub-items of this Standard;
- b) closed tool, which means the enclosure of the tool pair, with cracks or passages that do not allow fingers and hands to enter the danger zones, according to table I, item A, of Annex I of this Standard;
- c) Type 4 redundant self-test light curtain, according to IEC 61496-1: 2006, monitored by a safety interface, dimensioned and installed, according to item B, of Annex I, of this Standard and current official technical standards, in conjunction with two-hand drive device, complying with the provisions of items 12.26, 12.27, 12.28 and 12.29 of this Standard.

2.1.1 In case of access to danger areas not supervised by the light curtains, movable interlocking or fixed guards shall be provided, according to items 12.38 to 12.55 and their subitems of this Standard.

2.1.2. The number of bimanual controls shall match the number of operators in the machine, according to the item 12.30 and sub-items of this Standard.

2.1.3. The safety systems referred to in paragraph "c" of sub-item 2.1 and on item 2.1.1 of this Annex shall be classified as category 4, according to ABNT NBR 14153.

2.1.4 For cold forging activities on presses, the front of the machine must be protected by interlocking movable guards and other parts of the hazardous area with fixed guards as per items 12.38 to 12.55 and its sub-items thereof. Standard.

2.1.4.1 The frontal protection shall be so sized and constructed as to prevent projection of material from the process from reaching the operator.

2.2 Eccentric key engaging or full-cycle equivalent coupling mechanical presses and spindle driven mechanical friction presses shall not allow operators' hands or fingers to enter the pressing zones, and one of the following shall be adopted: following security systems:

- a) enclosure with fixed guards and, with the necessity of frequent change of tools, with movable guards equipped with interlock with lock, in order to allow the opening only after the total stop of the risky movements, according to sub-item 2.1 a). , of this Annex and 12.46 of this Standard; or
- b) operation with closed tools only, according to sub-item "b" of sub-item 2.1 of this Annex.

2.3 Servo-driven, hydraulic, pneumatic, hydropneumatic eccentric brake-clutch mechanical presses shall adopt one of the following safety systems in the press or work areas:

- a) enclosure with fixed guards or movable guards equipped with interlocking, according to item "a" of sub-item 2.1 of this Annex;

- b) operation with closed tools only, according to sub-item “b” of sub-item 2.1 of this Annex;
- c) use of light curtain in conjunction with two-hand drive device, according to sub-item “c”, 2.1 and its subitems of this Annex.

2.4 The eccentric mechanical presses with pneumatic brake-clutch and pneumatic presses shall be controlled by a specific safety valve classified as category 4 according to the applicable technical standard, with dynamic monitoring and residual pressure that does not compromise the safety of the system, and which is locked in. case of failure.

2.4.1 In the event of a valve failure, it shall only be possible to return to normal operating condition after manual reset or reset.

2.4.1.1 The manual reset or reset must be incorporated into the safety valve or elsewhere in the system, with actuator in a safe position providing good visibility to verify that there are no people in the danger zones to validate by means of a intentional manual action a start command.

2.4.2 For valve models with external dynamic pressure monitoring, micro switches or proximity sensors integrated in the valve, monitoring shall be performed by safety interface in a system classified as category 4 according to ABNT NBR 14153.

2.4.3 For safety valves, only exhaust silencers which do not present a risk of clogging or have a free passage corresponding to the nominal diameter may be used so as not to interfere with the braking time.

2.4.4 When independent safety valves are used for the control of separate clutch and brake presses, they shall be interconnected to establish dynamic monitoring to ensure that the brake is applied immediately if the clutch is released during the cycle. , and also to prevent the clutch from being engaged if the brake valve does not apply.

2.4.5 The requirement of subclause 2.4.4 does not apply to pneumatic presses.

2.4.6 For pneumatic presses, when the mass of hammer and tool assembly is greater than 15 kg, measures shall be taken to prevent the assembly from falling by gravity in the event of accidental depressurization.

2.5 Hydraulic brake-clutch eccentric mechanical presses shall be driven by a safety system consisting of redundant valves with dynamic monitoring and residual pressure that does not compromise system safety.

2.5.1 The hydraulic system referred to in item 2.5 of this annex shall be classified as category 4 according to ABNT NBR 14153.

2.5.2 In the event of a valve failure, it shall only be possible to return to normal operating condition after the manual reset or reset.

2.5.2.1 The manual reset or reset must be incorporated into the safety valve or elsewhere in the system, with actuator in a safe position providing good visibility to verify that there are no people in the danger zones to validate by means of a intentional manual action a start command.

2.5.3 When the monitoring of the valves takes place by means of safety interface it shall be classified as category 4 according to ABNT NBR 14153.

2.5.4 When independent valves are used, they shall be interconnected to establish dynamic monitoring to ensure that there is no residual pressure capable of compromising the operation of the brake-clutch assembly in the event of failure of either valve.

2.5.5 Where independent valves are used for the control of separate brake and clutch presses, the provisions of subsection 2.4.4 of this annex shall apply.

2.6 Hydraulic presses shall have a safety hydraulic block or equivalent hydraulic system that has the same characteristic and effectiveness with dynamic monitoring. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.6.1 The safety hydraulic block or equivalent hydraulic system shall consist of redundant valves that interrupt the main fluid flow. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.6.2 In the event of failure of the safety hydraulic block or equivalent hydraulic system, the safety system shall be manually reset or reset in order to prevent subsequent actuation. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.6.3 In valve systems with dynamic monitoring by micro-switches or proximity sensors, monitoring shall be performed by safety interface classified as category 4 according to ABNT NBR 14153. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.6.4 Hydraulic presses shall have a check valve, whether or not incorporated in the safety hydraulic block, to prevent the hammer from falling in the event of a hydraulic system failure, and one of the redundant valves referred to in 2.6.1 may also perform the check valve function, in which case no additional valve is required for this purpose.

2.6.4.1 When using an equivalent hydraulic system, the check valve shall be mounted directly to the cylinder body and, if this is not possible, rigid, welded or flanged tubing shall be used between the cylinder and the valve.

2.6.5 Where the equivalent system hydraulic circuit permits pressure-intensifying damage, a relief valve shall be directly operated, locked and locked against unauthorized adjustments between the hydraulic cylinder and the check valve.

2.7 The presses shall have emergency stop devices that ensure the safe stop of machine movement, according to items 12.56 to 12.63 and its sub-items of this Regulatory Standard.

2.7.1 The press emergency stop system shall be prepared for interconnection with peripheral equipment emergency stop systems such as unwinders, straighteners and feeders, so that the emergency stop device of any of the equipment cause all others to stop safely.

2.7.2 When using two-hand removable plug or socket pluggable actuation devices that contain an emergency stop button, there must also be an emergency stop device on the panel or body of the machine.

2.7.3 If there are several two-hand drive devices for operating a press, they shall be connected in such a way as to ensure proper operation of the emergency stop button of each of them, in accordance with this Regulatory Standard.

2.8 In eccentric brake-clutch mechanical presses with non-enclosed pressing zone with fixed guard, movable guarded interlocking guards or whose tools are not closed, the position of the hammer shall be monitored by electrical signals produced by mechanically coupled equipment to the shaft. of the machine. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.8.1 Monitoring of hammer position, including lower dead center - PMI, upper dead center - PMS and maximum allowable slip, shall include devices to ensure that if the braking slip exceeds the maximum allowable up to fifteen degrees), specified by ABNT NBR 13930, a stop action is initiated and a new cycle cannot be started. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.8.1.1 Electrical signals shall be generated by positive-channel dual-channel safety switches monitored by a safety interface classified as category 4 according to ABNT NBR 14153. (See Term - Ordinance MTb No. 873, of 06 July 2017)

2.8.1.2 When using a programmable safety interface that has programming blocks dedicated to the PMS, PMI and slip control and supervision function, the dual channel requirement is waived. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

2.8.2 For presses where it is not possible to guarantee the safe stop of the hammer due to its speed and the machine's response time, the use of light curtains to protect the pressing zone is not permitted. 2.8.1 of this Annex, and the pressing area shall be protected with fixed or movable protections with interlock with locking, in accordance with items 12.38 to 12.55 and their subitems of this Regulatory Standard.

2.9 Presses that have a clamped work or press zone or use only closed tools may be pedal operated with electric, pneumatic or hydraulic actuation, and the use of mechanically actuated pedals or levers is not permitted.

2.9.1 Drive pedals shall allow access by one direction and one foot only, and shall be secured to prevent accidental activation.

2.9.2 The number of pedals shall correspond to the number of operators as per item 12.30 and its subitems of this International Standard.

2.9.3 For warm and hot forging activities, pedals may be used, without requiring the enclosure of the feed face of the pressing zone, provided that protective measures are taken to ensure that the worker is kept away from hazardous areas.

2.9.3.1 If necessary, the tongs and tongs shall be supported by weight-relieving devices such as movable rockers or tripods to minimize work overload.

2.10 Power transmissions, such as handwheels, pulleys, belts and gears, shall be protected in accordance with paragraphs 12.38 to 12.55 and their subitems of this International Standard.

2.10.1 In eccentric mechanical presses, there must be a fixed protection of the connecting rods and the ends of their shafts that resist the stresses in case of rupture.

2.10.2 The vertical and horizontal handwheels of spindle driven friction presses shall be protected so that they are not designed in the event of spindle or shaft breakage.

2.11 Downward vertical presses shall have a mechanical restraint system that supports the weight of the hammer and the top of the tool to lock the hammer at the beginning of tool change, adjustment and maintenance operations.

2.11.1 Upright vertical presses shall have a mechanical restraint system to deter dangerous movement at the beginning of tool change, adjustment and maintenance operations.

2.11.2 The mechanical retaining component shall:

- a) have interlock monitored by safety interface, in order to prevent, during its use, the operation of the press;
- b) ensure mechanical retention at hammer stop positions;
- c) be designed and constructed to ensure resistance to the static force exerted by the total weight of the movable assembly to be supported and to prevent its projection or its simple release.

2.11.3 In situations where it is not possible to use the mechanical restraint system, alternative measures shall be adopted to ensure the same result.

2.12 Table upward-moving hydraulic presses are exempt from the use of the safety hydraulic block provided that the following requirements are met:

- a) have interlocked movable guards monitored by safety interface, which actuate the power supply to the hydraulic pump by means of two contactors connected in series, monitored by safety interface, which system shall be classified as category 4;
- b) have a two-hand drive device according to items 12.26 to 12.30 and its sub-items of this Standard;
- c) Have a check valve installed directly on the cylinder body and, if this is not possible, use rigid, welded or flanged tubing between the cylinder and the check valve;
- d) prevent the danger of shearing or crushing in the area below the movable table due to its downward movement during maintenance, adjustment or other intervention with a mechanical interlocking device monitored by a safety interface classified as category 4;
- e) additional protective measures shall be adopted in accordance with items 12.77 and 12.81 and their sub-items of this Standard.

2.12.1 In the case provided for in item 2.12 of this annex, it should be noted that there is no access from any part of the body through the area between the table and the machine frame.

2.13 Horizontally moving presses and the like are exempt from the obligation to use mechanical retention due to their constructive characteristics.

3. Safety Requirements for Guillotines

3.1 Guillotine Front Work Area Protection:

3.1.1 In the hydraulic guillotines and brake-clutch, the frontal protection shall comply with the provisions of item 2.3, points “a” and “c”, “Press Zone Safety Systems” of this Annex.

3.1.2 In guillotines whose engagement of the coupling system is performed by a key or similar mechanical coupling associated with a belt brake, item 2.2 (a) of this Annex applies.

3.1.3 Item 12.30 of this Standard does not apply when fixed or movable interlocked protection in the front area is used in hydraulic guillotines or brake-clutch.

3.2 Protection of guillotine side and rear access zone:

3.2.1 Guillotines shall have a safety system that prevents access from the sides and rear of the machine to the danger zones, according to items 12.38 to 12.55 and its subitems of this Standard.

3.3 Hydraulic and pneumatic guillotine control systems.

3.3.1 Items 2.4 and 2.5 respectively and their sub-items of this annex apply to pneumatic and hydraulic brake-clutch guillotines.

3.3.1.1 Guillotines with pneumatic brake-clutch shall be controlled by a specific safety valve classified as category 4, with dynamic monitoring, failure lockout and residual pressure that does not compromise system safety.

3.3.1.1.1 Item 3.3.1.1 shall not apply when the fixed protection provided for in item 2.1 (a) is used for protection of the front, side and rear of the guillotines.

3.3.1.2 The guillotine must have a manual reset or reset, incorporated in the safety valve or other system component, to prevent accidental activation in case of failure.

3.3.1.3 In models of valves with external dynamic pressure monitoring, micro switches or proximity sensors integrated in the valve, monitoring shall be performed by safety interface in a system classified as category 4.

3.3.1.4 Only safety silencers which do not present a risk of clogging or free passage corresponding to the nominal diameter may be used in the safety valves, so as not to interfere with the braking time.

3.3.2 Hydraulic guillotines apply to item 2.6 and their sub-items of this annex. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

3.3.2.1 Hydraulic guillotines shall have a safety hydraulic block or equivalent hydraulic system having the same characteristic and effectiveness with dynamic monitoring. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

3.3.2.1.1 The safety hydraulic block or equivalent hydraulic system shall consist of redundant valves that interrupt the main flow of the fluid. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

3.3.2.1.2 Item 3.3.2.1 shall not apply when the fixed protection provided for in item 2.1 (a) of this annex is used for the protection of the front, side and rear of the guillotines.

3.3.2.2 The guillotine shall be manually reset or rearmed in order to prevent accidental activation in the event of failure.

3.3.2.3 Hydraulic guillotines shall have a check valve, whether or not incorporated in the safety hydraulic block, to prevent the knife holder from falling in the event of a hydraulic system failure. One of the valves in redundancy referred to in item 3.3.2.1. It may also perform the check valve function, in which case an additional valve is not required for this purpose.

3.3.2.3.1 The check valve shall be mounted directly to the cylinder body and if this is not possible, rigid, welded or flanged tubing shall be used between the cylinder and the valve.

3.3.2.4 When the equivalent system hydraulic circuit permits a pressure intensification capable of damage, a relief valve shall be directly operated, blocked and locked against unauthorized adjustments between the hydraulic cylinder and the check valve.

4. Safety Requirements for Folders

4.1 Folders shall have a properly selected security system installed in accordance with this annex.

4.1.1 The security system shall prevent or detect access from the sides and rear of the machine to the danger zones according to items 12.38 to 12.55 and its subitems of this International Standard.

4.1.2 The frontal safety system shall cover the work area, and shall be selected according to the constructive characteristics of the machine and the geometry of the part to be formed.

4.1.2.1 For hydraulic brakes the following safety devices are considered as ESPE (Electrosensitive Protective Equipment):

- a) Redundant self-test light curtains, type 4 according to IEC 61496, monitored by safety interface, properly dimensioned and installed in accordance with EN 12622; or
- b) Multizone detection safety system - ESPE / AOPD type 4 multizone according to IEC 61496, monitored by safety interface, properly sized and installed according to EN 12622.

4.1.2.1.1 The multizone detection safety system - ESPE / AOPD multizone shall provide a protection zone with a detection capacity of 14 mm (fourteen millimeters) that extends vertically directly below the upper tool centerline but not more than 2,5 mm (two point five millimeters) behind (bend plane).

4.1.2.1.1.1 The detection of the protection zone shall be validated by tests provided by the manufacturer and described in the instruction manual.

4.1.2.1.1.2 The protection zone shall also extend in front of the bending plane by at least 15 mm.

4.1.2.1.1.3 Blanking of this protection zone during the closing stroke is possible if the closing speed is reduced to 10 mm / s (ten millimeters per second) or less.

4.1.2.1.1.4 Muting of this protection zone may be done when the distance between the punch and the plate is less than or equal to 10mm (tenmm) if the closing speed is reduced to 10mm / s. (ten millimeters per second) or less.

4.1.2.1.1.5 The Multizone Detection Security System - ESPE / AOPD shall:

- a) be installed close to the upper tool so that it moves together with the hammer on the descending folders;
- b) be installed so as to ensure that it is not subject to external light interference inadvertently impinging on the receiver, and within proper alignment between sender and receiver, and that there are no expected optical reflections for bending machines;
- c) be used for working with the size and shape tools indicated by the manufacturer of the multizone ESPE / AOPD, respecting the limitations of use and additional safety measures to ensure the protection zone provided for in items 4.1.2.1.1 and 4.1. 2.1.1.1 of this Annex in accordance with the information in the ESPE / AOPD Multizone Instruction Manual and Annex IC of this standard;
- d) be used in conjunction with two-hand control as per items 12.26 to 12.30 and its sub-items of this standard or with a 3-position pedal as per Annex I C of this standard.

4.1.2.1.1.6 The approaching descent movement speed is free and the manufacturer's ESPE / AOPD multi-slip safety criteria must be met, but after blanking the speed must be less than or equal to 10 mm / s. (ten millimeters per second).

4.1.2.1.1.7 In systems whose technology permits continuous speed reduction monitoring, the speed of 10 mm / s (ten millimeters per second) shall be reached prior to deactivation of the upper beam of the ESPE / AOPD multizone.

4.1.2.1.1.8 For a special mode of operation, such as box-folding, safety measures shall be taken to disable the front and / or rear protection zone (s) when available while keeping the central protection zone active.

4.1.2.1.1.8.1 This special mode of operation shall be performed by the operator by means of a validation device and shall be automatically deactivated:

- a) at each power up of the machine;

- b) after changes in modes of selection or operation;
- c) after program change of numerical control;
- d) within 8 hours of operation.

4.1.2.1.1.8.2 Deactivation of this protection zone is also possible with high speed movement (more than 10 mm / s), as the blanking function may be activated by the control system before each cycle. bending (eg through numerical control information to determine the sequence of deactivated and non-deactivated cycles). For each of the cycles that require deactivation, the operator must have an individual confirmation action (eg pushbutton or extra pedal pressure) for deactivation to be allowed.

4.1.2.1.1.9 There shall be visual indicators of the mode of operation of the multizone ESPE / AOPD (eg blanking and muting).

4.1.2.1.1.10 In the case of bending of corrugated sheets and other obstacles of the material to be formed, such as protective plastic films that may obstruct the security system, it may be completely disabled during the final stage of muting following operator validation by either a button or pedal control, together with a reduction in descent speed to 10 mm / s (ten millimeters per second) or less, and shall be automatically re-enabled after reaching the PMS (top dead center).

4.1.2.1.1.10.1 This information shall be described in the procedure attached to the machine.

4.1.2.1.1.11 In the case of folds where the part to be folded exceeds the machine table due to its geometry, the multizone ESPE / AOPD safety system may be deactivated only during this fold, together with the reduction in descent speed to 10mm / s (tenmm per second) or less, and must be rehabilitated for other folds;

4.1.2.1.2 In case of use of forming tools in hydraulic folding machines, the machine must be enclosed, use closed tool and / or light curtain combined with two-hand control according to items 12.26 to 12.30 and its subitems of this standard. .

4.1.2.2 Safety in mechanized (non-manual) movement of the backrests shall be ensured by determining a safety zone greater than or equal to 50mm (fifty millimeters) between the backrest and the lower tool and at least one of the following: alternatives:

- a) approach speed less than or equal to 2m / min (two meters per minute), or
- b) force limitation to 150N (one hundred and fifty Newtons), or
- c) backrest tilting system, associated with approach with horizontal movement at least 5mm (five millimeters) above the lower tool and subsequent downward movement for the final positioning of the backrests.

4.1.2.2.1 These measures may be applied by the machine's own control system.

4.1.2.3 Safety against risks arising from approaching the plate to be folded and the machine apron shall be ensured by reducing the bending speed (where applicable) and using the three-position pedal as per Annex I C to this standard.

4.1.2.4 Hydraulic bending slip test shall be performed at most every 30 (thirty) hours of continuous use and / or at each power-up of the machine, by means of an electronic safety monitoring system classified as a minimum of category 2, according to ABNT NBR 14153, associated with a cam system, linear or rotary encoder, or automatically by ESPE / AOPD multizone itself.

4.1.2.5 For the ESPE / AOPD multizone blanking function, slow speed (less than or equal to 10mm / s) shall be ensured through direct monitoring of fast speed valves or through direct apron speed measurement, both by a security system classified at least as category 3 according to ABNT NBR 14153.

4.1.3 Hydraulic benders apply to item 2.6 and its sub-items of this annex. (See deadline - Ordinance MTb No. 873, of July 6, 2017)

4.2 Brake-clutch safety systems shall be designed, dimensioned and installed with the same criteria as those used for the safety of brake-clutch type eccentric presses provided for in this standard.

4.3 Hybrid folder safety systems, those with servomotor driven hydraulic motors, shall be designed, dimensioned and installed in accordance with the same criteria as used for the safety of hydraulic folders in this annex.

5. Hydraulic and / or pneumatic devices

5.1 For the purposes of this annex, hydraulic and / or pneumatic devices are small machines used for forming and cutting various materials, or assembling parts assemblies, whether or not using tools, in which the cylinder has no plate or hammer. guided by prisms or side columns.

5.2 Hydraulic and / or pneumatic devices shall have one of the following hazardous area safety systems unless they comply with item 12.84 and its subitems of this standard:

- a) enclosure of the danger zone, with cracks or passages that do not allow the entry of fingers and hands, according to item A of Annex I of this Standard, consisting of fixed guards, according to items 12.38 to 12.55 and its sub-items of this Standard; or
- b) enclosure of the danger zone, with cracks or passages that do not allow the entry of fingers and hands, according to item A of Annex I of this Standard, consisting of fixed guards and movable guards equipped with interlocking, according to items 12.38 to 12.55 and its subitems of this Standard; or
- c) safety sensors according to items 12.38 to 12.55 and their subitems of this Standard.

5.2.1 In case of access to danger zones not supervised by the safety sensors provided for in item 5.2 (c), there shall be interlocking or fixed movable guards, according to items 12.38 to 12.55 and their subitems of this Standard.

5.3 Alternatively to the safety systems provided for in item 5.2 and its paragraphs, two-hand drive devices may be adopted on pneumatic devices requiring only one operator, subject to the provisions of items 12.26 and 12.28 of this International Standard.

5.3.1 In this case, the side and rear faces of the pneumatic devices shall be fitted with fixed guards or movable guards equipped with interlocking, with an opening on the front (front) face up to 50cm (fifty centimeters) in any direction - where the operator and where parts are inserted and removed.

5.3.2 For pneumatic devices with only pneumatic controls and controls of their dangerous movements, the monitoring of bimanual drive devices by means of safety interface with electrical supply is not necessary, and their simultaneous use of components and circuits must be ensured. tires that meet the state of the art.

5.4 When movable guards or safety sensors provided for in paragraph 5.2 (b) and (c) of this Annex are used, as indicated by the risk assessment and depending on the required safety category, hydraulic devices shall have one of the following designs: : (See deadline - Ordinance MTb No. 873, of July 6, 2017)

- a) for category 4: two dynamically monitored and serially connected hydraulic safety valves or hydraulic safety block;
- b) for category 3: one dynamically monitored hydraulic safety valve and one conventional series valve;
- c) for category 2: a dynamically monitored safety hydraulic valve or a conventional hydraulic valve with periodic operation check.

5.5 Where movable guards or safety sensors provided for in paragraph 5.2 (b) and (c) of this Annex are used, as indicated by the risk assessment and depending on the required safety category, pneumatic devices shall comply with the following designs:

- a) Dynamically monitored pneumatic safety valve classified as category 4 with blockage in the event of failure and incomplete switching of one of the valves or residual pressure due to switching failure or damaged seals shall not compromise safety of the system;
- b) monitored safety pneumatic valve classified as category 3, or equivalent pneumatic circuit, where incomplete switching of one of the valves, or residual pressure due to failed switching or damaged seals, shall not compromise system safety;
- c) a monitored pneumatic valve or a conventional pneumatic valve with periodic operation check for category 2.

6. Repressor with brake-clutch coupling

6.1 Repressor: It is a mechanical brake-clutch press with hammer lock in horizontal position. Repressing is to transform a steel bar under controlled conditions into stages with sequential matrices, allowing approximation of the part geometry.

6.2 For activities on hot forging pressers, pedals may be used without requiring the enclosure of the feeding face of the pressing zone, provided that tongs are used to ensure that the worker is kept away from danger zones.

6.2.1 Other parts of the machine that allow access to the hazardous area shall be protected by interlocking or fixed movable guards in accordance with items 12.38 to 12.55 and their sub-items of this Regulatory Standard.

6.2.2 The drive pedals shall allow access by only one direction and one foot and shall be protected to prevent accidental activation, and the use of a mechanical actuation pedal shall be prohibited.

6.3 The use of tongs should be supported by weight-relieving devices such as movable rockers, bars or tripods to minimize work overload.

6.4 Pneumatic brake-clutch repressors shall be controlled by a specific safety valve classified as category 4, with dynamic monitoring and residual pressure that does not compromise system safety and which is blocked in the event of failure.

6.4.1 In the event of a valve failure, it shall only be possible to return to normal operating condition after the manual reset or reset.

6.4.1.1 The manual reset or reset shall be incorporated into the safety valve or elsewhere in the system, with actuator in a safe position providing good visibility to verify that there are no persons in the danger zones to validate by means of a intentional manual action a start command.

6.4.2 Only safety silencers which do not present a risk of clogging or that have a free passage corresponding to the nominal diameter may be used in the safety valves, so as not to interfere with the braking time.

6.4.3 For valve models with external dynamic pressure monitoring, micro switches or proximity sensors integrated in the valve, monitoring shall be performed by safety interface in a system classified as category 4.

7. Forging Hammers

7.1 For the purposes of this Annex, the following are forging hammers:

- a) free fall forging hammers;
- b) double acting forging hammers, hydraulic or pneumatic;
- c) hydraulic or pneumatic blow-forging hammers;
- d) compressed air forging hammers.

7.2 Forging hammers pressing or working areas shall be fitted with fixed guards or, if necessary, movable interlock guards as described in sub-item 2.1 (a) of this Annex.

7.3 For hot hammering activities, pedals or levers may be used, without requiring the enclosure of the feed face and removal of parts from the press or work zone, provided that protective measures are taken to ensure that the worker is detached. danger zones by means of a physical barrier.

7.3.1 The drive pedals shall allow access by only one direction and one foot and shall be protected to prevent accidental activation, and the use of a mechanical actuation pedal shall be prohibited.

7.3.2 The use of tongs should be supported by weight-relieving devices such as movable rockers, bars or tripods to minimize work overload.

7.4 In addition to the provisions of item 7.2 pneumatic hammers shall have:

- a) the central bolt of the shock absorber head attached with wire rope;
- b) the air inlet hose with protection that prevents its projection in case of rupture; and
- c) all upper and lower studs locked with wire rope.

7.5 For hot forging activities in hammers or presses, additional collective protective measures shall be taken to prevent the projection of parts of the material being processed or sparks from reaching workers.

8. Vertical Baler Press

8.1 Vertical balers are not required to use the safety hydraulic block, provided that the following requirements are met:

- a) safety interface-monitored interlocking movable guards, which actuate the power supply to the hydraulic pump by means of two serially connected contactors, monitored by a safety interface, which system shall be classified as category 4;
- b) control driven actuation that requires the simultaneous use of both operator's hands, being accepted a manually operated hydraulic valve with lever combined with an actuation button;

- c) check valve installed directly on the cylinder body and, if this is not possible, use rigid, welded or flanged tubing between the cylinder and the check valve;
- d) a safety procedure shall be adopted for the binding and removal of the bales;
- e) additional protective measures as per items 12.77 to 12.81 and their sub-items of this standard.

9. Other provisions

9.1 If the measures prescribed in this annex cannot be applied, other protective measures and safety systems may be adopted in presses and the like, subject to items 12.5 and 12.38.1, provided that they ensure the same effectiveness as the protections and devices mentioned in this annex, and comply with the applicable official technical standards type A and B and, in their absence, applicable harmonized international and European standards.

9.2 The importation, manufacture, marketing, auctioning, leasing and assignment of any kind of eccentric and similar mechanical presses with coupling for lowering the hammer by means of a key or similar coupling and of new or used mechanical belt brakes is prohibited. , Throughout the national territory.

9.2.1 A similar mechanism is understood to be one that does not allow the immediate stop of hammer movement at any position of the duty cycle.

9.3 Any substantial transformation of the operating system or the coupling system for hammer movement - retrofitting of presses and similar equipment shall only be carried out by a mechanical design prepared by a legally qualified professional, accompanied by a Technical Responsibility Note - ART.

9.3.1 The project shall contain component sizing calculation memory, specification of materials used and descriptive memorandum of all components.

ANNEX IX PLASTIC INJECTION MACHINE

1. For the purposes for applying this Annex is considered injection machine the machine used for discontinuous manufacturing of molded products, by injecting material into the mold, which contains one or more cavities in which the product is formed, consisting essentially of closing unit – mold area and closing mechanism, injection unit and actuation and control systems, as shown in Figure 1 of this Annex.

1.1 Applicable definitions:

- a) hydraulic injection machine: injection machine in which the axis actuation are performed by hydraulic power circuit, comprising of electrical motor, hydraulic pump and hydraulic cylinder;
- b) mold area: zone comprised between the plates, where the mold is mounted;
- c) closing mechanism: mechanism fixed to the moveable plate to move it and apply the closing force;
- d) closing force: force exerted by the injection cylinder and thread assembly on the plastic part that solidifies into the mold of an injection machine, to ensure its feeding with additional material as it contracts as a function of solidification and cooling;
- e) injection unit: unit responsible for plasticizing and injecting material into the mold through the nozzle;

- f) injection: mass transfer from injection cylinder to the mold, cyclical process in which a material softened by heat is injected into a mold under pressure, that is maintained until the plastic has hardened sufficiently to be ejected from the mold;
- g) power circuit: circuit that provides power for machine operation;
- h) rotating carousel injection machine: machine with two or more closing units, mounted on moveable carousel, vertically or horizontally, linked to one or more fixed injection units;
- i) multi-station injection machine with moveable injection unit: machine with moveable injection unit linked to two or more fixed closing units;
- j) injection machine with mold-holder table of transverse displacement: machine designed to contain one or more mold lower parts attached to a mold-holder table of transverse displacement, which links the mold lower part by table displacement or rotation movement, to the top and to the injection unit;
- k) electrical injection machine: injection machine in which the axis actuations are performed by electrical actuators - servomotors;
- l) electrical motor: any motor type that uses electrical energy, such as servomotor or linear motor;
- m) motor control unit: unit to control the movement, the stop process and movement interruption of an electrical motor, with or without integrated electronic device such as frequency converter and contactor;
- n) electrical axis: system consisting by an electrical motor, a motor control unit and the additional contactors;
- o) stop condition: condition in which there is no movement of one part of the machine with an electrical axis;
- p) safe stop condition: stop condition during which additional measures are taken to avoid unexpected triggering;
- q) stop: movement deceleration of one part of the machine until the stop condition is reached;
- r) safe stop: stop during which additional measures are taken to prevent dangerous stop of movement;
- s) monitored safety command input: input of an motor control unit used to provide a power outage to the electrical axis motor;
- t) peripheral equipment: equipment that interacts with the injection machine, for example, handler for parts removal, equipment for mold exchange and automatic attaching clamps of the mold.

1.2 Specific safety requirements in the danger zone of the injection machines

1.2.1 Hazards related to the mold area.

1.2.1.1 The access to the mold area where the cycle is controlled, or front, shall be prevented by means of interlocked moveable protections - doors, equipped with two electromechanical safety switches monitored by safety interface, acting on the control unit so that the failure in any of the interlocking devices or interconnections are automatically recognized and still prevented the beginning of any danger subsequent movement, according to items 12.38 to 12.55 and subsequent sub-items of this Standard.

1.2.1.1.1 When magnetic, electronic coded or optoelectronics safety switches are used, among others without mechanical actuation, can be adopted one switch only for the interlocking and the monitoring shall be maintained safety interface.

1.2.1.2 In addition to the provisions of sub-item 1.2.1.1 of this Annex, the front protection shall act on the power circuit through a monitored valve or, indirectly, by means of two electromechanical safety switches monitored by safety interface, except for electrical injection machine.

1.2.1.2.1 When magnetic, electronic coded or optoelectronic safety switches are used, among others without mechanical actuation, can be adopted only one switch for this function, keeping the monitoring by safety interface.

1.2.1.3 When magnetic, electronic coded or optoelectronic safety switches are used, among others without mechanical actuation, can be adopted only one interlocking device, monitored by safety interface in order to attend each one of sub-items 1.2.1.1 and 1.2.1.2 of this Annex.

1.2.1.4 The access to the mold area where the cycle is not controlled, or rear, shall be prevented by means of interlocked moveable protections - doors, equipped with two electromechanical safety switches monitored by safety interface, acting on the power circuit, and shuts down the main motor.

1.2.1.4.1 When magnetic, electronic coded or optoelectronic safety switches are used, among others without mechanical actuation, can be adopted only one switch for this function, keeping the monitoring by safety interface.

1.2.5.1 *(Excluded by Ordinance MTb No. 98 of 08 and February 2018)*

1.2.1.6 The moveable protections shall be designed so that it is not possible to stay a person between them and the mold area.

1.2.1.6.1 If it is necessary to stay or access of the whole body between the protections and the dangerous movement area or inside the mold area, shall be met the sub-items of 1.2.6.2 to 1.2.6.3.5 of this Annex.

1.2.1.7 Self-adjustable safety mechanical device shall be installed, so that it acts independently of the plate position when the protection - door is opened, stopping the movement of this plate without any adjustment, i.e. no adjustment at each mold change.

1.2.1.7.1 From the opening protection up to the effective safety actuation, it is allowed a displacement of the moveable plate, of maximum amplitude equal to the pitch of the self-adjustable safety mechanical device.

1.2.1.7.2 The self-adjustable safety mechanical device shall be sized to withstand the efforts of the beginning of closing movement of the moveable plate, not being its function to withstand the closing force.

1.2.1.7.3 The installation of the self-regulating mechanical safety device is exempt from the manufacture or imported machines that meet the requirements of ABNT NBR 13536: 2016 or harmonized standard EN 201. *(Inserted by Ordinance MTb No. 873, of 06 July 2017)*

1.2.1.7.3.1 Machines manufactured from June 1, 2016 shall comply with the requirements of ABNT NBR 13536: 2016 and its amendments, observing the provisions of item 12.5.1 of this Standard. *(Inserted by Ordinance MTE No. 197 of December 17, 2010)*

1.2.1.7.3.2 Imported machines must comply with the harmonized technical standard EN 201, in force at the date of manufacture, or the standard ABNT NBR 13536: 2016 and its amendments, observing the provisions of item 12.5.1 of this Standard. *(Inserted by Ordinance MTE No. 197 of December 17, 2010)*

1.2.1.7.3.3 If the company proves that it started the injector purchase process between June 1, 2016 and January 1, 2017, it may choose to comply with Annex IX, provided that it sends this information to the Safety and Security Department. Occupational Health. *(Inserted by Ordinance MTE No. 197 of December 17, 2010)*

1.2.1.8 The moveable interlocked protections - doors, shall also protect against other movements, and when opened, shall:

- a) stop the cycle; the plasticization may continue if the plastic material splashing is prevented and the nozzle contact force cannot cause a hazard;
- b) to prevent forward movement of the injection thread or piston;
- c) to prevent forward movement of the injection unit; and
- d) to prevent dangerous movements of the parts and male extractors and their actuation mechanisms.

1.2.1.9 Safety devices for machines with electrical axis – electrical injection machines.

1.2.1.9.1 The electrical injection machines shall meet the safety requirements of this Annex, except the sub-items 1.2.1.2 and 1.2.1.7.

1.2.1.9.2 For the closing movement of the electrical injection machines plate, the power circuit shall have serial connection with more than one motor control unit, such as follows:

- a) a motor speed control unit having in its output two more contactors in series; or
- b) a motor speed control unit with one monitored safety control input, having its output one more contactor in series; or
- c) a motor speed control unit with two monitored safety control inputs of category 3, and in this case, the use of contactor in series is unnecessary.

1.2.1.9.3 The power circuit components shall have automatic monitoring, so that if one component fails, cannot be possible to initiate the next movement of the injection cycle.

1.2.1.9.3.1 The automatic monitoring shall be performed at least once every movement of the moveable protection - door.

1.2.1.9.4 The moveable protection - door of the electrical injection machine shall have interlocking device with lock that prevents its opening during the dangerous movement.

1.2.1.9.4.1 The interlocking device with lock shall:

- a) conform to the provisions of items and 12.38 to 12.55 and sub-items of this Standard;
- b) withstand an stress of up to 1000 N (one thousand Newtons);
- c) keep the moveable protection locked in the closed position until the stop condition of the danger movement is met, and the stop condition detection be safe against individual failure.

1.2.1.9.5 The electrical injection machines shall meet a controlled emergency stop, with power supply to the power circuit needed to reach the stop and, then, when the stop is reached, the power is removed.

1.2.1.9.5.1 The emergency stop actuation shall stop all movements and discharge the hydraulic accumulators.

1.2.2 Closing mechanism area.

1.2.2.1 The access to the danger zone of the closing mechanism shall be prevented by mean of fixed or moveable interlocked protection - doors.

1.2.2.2 The moveable interlocked protection - door, front and rear, shall have a monitored safety switch by safety interface, which actuates in the power circuit and shuts down the main motor.

1.2.2.3 The electrical injection machines in which the shutdown of the engine can keep potential energy retention that brings risk of unexpected movements in the closing - extraction mechanism area in molds with springs, for example, shall have additional devices that prevent those movements, such as magnetic brakes.

1.2.3 Plasticization cylinder Protection and injection nozzle.

1.2.3.1 The plasticization cylinder shall have fixed protection to prevent burns resulting from unintended contact in hot parts of the injection unit in which the working temperature exceeds 80°C (eighty degrees Celsius) and, in addition, shall be fixed a label indicating the statement "high temperature".

1.2.3.2 The injection nozzle shall have interlocked moveable protection with a monitored safety switch by safety interface, which stop all movements of the injection unit.

1.2.3.3 The protections design shall take into account the end positions of the nozzle and the risk of plasticized material splashing.

1.2.3.4 The moveable parts of the injector shall receive fixed protections or interlocked moveable protection with a safety switch monitored by safety interface, which stop all movements of the injection unit.

1.2.4 Feeding materials area - Funnel.

1.2.4.1 The access to the plasticizer thread shall be prevented, meeting the safety distances specified in section A of Annex I of this Standard.

1.2.4.2 In the case of horizontal injection units, it is allowed a lower opening in the nozzle protection.

1.2.4.3 The injection units positioned on the mold area shall be equipped with a restraint system to prevent downward movement by the gravity's action.

1.2.4.3.1 In the case of vertical movement of hydraulic actuation, a restraint valve shall be installed directly on the cylinder, or as close as possible to that, using flanged pipes only.

1.2.4.4 In specific maintenance situations, among them the access to the danger zone, shall be adopted additional measures provided on sub-item 12.113.1 of this Standard.

1.2.5 Parts discharge area.

1.2.5.1 There shall be protection on the parts discharge area so as to prevent that body segments reach the danger zones, according to the items 12.38 to 12.55 and sub-items and item A of Annex I of this Standard.

1.2.5.1.1 The existence of the conveyor belts in the discharge area does not exempt to meet the provisions on sub-item 1.2.5.1.

1.2.6 Additional safety requirements associated with large machines.

1.2.6.1 Large machines are defined when:

a) the horizontal or vertical distance between the closing links is greater than 1.2 m (one meter and twenty centimeters); or

b) if there are no links, the equivalent horizontal or vertical distance, which limits the access to the mold area is larger than 1.2 m (one meter and twenty centimeters); or

c) a person can stay between the mold area protection - door - and the dangerous movement area.

1.2.6.2 Additional safety components, such as mechanical locks, shall be installed in the protections on all sides of the machine where the cycle can be initiated to act on every opening movement of the protection and prevent their return to the "closed" position.

1.2.6.2.1 The components provided on sub-item 1.2.6.2 shall be reactivated separately before can be initiated another cycle.

1.2.6.2.2 The correct operation of the additional safety components shall be supervised by monitored safety devices by safety interface, at least once for each cycle of protection - door movement, so that any failure in such components, their safety devices or their interconnection is automatically recognized, so as to prevent the beginning of any closing movement of the mold.

1.2.6.3 The large injection machines shall have additional safety devices to detect the presence of a person between the moveable protection of the mold - door area and the own mold area, or detect a person inside the mold area, according to the item 12.42, paragraph "c" of this Standard.

1.2.6.3.1 The position from which these devices are reactivated shall enable a clear view of the mold area, with the use of auxiliary vision means, if necessary.

1.2.6.3.2 While these devices are operated, the control circuit of the plate closing movement shall be stopped and, in case of protections - door - with automatic actuation, the control circuit of the protection closing movement shall be stopped.

1.2.6.3.3 When the zone monitored by the presence detectors devices is invalidated, an automatic control shall:

- a) stop the control circuit of the plate closing movement, and in the case of use automatic actuations protections - doors, stop the control circuit of the protection closing movement;
- b) to prevent the injection into the mold area; and
- c) prevent the beginning of the subsequent cycle.

1.2.6.3.4 At least one emergency button shall be installed, in accessible position, between the moveable protection of the mold - door area and the mold area, according to items 12.56 to 12.63 and sub-items of this Standard.

1.2.6.3.5 At least one emergency button shall be installed in accessible position inside the mold area, according to the items 12.56 to 12.63 and sub-items of this Standard.

1.2.7 Machines with vertical movement of the moveable plate.

1.2.7.1 Hydraulic or pneumatic machine with vertical closing shall be equipped with two restraints devices that can be, for example, hydraulic valves that prevent accidental downward movement of the plate.

1.2.7.1.1 The valves provided on sub-item 1.2.7.1 shall be installed directly into the cylinder, or as close as possible, using flanged pipes only.

1.2.7.2 At the location where the plate has a size greater than 800 mm (eight hundred millimeters) and the opening course can exceed 500 mm (five hundred millimeters), at least one of restraint devices shall be mechanical.

1.2.7.2.1 When the protection of the mold area is opened or when other safety device of the mold area actuates, this mechanical restraint device shall act automatically in the entire course of the plate.

1.2.7.2.1.1 When it is not possible moveable protection opening of the mold area before it reaches its maximum opening position, it is allowed that the mechanical restraint device actuate after the opening course only.

1.2.7.2.1.2 In the event of a failure of one of the restraint device, the other shall prevent the downward movement of the plate.

1.2.7.3 The restraint devices shall be automatically monitored so that the failure of one of them:

- a) is automatically recognized; and
- b) is prevented to begin any downward movement of the plate.

1.2.8 Carousel machines.

1.2.8.1 The access to dangerous movements of the carousel shall be prevented by interlocked fixed or moveable protections according to the items 12.38 to 12.55 and sub-items of this Standard.

1.2.8.2.The access to the mold area shall be prevented according to the sub-item 1.2.1.1 of this Annex.

1.2.9 Machine with mold-holder table of transverse displacement.

1.2.9.1 The access to dangerous movements of the table shall be prevented by the adoption of safety systems provided on items 12.38 to 12.55 and sub-items of this Standard and additionally by the adoption of actuation devices of bimanual control type, according to the items 12.26, 12.27, 12.28 and 12.29 of this Standard.

1.2.9.2 When the vertical movement of the table is possible, shall be prevented the accidental downward movement by the gravity's action.

1.2.10 Multi-station injection machine with moveable injection unit.

1.2.10.1 The access to the dangerous zones of the injection unit when it moves between the closing units, it shall be prevented by interlocked fixed or moveable protections, according to the items 12.38 to 12.55 and sub-items of this Standard.

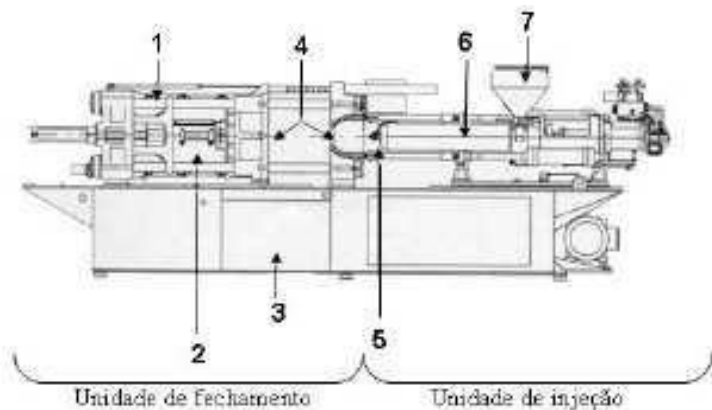
1.2.10.2 The access to the mold area shall be prevented according to the sub-item 1.2.1.1 of this Annex.

1.2.11 Peripheral equipment.

1.2.11.1 The peripheral equipment installation shall not reduce the safety level, noting that:

- a) the peripheral equipment installation that involves the modification of the machine protections shall not allow the access to danger zones;
- b) if the opening of a peripheral equipment protection allow access to a machine danger zone, this protection shall act the same way as that specified for that of the machine zone or, in the case of possibility to access the whole body, shall be applied the provisions of sub-item 1.2.6 of this Annex;
- c) if the peripheral equipment prevents the access to the machine danger zone and can be removed without the use of tools, shall be interlocked with the machine control circuit in the same way to the protection specified for that area; and
- d) if the opening of a machine moveable protection allow access to a danger zone of a peripheral equipment, such protection shall meet the safety requirements applicable to the equipment.

Figure 1 - Schematic drawing of horizontal injection machine showing the main danger zones without fixed or moveable protections.



Subtitle:

- 1: closing mechanism
- 2: hydraulic puller
- 3: parts discharge area
- 4: moveable plate and fixed plate of the nozzle (mold area)
- 5: injection nozzle
- 6: plasticizing cylinder (cannon)
- 7: feeding funnel

Source: Fundacentro

ANNEX X
FOOTWEAR AND RELATED MACHINES
(Writing by Ordinance MTb No. 252, of April 10, 2018)

1. Introduction

1.1 This Annex lays down specific safety requirements for machinery used in the manufacture of footwear and components, namely: hand swing arm (alligator rocker), hand bridge rocker, rubber camber machine, machete camber machine, automatic machine (pneumatic or mechanical) grommets, rivets and adornments, rear forming machine, heel nailing machine, rear bouncing bed setter, turntable (dubbing) machine, spout assembling machine, footwear mounting machine (adhesive dowel or adhesive injector), ice cream maker, high frequency machine, shoe mount and base assemble machine, automatic shoe plant rebate machine, mobile carousel rotary injection machine, hand trimmer (riveting machine), dubbing or joining components of pneumatically actuated footwear, frog mouth machine, monomer machines side seals, sole and insole stamping machine, scratching and marking machine, splitting machine (splitting machine), beveling machine, tape gluing machine, pad printing machine, embroidery machine, gluing machine, machine reactivate steam harness, rotographic machine and sewing machine.

1.2 For the purposes of this Annex and the applicable Official Technical Standards, the safety systems described herein for each machine are the result of risk assessment.

1.3 Machines in this Annex that do not have a quote on the use of an emergency stop device are exempt from its application, according to item 12.56 of this Regulatory Standard.

1.4 Machines in this Annex that have safety interface monitored safety systems classified as Category 3 or higher, according to ABNT NBR 14153, shall comply with one of the points in item 12.37 and its subitem for the start and stop command. electric motor that causes dangerous movement.

1.5 Machines in this Annex that have security systems classified as category 2 or lower, according to ABNT NBR 14153, are exempt from complying with the provisions of item 12.37.

2. Manual Swing Arm Rocker (Alligator Rocker)

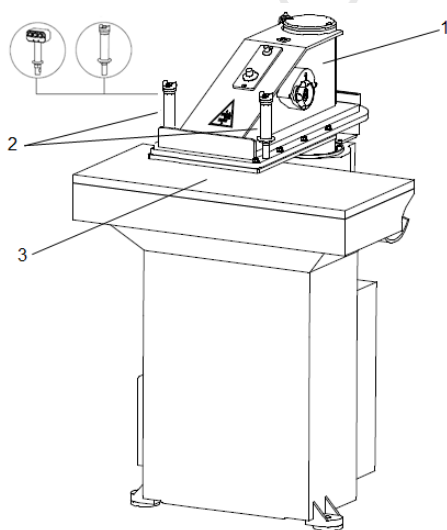
2.1 Hand swing arm (alligator rocker) rockers shall have the following specific safety requirements:

- a) bimanual drive device according to items 12.26 and 12.28 of this Regulatory Standard, installed next to the movable arm, monitored by safety interface classified as category 4, according to ABNT NBR 14153;
- b) force to move the moving arm less than or equal to 50N (fifty Newtons); and
- c) height of the floor to the cutting surface equal to 1000 +/- 30mm (one thousand millimeters, with a tolerance of about thirty millimeters), and may vary to comply with item 12.101 (a) of this Standard.

2.2 Alligator-type rockers having automatic angular movement of horizontal arm travel shall:

- a) adopt fixed or movable interlocked protection monitored by safety interface, on the side and rear, according to items 12.38 to 12.55 of this Regulatory Standard;
- b) have two-hand drive devices for moving arm displacements in accordance with items 12.26 and 12.28 of this Regulatory Standard;
- c) use manual reset emergency stop device according to items 12.56 to 12.60 and sub-items of this Regulatory Standard, installed on the front of the machine frame;
- d) fixed or movable guards shall not cause an accident hazard such as shearing or crushing as a function of the angular movement of the movable arm;
- e) have security interface monitoring classified as category 3 or higher, according to ABNT NBR 14153.

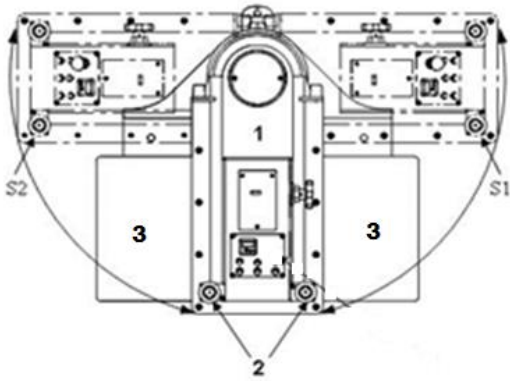
Figure 1: Manual Swing Arm Rocker (Alligator Rocker) - Side View



Subtitle:

1. movable arm
2. two-hand drive device
3. cutting surface

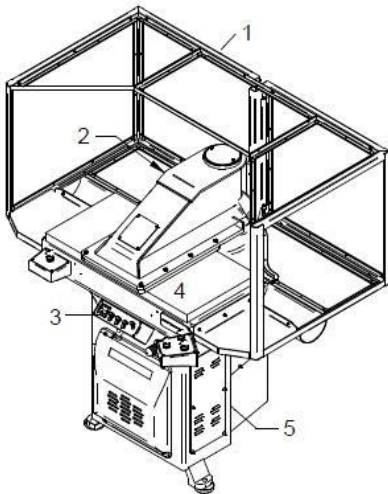
Figure 2: Manual swing arm rocker (alligator rocker). Top View - Arm Rotation Position 180 ° (One hundred and eighty degrees)



Subtitle:

- 1. movable arm
- 2. two-hand drive device
- 3. cutting surface
- S1 rotate position to the right
- S2 left rotate position

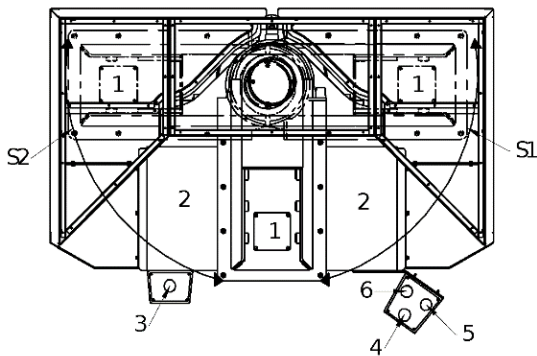
Figure 3: Automatic movable arm rocker (automatic angular movement of horizontal arm travel) - Isometric View



Subtitle:

- 1. fixed protection
- 2. movable arm
- 3. emergency stop device
- 4. cutting surface
- 5. body

Figure 4: Automatic Swing Arm Rocker (Automatic Angle Movement of Horizontal Arm Displacement) - Top View - Swing Position 180 ° (One Hundred and Eighty Degrees)



Subtitle:

- 1. movable arm
- 2. cutting surface
- 3 and 4. Two-hand drive device, cut
- 3 and 5. Two-hand drive device, right shift
- 3 and 6. Two-hand drive device, left shift
- S1 rotate position to the right
- S2 left rotate position

3. Manual Bridge Rocker

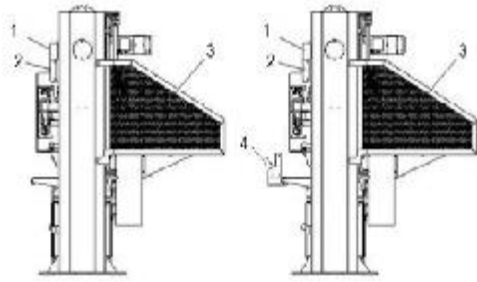
3.1 Manual bridge rockers must have the following specific safety requirements:

- a) fixed or movable protection interlocked at the rear and front of the machine that prevents access to the hazardous zone, except in the region of operation, as shown in Figure 5 of this Annex;
- b) fixed or movable front interlocked protection in the horizontal transmission displacement force transmission area, according to item 12.47 and sub-items of this Regulatory Standard and Figure 5 of this Annex;
- c) actuation by three bimanual actuation devices in accordance with items 12.26 and 12.28 of this Regulatory Standard, being two for the horizontal displacements of the mobile car and another for the vertical cutting movement, according to detail “A” or “B” of the Figure 6 of this Annex;
- d) emergency stop device according to items 12.56 to 12.60 and sub-items of this Regulatory Standard;
- e) have security interface monitoring classified as category 3 or higher, according to ABNT NBR 14153.

3.2 When the hand bridge type rocker has automatic movement of the horizontal movement of the car, it must adopt a front light curtain monitored by safety interface classified as category 3 or higher, according to ABNT NBR 14153 and items 12.38 and 12.39. of this Regulatory Standard.

3.3 When two-hand drive devices are installed on the machine frame, they must be located in such a way that they do not cause a risk of accident such as shearing or crushing due to the vertical or horizontal movement of the carriage.

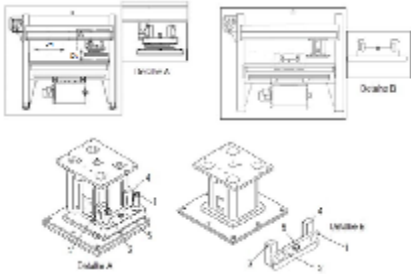
Figure 5: Manual Bridge Rocker - Side View



Subtitle:

1. car guide protection
2. front protection
3. back protection
4. bimanual drive device

Figure 6: Manual Bridge Rocker - Front View



Caption - Detail "A" and "B":

DH. horizontal displacement

DV. vertical displacement

1 and 2. Two-hand drive device, vertical displacement

1 and 3. Two-hand drive device, right horizontal shift

2 and 4. Two-hand drive device, horizontal left shift

5. emergency stop device

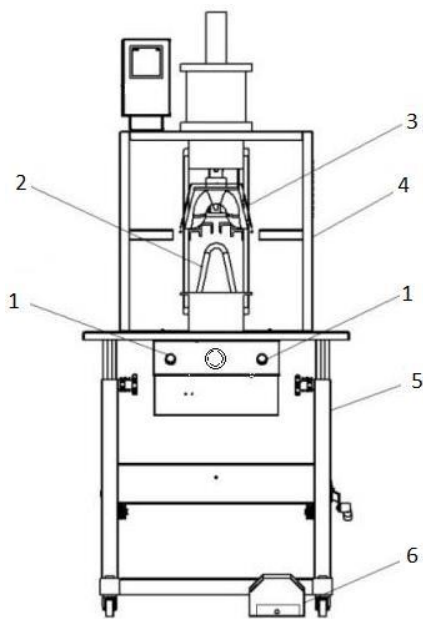
4. Cambride Rubber Machine

4.1 Rubber camber machines must have the following specific safety requirements:

- a) fixed protections in the upper, lateral and rear zones, according to items 12.38 to 12.55 of this Regulatory Standard, according to Figure 7 of this Annex;
- b) approaching the cylinder by means of a continuous action device with approaching force, obeying the provisions of items 12.84 and 12.84.1 of this Regulatory Standard;
- c) actuation of the working pressure by means of a bimanual actuation device, in accordance with item 12.26, sub-paragraphs "a", "c", "d", "e", "f" and "g" of this Standard Regulator, which can only occur after the positioning cylinder is in the lower dead center;
- d) If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

4.2 The return action of the cylinder shall not cause a risk of accident such as shearing or crushing.

Figure 7: Rubber Cambret Machine - Front View



Subtitle:

1. two-hand drive device
2. bottom matrix (rubber)
3. upper matrix
4. fixed protection
5. machine structure
6. drive pedal

5. Camouflage machete machine

5.1 Machete cambres must have the following specific safety requirements:

- a) fixed protections in the upper and rear zones, according to items 12.38 to 12.55 of this Regulatory Standard, according to Figure 8 of this Annex;
- b) The spacing between the movable lower and the fixed upper matrix shall be a maximum of 6 mm (6 mm), as shown in Figures 8 and 9 of this Annex.

5.2 When the movable lower matrix movement system has limitation of working force and pressure, so as not to cause damage to the physical integrity of the workers, in compliance with the items 12.84 and 12.84.1 of this Regulatory Standard, it will be exempt from the mandatory obligation item 5.1, item “b” of this Annex.

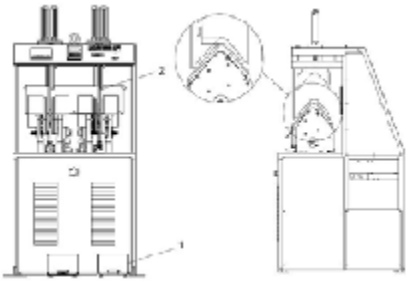
5.3 When the machine is equipped with a support device of the upper, it must be limited to the working force and pressure of the movement mechanisms (pneumatic cylinder), in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

5.4 The machining of camouflage machines can be performed by simple pushbutton, foot pedal or other single-push system.

5.5 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

5.6 The return action of the cylinder shall not cause an accident hazard such as shearing or crushing.

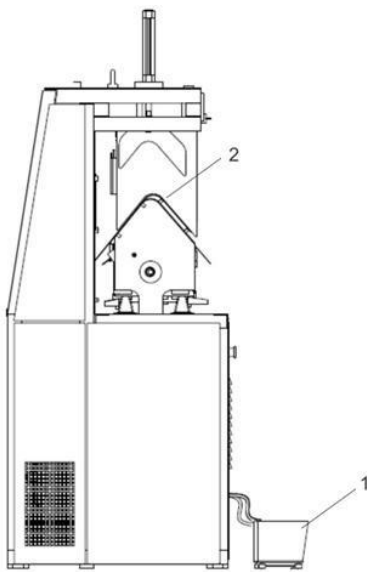
Figure 8: Machete Cambride Machine - Front View



Subtitle:

1. drive pedal protection
2. limitation of desktop opening

Figure 9: Machete Cambride Machine - Side View



Subtitle:

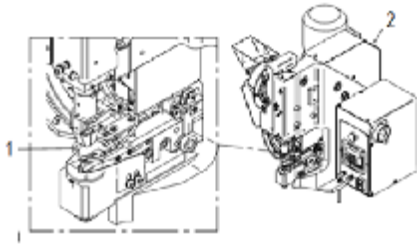
1. drive pedal protection
2. limitation of desktop opening

6. Automatic machine (pneumatic or mechanical) for applying eyelets, rivets and adornments

6.1 Automatic machines (pneumatic or mechanical) for applying eyelets, rivets and adornments shall have the following specific safety requirements:

- a) Electric pedal drive in conjunction with a positive-action keyed interlock mechanical limiting device without the need for safety interface monitoring, as shown in Figure 10 of this Annex;
- b) If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation;
- c) The eyelet / rivet application region shall be provided with an obstruction device at the side and front which makes access to this area difficult.

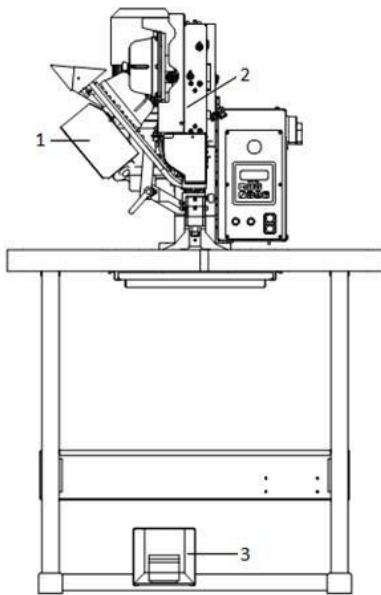
Figure 10: Automatic eyelet, rivet and trim machine - front view detail



Subtitle:

1. mechanical limiting device
2. fixed protection

Figure 11: Automatic eyelet, rivet and trim machine - front view



Subtitle:

1. fixed protection
 2. fixed protection
 3. drive pedal protection
7. Rear Forming Machine

7.1 Rear forming machines shall have the following specific safety requirements:

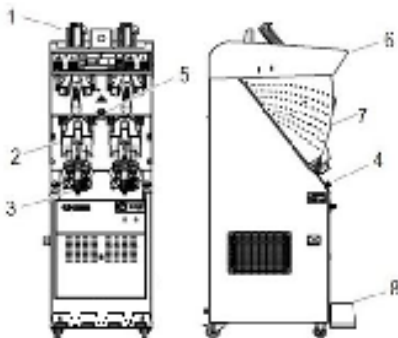
- a) obstruction device in the movement mechanisms of the forming rubbers, according to items 12.38 to 12.55 of this Regulatory Standard and according to Figure 12 of this Annex;
- b) limitation of the approach force of the movement mechanisms of the forming rubbers (hot and cold dies) and the tweezers, obeying the provisions of items 12.84 and 12.84.1 of this Regulatory Standard, being allowed the use of electric pedal, with protection against accidental activation or simple push button.

7.2 When there is a limitation of the approach force according to item “b” of item 7.1 of this Annex, the hot die and cold die working pressure actuations may be performed by two-hand actuating device, in accordance with item 12.26, sub-paragraphs. “A”, “c”, “d”, “e”, “f” and “g” of this Regulatory Standard, either by simple pushbutton or other intentional action device.

7.3 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

7.4 When using a two-hand drive device, in accordance with item 12.26 and its paragraphs, to actuate the working pressure of hot or cold dies, the obligation provided for in item 7.1, item “b” of this Annex shall be waived.

Figure 12: Rear Forming Machine - Front and Side View



Subtitle:

1. hot rubber approach system
2. cold rubber approach system
3. tweezers approach system
4. bimanual drive device - cold matrix
5. simple actuation command
6. fixed or movable upper mechanism protection
7. fixed or movable side protection
8. fixed drive pedal protection

8. Heel Nail Machine

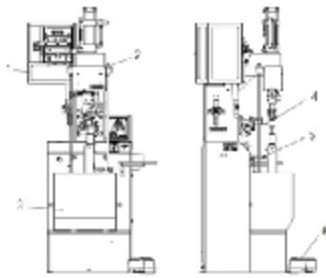
8.1 Heel nailing machines must have the following specific safety requirements:

- a) Interlocking fixed or movable guards of the areas of the nail box mechanism and hammer movement mechanism and the heel support return, in accordance with items 12.38 to 12.55 of this Regulatory Standard, as per Figure 13 of this Annex;
- b) limitation of the approach force of the support and the nail supply, according to items 12.84 and 12.84.1 of this Regulatory Standard;
- c) the nailing action shall be performed by means of a two-hand drive device, in accordance with item 12.26, sub-paragraphs “a”, “c”, “d”, “e”, “f” and “g” of this Standard Regulator;
- d) actuation of the working pressure by the bimanual actuation device may only occur after the positioning cylinder is in the lower dead center;
- e) advance device of the nail supply having a mechanical locking mechanism with a breakable, positive action key, without the need for safety interface monitoring, so that when triggered the supply will return to the starting position.

8.2 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

8.3 When mobile protection is used, the monitoring of safety keys shall be performed by safety interface, complying with category 3, according to ABNT NBR 14153.

Figure 13: Heel Nail Machine - Front and Side View



Subtitle:

1. interlocked fixed or movable nail box protection
2. fixed cylinder tower protection
3. fixed jump support protection
4. feed advance protection lever
5. bimanual drive device
6. fixed drive pedal protection

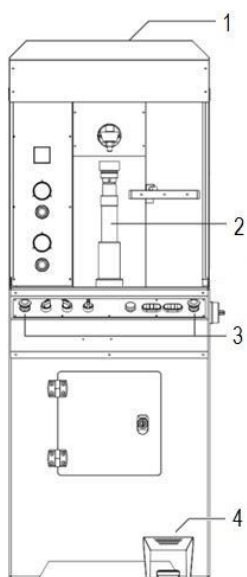
9. Heel Bed Seating and Rear Bounce Machine

9.1 Heel Bed Seating and Rear Bounce machines shall have the following specific safety requirements:

- a) limitation of the approach force of the form fastener in accordance with items 12.84 and 12.84.1 of this Regulatory Standard;
- b) actuation of the working pressure by means of a bimanual actuation device, in accordance with item 12.26, points “a”, “c”, “d”, “e”, “f” and “g” of this Regulatory Standard; which can only occur after the positioning cylinder is in the top dead center;
- c) fixed protection on the side, rear and top of the equipment, as shown in Figure 14 of this Annex.

9.2 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

Figure 14: Automatic heel bed and rear heel seat machine - front view



Subtitle:

1. fixed or movable top protection interlocked
2. approach cylinder
3. two-hand drive device
4. fixed drive pedal protection

10. Rotary Plate Machine (Dubbing)

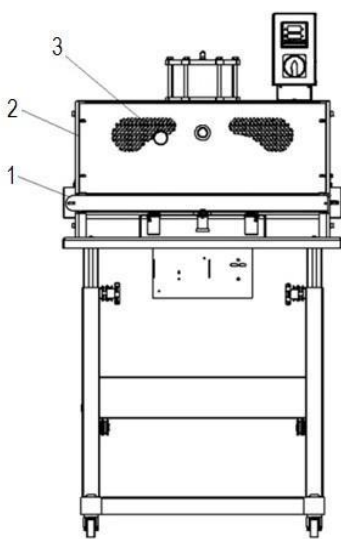
10.1 Turntable (dubbing) machines shall have the following specific safety requirements:

- a) fixed protection on the side, top and rear of the machine, according to items 12.38 to 12.55 of this Regulatory Standard, according to Figure 15 of this Annex;
- b) fixed frontal protection which, in combination with the mechanical restraint device of the turntable, does not allow access to the hazardous area;
- c) turntable with mechanical restraint device, as shown in Figure 16 of this Annex;
- d) The spacing between the mechanical restraint device and the pressing plate shall be a maximum of 4 mm (four millimeters).

10.2 Rotating cymbal (dubbing) machines can be operated by simple pushbutton, foot pedal or other single-push system.

10.3 If a footswitch is used, the footswitch shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

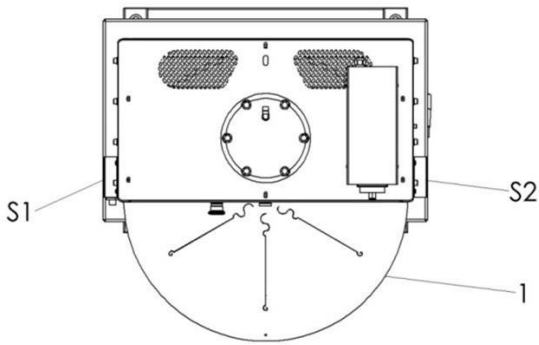
Figure 15: Turntable Machine (Dubbing) - Front View



Subtitle:

1. mechanical turntable lock
2. fixed protection
3. push button

Figure 16: Turntable Machine (Dubbing) - Top View



Subtitle:

1. turntable

S1 left rotate position

S2 rotate position to the right

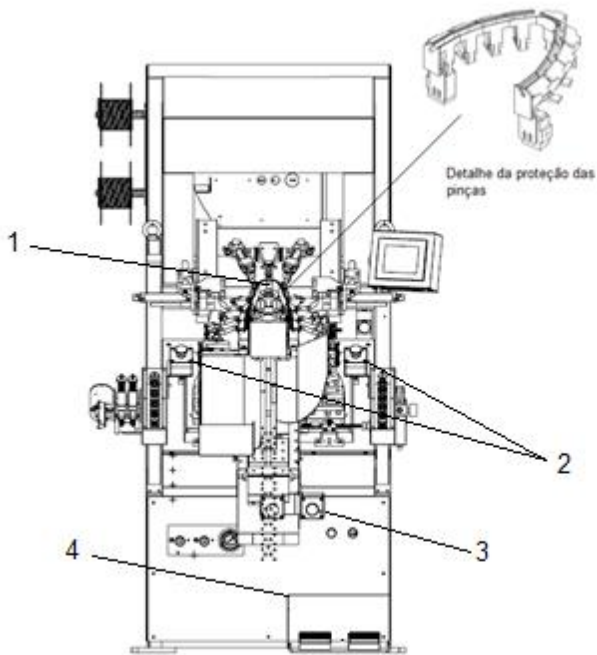
11. Nozzle Mount Machine

11.1 Nozzle assemblers must have the following specific safety requirements:

- a) At least one emergency device, dual channel monitored by safety interface, in accordance with items 12.57 and 12.58 of this Regulatory Standard;
- b) bimanual drive device for closing the scissors, in accordance with item 12.26 of this Regulatory Standard;
- c) lower clamp access obstruction device, as shown in Figure 17 of this Annex;
- d) limitation of the force and working pressure of the rear clamping mechanism, following the provisions of items 12.84 and 12.84.1 of this Regulatory Standard;
- e) monitoring by safety interface classified as category 3 or higher, according to ABNT NBR 14153.

11.2 If electric pedals are used for closing and opening the clamps, the use of a single guard to prevent accidental activation is permitted, as shown in Figure 17 of this Annex.

Figure 17: Nozzle Mount Machine



Subtitle:

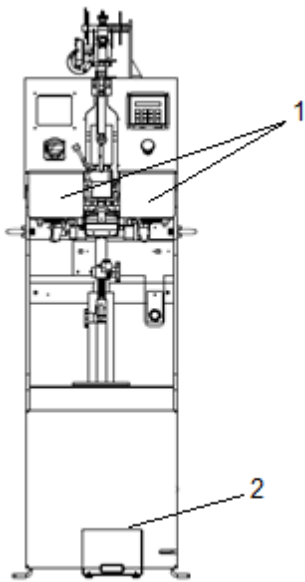
1. fixed protection of the tweezers
2. two-hand drive device
3. emergency stop device
4. fixed drive pedal protection

12. Shoe mount machine (adhesive dowel or adhesive injector)

12.1 Shoe mount machines (adhesive dowel or adhesive injector) shall have the following specific safety requirements:

- a) the machine's foot pedal with access by only one direction and one foot and must be protected to prevent accidental activation;
- b) The feeding or supply region of the machine shall be provided with an obstruction device at the front as shown in Figure 18 of this Annex.
- c) limitation of the working force and working pressure of the pneumatic height reading cylinder, in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

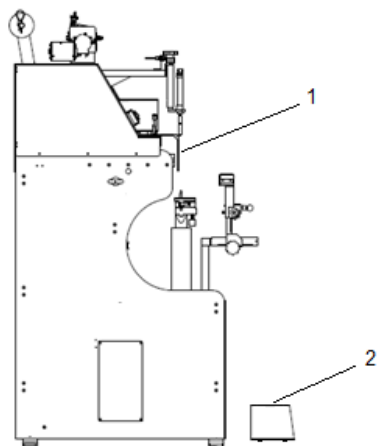
Figure 18: Footwear Mounting Machine



Subtitle:

1. obstruction device
2. fixed drive pedal protection

Figure 19: Footwear Mounting Machine - Side View



Subtitle:

1. obstruction device
2. fixed drive pedal protection

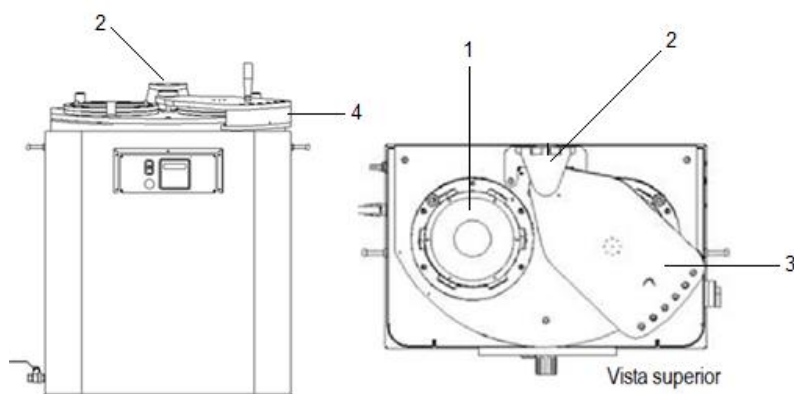
13. Ice cream machines

13.1 Ice cream machines must have the following specific safety requirements:

- a) mechanical restraint device on the compression chamber lid retaining pin and pivot, which withstands the internal pressure of the rubber membrane and does not cause risk of accident by projection of materials while it is pressurized;
- b) cover of the footwear compression chamber interlocked by an electrical device interconnected with a pneumatic valve for air release to the rubber membrane;
- c) cover of the footwear compression chamber provided with a mechanical restraint device (nail) which withstands the internal pressure of the rubber membrane and does not cause a risk of accident by spraying materials while it is pressurized;

- d) Rubber membrane cover locking device for safe transport of the machine.

Figure 20: Ice cream maker



Subtitle:

1. shoe compression chamber
2. mechanical restraint device on the clamping pin and turning of the compression chamber lid
3. compression chamber cover
4. mechanical restraint device (nail) of the compression chamber cover

14. High Frequency Machine

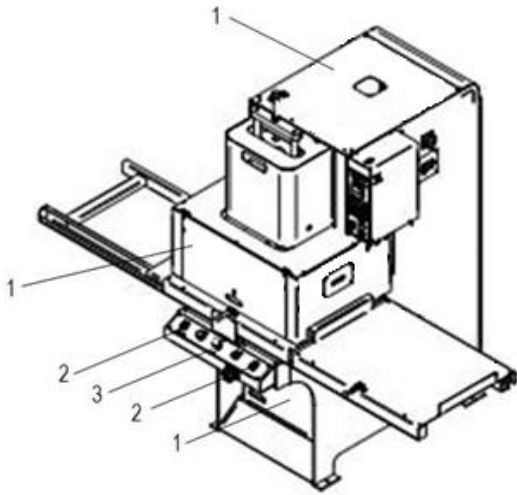
14.1 High frequency machines shall have the following specific safety requirements:

- a) Interlocking fixed or movable guards in accordance with items 12.38 to 12.55 of this Regulatory Standard;
- b) actuation through a bimanual actuation device, in accordance with item 12.26, sub-paragraphs “a”, “c”, “d”, “e”, “f” and “g” of this Regulatory Standard;
- c) dual channel emergency stop device monitored by a safety interface in accordance with items 12.56 to 12.60 of this Regulatory Standard;
- d) thermoforming area of the machine provided with fixed or movable interlocked protection, according to items 12.38 to 12.55 and Table I of Annex I of this Regulatory Standard.

14.1.1 To have security interface monitoring classified as category 3 or higher, according to ABNT NBR 14153, for item 14.1, sub-paragraphs “a”, “c” and “d”, of this Annex.

14.2 When the machine material transport device is manually displaced to the thermoforming area, the use of the two-hand drive device provided for in item 14.1 (b) of this Annex is excluded.

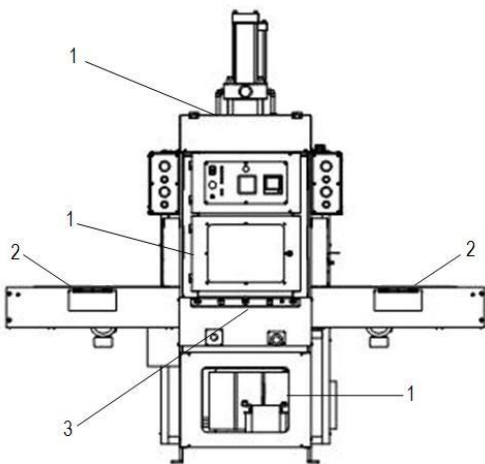
Figure 21: High Frequency Machine with Manual Moving Table



Subtitle:

1. fixed or movable interlocked protection
2. two-hand drive device
3. emergency stop device

Figure 22: Hydro-pneumatic / Hydraulic Automatic Table Displacement High Frequency Cutting Machine - Front View



Subtitle:

1. fixed or movable interlocked protection
2. two-hand drive device
3. emergency stop device

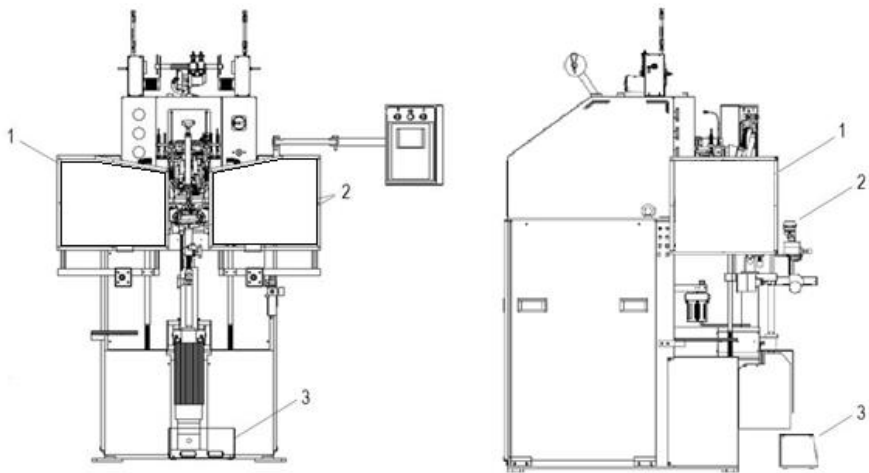
15. Footwear Base and Flanging Machine

15.1 Footwear base and braking machines shall have the following specific safety requirements:

- a) fixed guards at the rear and sides, except in the machine's operating area, where the operator's footwear is positioned, as shown in Figure 23 of this Annex;
- b) obstruction devices that hinder access to the machine's work area in the front, as shown in Figure 23 of this Annex;
- c) footswitch with access by only one direction and one foot, and must be protected to prevent accidental activation;

- d) Two-hand drive device for closing the footrest base and braking and caliper movement, in accordance with items 12.26 and 12.28 of this Regulatory Standard, monitored by safety interface classified as category 4, according to ABNT NBR 14153 ;
- e) limitation of the working force and working pressure of the pneumatic support cylinder of the form, following the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

Figure 23: Shoe mount and base assembly machine



Subtitle:

- 1. fixed protection
- 2. two-hand drive device
- 3. fixed pedal protection

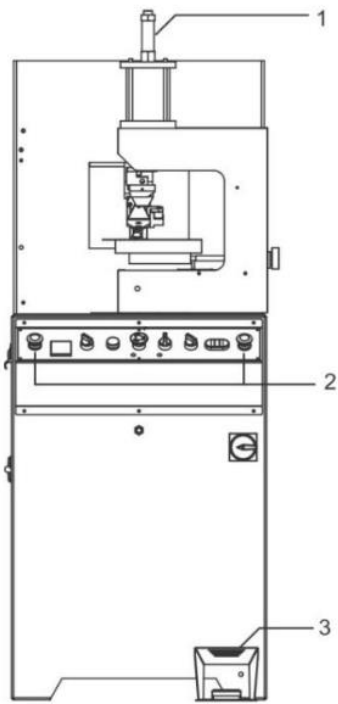
16. Automatic Shoe Plant Bouncing Machine

16.1 Shoe plant bouncing machines shall have the following specific safety requirements:

- a) fixed guards, according to items 12.38 to 12.55 of this Regulatory Standard, except in the machine's operating zone, where the operator's footwear is positioned, as shown in Figure 24 of this Annex;
- b) limitation of the approach force of the support cylinder of the form, obeying the provisions of items 12.84 and 12.84.1 of this Regulatory Standard;
- c) actuation of the working pressure by means of a two-hand actuation device, in accordance with item 12.26, sub-paragraphs "a", "c", "d", "e", "f" and "g" of this Regulatory Standard , which can only occur when the shape support cylinder is in the lower dead center;
- d) limitation of the working force and working pressure of the rotation movement of the footwear's folding device, in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

16.2 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

Figure 24: Automatic Matrix Plant Bouncing Machine - Front View



Subtitle:

1. approach cylinder
2. two-hand drive device
3. fixed drive pedal protection

17. Mobile Carousel Rotary Injection Molding Machine

17.1 Mobile carousel rotary injection molding machines shall have the following specific safety requirements:

17.1.1 Carousel Perimeter Security:

- a) fixed protection and / or movable protection interlocked at the carousel perimeter, in accordance with Table II of Annex I of this Regulatory Standard, except in the areas of footwear component insertion and product extraction;
- b) mobile carousel rotary injection molding machines shall not permit automatic closing of the mold outside the protected region for closing the mold;
- c) Carousel perimeter guards shall not cause the risk of accidents such as shearing or crushing as a result of the carousel rotating motion;
- d) the perimeter of the lower region of the carousel shall be provided with fixed protection and / or interlocking movable protection, as shown in Figure 25 of this Annex.

17.1.2 Safety for the injection zone:

- a) fixed protection and / or movable protection in the injection region preventing access to the injection assembly;
- b) The plasticizing cylinder shall have an obstruction device which makes unintentional contact with hot parts of the injection unit difficult when the contact temperature exceeds 80 ° C (eighty degrees Celsius);
- c) The plasticizing cylinder feed nozzle must be geometryly constructed or have an obstruction device that prevents the upper limbs from entering the plasticizing spindle area.

17.2 Mobile carousel rotary injection molding machines installed up to the date of publication of Ordinance No. 197/2010 are exempt from compliance with the dimensions set forth in items 12.70, paragraphs “c” and “e”, 12.74 and 12.75 of this Regulatory Standard.

17.3 Mobile carousel rotary injection molding machines shall have at least one double-channel emergency stop device located on the machine control panel and an emergency stop device in the operating zone near the mold closure area. , in accordance with items 12.56 to 12.63 of this Regulatory Standard.

17.4 Mobile carousel rotary injection molding machines can be operated by simple pushbutton to start operation in semi-automatic mode.

17.5 If mobile protection is used, it must be interlocked by a safety switch, double channel, monitored by safety interface, classified as category 3 or higher, according to ABNT NBR 14153.

17.6 Serial connection of up to 4 (four) mobile protections of infrequent use (opening frequency less than or equal to once per hour) and non-simultaneous opening is permitted on the same safety interface, or safety keys of 1 (one) frequent use protection (opening frequency greater than once per hour) and 1 (one) infrequent use protection, with non-simultaneous opening.

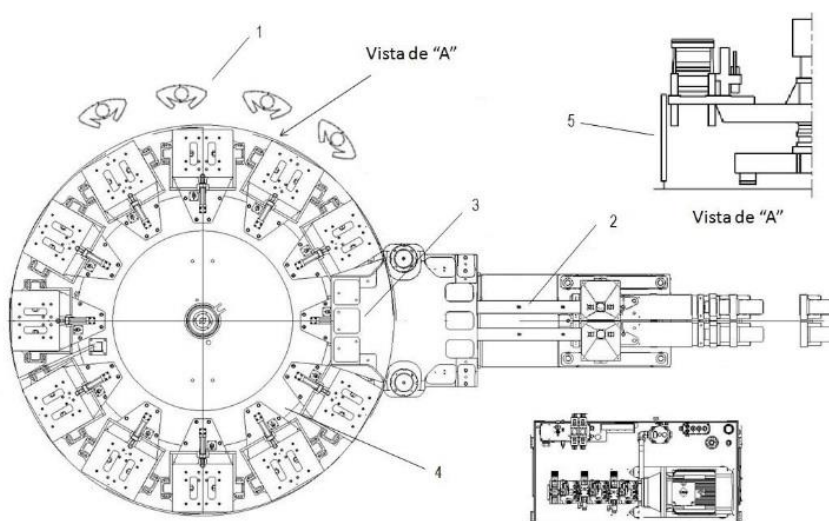
17.7 The electric circuit of the start and stop command of the mobile carousel rotary injection machine electric motor shall have a contactor, without the need for safety interface monitoring.

17.8 For mobile carousel rotary injection molding machines, the monitored hydraulic valve for the mold opening and closing system, classified as category 3 or higher according to ABNT NBR 14153, applies.

17.8.1 Mobile carousel rotary injection machines enclosed in the injection region or inaccessible to operators are exempt from item 17.8 of this Annex.

17.9 Rotating mobile carousel injection molding machines with human opening and closing of the mold are exempt from item 17.8 of this Annex.

Figure 25: Mobile Carousel Rotary Injection Molding Machine



Subtitle:

1. operation zone
2. injection assembly
3. injection zone
4. carousel

5. interlocked fixed or movable lower carousel guard

18. Manual Embellishment Nailing Machine (Riveter)

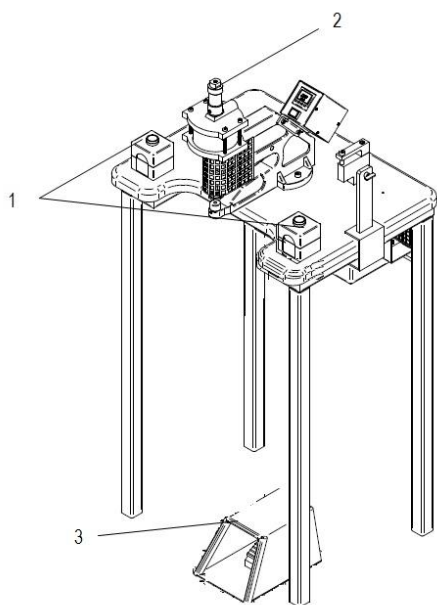
18.1 Hand embellishments (riveting machines) shall have the following specific safety requirements:

- a) approaching the cylinder by means of a continuous action device with approach force, according to items 12.84 and 12.84.1 of this Regulatory Standard;
- b) activation of the working pressure by means of a two-hand actuating device, in accordance with item 12.26, sub-paragraphs “a”, “c”, “d”, “e”, “f” and “g” of this Standard Regulator, which can only occur after the positioning cylinder is in the lower dead center.

18.2 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental activation.

18.3 For hand embellishment, it is not necessary to install fixed or movable interlocked guards for the machine's peripheral, side, rear and top.

Figure 26: Hand Embellishment (Riveting) - Isometric View



Subtitle:

1. two-hand drive device
2. approach cylinder
3. fixed drive pedal protection

19. Machine for dubbing or joining pneumatically actuated shoe components

19.1 Machines for dubbing or joining pneumatically driven shoe components shall have the following specific safety requirements:

- a) fixed protections in the upper, lateral and rear zones, according to items 12.38 to 12.55 of this Regulatory Standard, according to Figure 27 of this Annex;
- b) movable guard at the front, operating area of the machine, provided with mechanical restraint device, which acts synchronously at the opening of that guard;

c) the actuation can be done through a simple control button.

19.2 Machines for dubbing or joining pneumatically operated shoe components that have a manually movable drawer type table are exempt from compliance with item 19.1 of this Annex and shall have the following specific safety requirements:

- a) pneumatic valve that blocks the air flow of the system when the movable guard is open;
- b) movable protection interlocked by safety key, interconnected to the control valve of the pneumatic cylinder to act on the dubbing plateau.

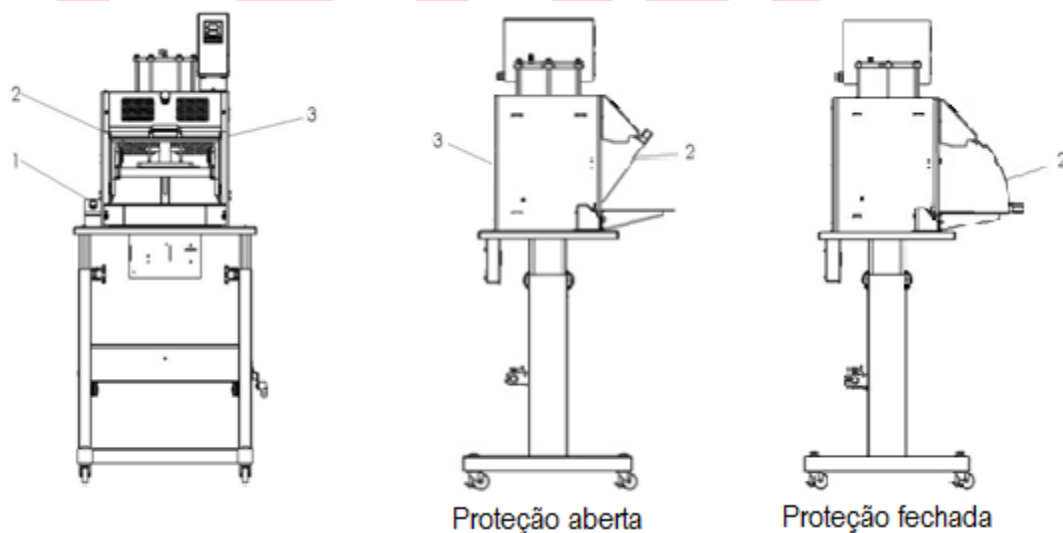
19.2.1 The pneumatic airflow control valve referred to in item 19.2 (a) of this Annex may be actuated mechanically by closing the movable guard.

19.3 When mobile protection is used, it must be interlocked with a safety key, without the need for monitoring by safety interface, complying with category 1, according to ABNT NBR 14153.

19.4 Machines for dubbing or joining pneumatically operated shoe components that have a movable drawer-type movable table shall be exempt from compliance with items 19.1 (b) and 19.2 of this Annex and shall have the following specific safety requirements. :

- a) bimanual drive device according to items 12.26 and 12.28 of this Regulatory Standard, monitored by safety interface classified as category 4, according to ABNT NBR 14153;
- b) mechanical restraint device that limits the travel of the movable table.

Figure 27: Dubbing or Joining Footwear Machine - Front and Side View



Subtitle:

- 1. push button
- 2. front movable protection
- 3. fixed protection

20. Frog Mouth Machine

20.1 Frogmills must have the following specific safety requirements:

- a) fixed guards, at the rear and sides of the machine, in accordance with items 12.38 to 12.55 of this Regulatory Standard and according to Figure 28 of this Annex;

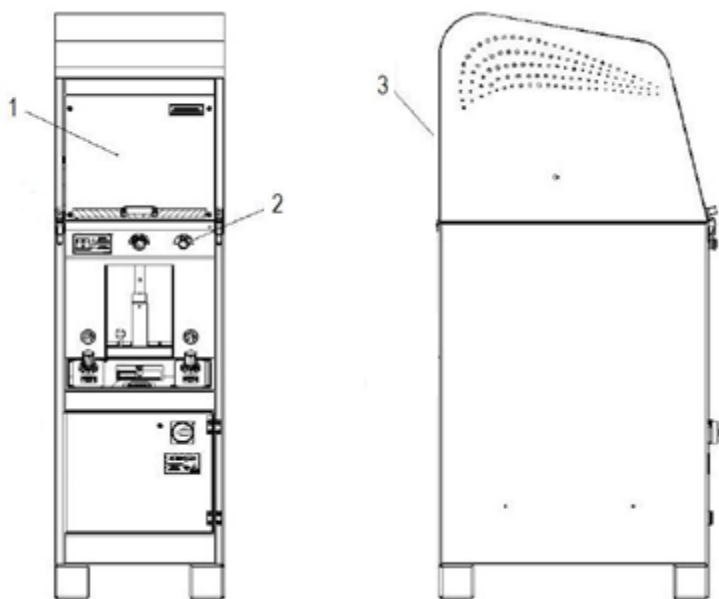
- b) cover (hood) of the footwear compression chamber provided with a mechanical restraint device that supports the internal pressure of the rubber membrane while it is pressurized;
- c) Mobile safety interlocked by double channel safety switch, monitored by safety interface, according to items 12.38 to 12.55 of this Regulatory Standard, which supports the possible projection of material fragments in case of failure of the lid locking system (hood) ;
- d) cover (hood) of the footwear compression chamber with a mechanical restraint device that prevents its unintentional closing when the movable guard is open.

20.2 Frog-mouth machines may be operated by simple push-button, or by the start-up interlocked protection in accordance with item 12.45.1 of this Regulatory Standard, or by another single-push system.

20.3 Compliance with sub-paragraph “c” of item 20.1 of this Annex is not required when the compression cap is provided with a safety system that ensures chamber pressurization only if the cap is closed and locked, category 3 provided for in ABNT NBR 14153.

20.3.1 For machines that have the safety system provided for in this item, there shall be a two-hand drive system according to item 12.26, points “a”, “c”, “d”, “e”, “f” and “g”, of this Regulatory Standard.

Figure 28: Frog Mouth Machine - Front View and Side View



Subtitle:

- 1. mobile protection
- 2. cycle start button
- 3. fixed protection

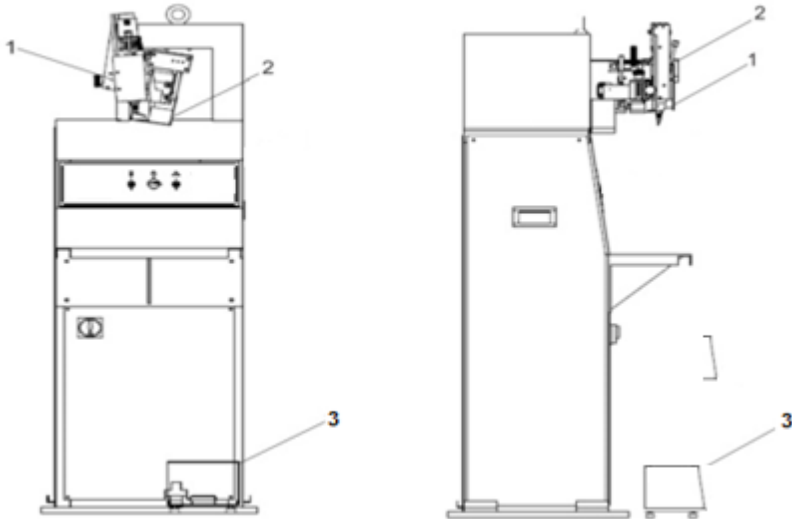
21. Side Mount Machine

21.1 Side-mount machines must have the following specific safety requirements:

- a) fixed protection on the cardan shaft, according to items 12.38 to 12.55 of this Regulatory Standard and according to Figure 29 of this Annex;
- b) obstruction device that hinders access to the heating device and the adhesive application zone, as shown in Figure 29 of this Annex;

c) footswitch with access only by one direction and one foot and must be protected to prevent accidental activation.

Figure 29: Side Mount Machine - Front and Side View



Subtitle:

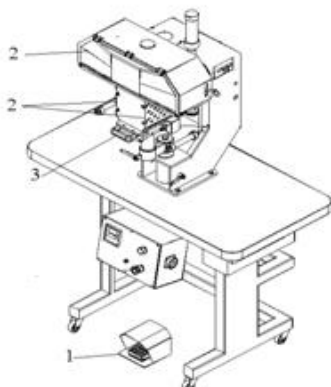
1. heating system obstruction device and application of thermoplastic adhesive
2. cardan shaft protection
3. fixed drive pedal protection

22. Sole and Insole Stamping Machine

22.1 Sole and insole stamping machines shall have the following specific safety requirements:

- a) mobile protection interlocked by a double channel safety switch, monitored by a safety interface that meets category 3, according to ABNT NBR 1453, and according to items 12.38 to 12.55 of this Regulatory Standard;
- b) Foot pedal with access only by one direction and one foot, and must be protected to prevent accidental activation.

Figure 30: Sole and Insole Stamping Machine



Subtitle:

1. fixed drive pedal protection
2. movable stamping protection

3. retractable table

23. Scratching and marking machine

23.1 Trimming and marking machines must have the following specific safety requirements:

- a) fixed protection on the sides and rear and movable protection interlocked by safety key in the front of the operating zone, according to items 12.38 to 12.55 of this Regulatory Standard, without the need for monitoring by safety interface;
- b) limitation of the working force and working pressure of the movement mechanisms (pneumatic cylinder), in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

23.2 The actuation may be performed by simple pushbutton, or by the interlocked protection with start command, according to item 12.45.1, or by another simple actuation system.

23.3 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental operation.

24. Split Splitting Machine

24.1 Split splitting machines must have the following specific safety requirements:

- a) fixed protection and / or movable protection, interlocked by a safety key, double channel, in the operating region, upper covers and knife sharpening area, with safety distances in accordance with Table II of Annex I to this Standard. Regulator;
- b) Fixed and / or movable safeguards interlocked by safety key, monitored by safety interface, in power transmissions, according to items 12.47 and 12.47.1 of this Regulatory Standard;
- c) dual channel emergency stop device in accordance with items 12.57 and 12.60 of this Regulatory Standard.

24.2 Monitoring of safety keys and emergency pushbutton may be performed by only one safety interface, complying with category 3, according to ABNT NBR 14153.

24.2.1 Serial connection of up to 4 (four) movable guards of infrequent use (opening frequency less than or equal to once per hour) and non-simultaneous opening is permitted on the same safety interface. , or security keys of 1 (one) protection of frequent use (opening frequency greater than once per hour) and 1 (one) protection of infrequent use, with non simultaneous opening.

25. Chamfering Machine

25.1 Cutting chamfering machines must have the following specific safety requirements:

- a) fixed protection and / or movable safety protection interlocked by double channel, in the sharpening zone, with safety distances in accordance with Table II of Annex I of this Regulatory Standard, without the need for monitoring by safety interface;
- b) Interlocked fixed or movable guards in the power transmission system, in accordance with items 12.38 to 12.55 of this Regulatory Standard
- c) the spacing between the guide and the cutting die must be a maximum of 4 mm (four millimeters).

26. Tape open stitching machine

26.1 Tape gluing and sewing machines shall have the following specific safety requirements:

- a) obstruction device which makes it difficult to gain access to the reinforcement tape transport zone;
- b) limitation of the working force and working pressure of the closing pneumatic cylinder movement mechanisms, in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard;
- c) footswitch with access only by one direction and one foot and must be protected to prevent accidental activation.

27. Pad Printing Machine

27.1 Tampon machines shall have the following specific safety requirements:

- a) obstruction device in the lateral and posterior regions of the movement of the stamp movement (plug);
- b) limitation of the working force and working pressure of the vertical movement mechanisms of the seal (cap), in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

27.2 The horizontal displacement of the seal (plug) must not cause the risk of accidents such as shearing or crushing due to the forward and backward movement of the pneumatic cylinder.

27.3 The actuation may be carried out by simple pushbutton, or by a foot pedal or other actuation system.

27.3.1 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental operation.

27.3.2 If drive by two-hand drive device is used, it shall be in accordance with item 12.26, paragraphs “a”, “c”, “d”, “e”, “f” and “g” of this Standard Regulatory

28. Embroidery Machine

28.1 Embroidery machines shall have, as a specific safety requirement, fixed guards in the power transmission system in accordance with items 12.38 to 12.55 of this Regulatory Standard.

28.2 Embroidery machines with more than one head and automatic sewing machines shall have the following specific safety requirements:

- a) has an obstruction device that prevents access to the needle work zone when the jig is positioned in the working position, or movable interlocking guard, or an optical-electronic device that interrupts the movements generated by the head assembly when the safety is triggered, complying with category 1 provided in ABNT NBR 14153;
- b) have a device that prevents the movements generated by the shuttle during the coil change, complying with category 1 provided in ABNT NBR 14153.

29. Gluing Machine

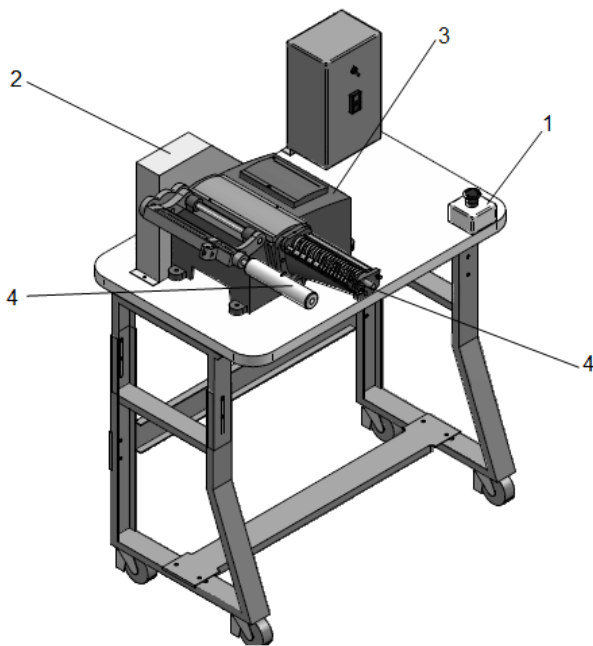
29.1 Gluing machines must have the following specific safety requirements:

- a) fixed protection inside the glue storage chamber, preventing access to the glue carrier thread, according to items 12.38 to 12.55 of this Regulatory Standard;

- b) fixed protection in the power transmission system, according to items 12.38 to 12.55 of this Regulatory Standard;
- c) emergency stop device, without the need for monitoring by safety interface, complying with category 1 provided for in NBR 14153;
- d) force exerted between the rollers cannot be sufficient to cause damage to the physical integrity of the workers, in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

29.2 The area of application of glue (rolls) is exempt from compliance with item “b” of item 29.1 of this Annex.

Figure 31: Gluing Machine



Subtitle:

- 1. emergency stop device
- 2. fixed protection of power transmission system
- 3. glue storage chamber
- 4. glue application zone (rollers)

30. Steam Armor Reactivate Machine

30.1 Steam-armored reactivation machines shall have, as a specific safety requirement, limitation of the working force and working pressure of the movement mechanisms (pneumatic cylinder), in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard.

30.2 The actuation may be carried out by simple pushbutton or by foot pedal or by another actuation system.

30.3 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental operation.

30.4 If drive by two-hand drive device is used, it shall be in accordance with item 12.26, paragraphs “a”, “c”, “d”, “e”, “f” and “g” of this Regulatory Standard.

31. Rotographic Machine

31.1 Rotographic machines shall have the following specific safety requirements:

- a) force exerted between the rollers may not be sufficient to cause damage to the physical integrity of workers, in compliance with the provisions of items 12.84 and 12.84.1 of this Regulatory Standard;
- b) fixed protection in the power transmission system, according to items 12.38 to 12.55 of this Regulatory Standard;
- c) emergency stop device, double channel, without the need for monitoring by safety interface, meeting category 1, according to ABNT NBR 14153.

31.2 If a foot pedal is used for approach operation, it shall be accessible only by one direction and one foot and shall be protected to prevent accidental operation.

31.3 The paint application area (rollers) is exempt from compliance with item “b” of item 31.1 of this Annex.

32. Sewing Machine

32.1 Sewing machines shall have, as a specific safety requirement, fixed guards on the power transmission system, except on the steering wheel, in accordance with items 12.38 to 12.55 of this Regulatory Standard.

32.2 Sewing machine drive pedals are exempt from adopting fixed protection except for bubble type drive pedals.

33. General provisions

33.1 In the impossibility of applying the measures prescribed in this Annex, other protective measures and security systems may be adopted, observing the items 12.5 and 12.38.1 of the body of this Standard, provided that they guarantee the same effectiveness of the protections and devices mentioned in this Annex. , and comply with the provisions of current official technical standards types A and B and, in their absence, applicable international standards.

33.2 The adoption of other security measures, including administrative ones, is permitted, as long as the company is adapting to the deadlines provided for in the publication order of this Annex, provided that there is no exposure of workers to serious and imminent risk.

ANNEX XI

MACHINERY AND IMPLEMENTS FOR AGRICULTURAL AND FORESTRY USE

1. This Annex applies to the design, manufacture, importation, trading, exhibition and cession in any way of stationary or non-stationary machinery and implements for agriculture and forestry use, and also to the machinery and equipment for storage and drying and their conveyors such as silos and dryers.

2. The protections, devices and safety systems provided in this Annex shall integrate the machinery from its manufacture, and cannot be considered optional items for any purposes.

3. The starting, actuation and stop devices of stationary machinery and equipment shall be designed, selected and installed so that they:

- a) are not localized in their hazardous areas;
- b) prevent inadvertent actuation or shutdown by the operator or by any other accidental way;

- c) do not provide additional risks;
 - d) cannot be juggled; and
 - e) can be activated or shut off in case of emergency by a person other than the operator.
- 4.** The starting or actuation commands of the stationary machinery shall have devices to prevent their automatic operation when energized.
- 5.** The machinery whose actuation by unauthorized persons may show a risk to health or safety integrity of any person shall have a system or, in the case of self-propelled machinery, ignition switch, that allows the lock of their actuation devices.
- 6.** Danger zones of machinery and implements shall have safety systems, characterized by fixed protections, moveable protections and interconnected or non-interconnected safety devices to ensure protection to health and physical integrity of workers.
- 6.1** The adoption of safety systems, particularly in the areas of operation that shows danger, shall consider the technical characteristics of the machine and the working process and the existing measures and technical choices in order to achieve the necessary safety level provided in this Standard.
- 6.1.1** The functional components of process and work areas of self-propelled machinery and implements, which need to be exposed for correct operation, shall be properly protected to the maximum possible extent, in order to allow the operational functionality as intended, meeting the current technical standards and the exceptions listed in Table II of this Annex.
- 6.2** For the purposes of applying this Annex, is considered protection the element used specifically to provide safety through a physical barrier, where can be:
- a) fixed guard, which must be kept in position permanently or by means of fasteners that only allow their removal or opening with the use of tools; *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*
 - b) moveable protection, which can be opened without the use of tools, usually by mechanical elements connected to the machine structure or a near fixed element, and shall be joined with the interlocking devices.
- 6.3** For the purposes of applying this Annex, are considered safety devices the components, alone or connected or related to protections, that reduce risks of accidents and other health injuries being classified as:
- a) electrical controls and safety interfaces: devices responsible to perform the monitoring, that verifies the connection, position and operation of other system devices and prevent the occurrence of a failure that causes the loss of safety function, such as safety relays, safety configurable controllers and safety programmable logic controller - PLC;
 - b) interlocking devices: electromechanical safety switches, with positive and break action, magnetic and electronic coded, optoelectronics, safety inductive sensors and other safety devices that have the purpose of preventing the operation of machine elements under specific conditions;
 - c) safety sensors: mechanical and no-mechanical presence detectors devices, that act when a person or part of your body penetrate the danger zone of a machine or equipment, sending a signal to stop or prevent the start of hazardous actions such as light curtains, optoelectronics presence detectors, laser of multiple beams, optical barriers, area monitors or scanners, stops, carpets and position sensors;
 - d) valves and safety blocks or pneumatic and hydraulic systems with the same effectiveness;

- e) mechanical devices, such as: restraint devices, limiters, separators, pushers, inhibitors, baffles and retractable; and
- f) validation devices: supplementary hand-operated control devices, that when applied on a permanent mode, enable the actuation device, such as lockable switches and lockable devices.

6.3.1 The components related to safety systems and actuation and stop controls of the stationary machines, including the emergency, shall ensure the safe state of the machinery or equipment when there are fluctuations in energy level beyond the limits considered in the design, including the power outage and reestablishing of energy supply.

6.4 The protections shall be designed and built to meet the following safety requirements:

- a) perform their functions appropriately during the useful life of the machine or permit the replacement of damaged or deteriorated parts;
- b) be built of resistant and suitable materials to contain the projection of parts, materials and particles;
- c) firm fixation and guarantee of stability and mechanical strength compatible with the required stresses;
- d) not create gripping or crushing points with machine parts or other protections;
- e) cannot have ends and sharp edges or other dangerous projections;
- f) withstand the environmental conditions of the place where they are installed;
- g) prevent from being juggled;
- h) provide hygiene and cleanliness conditions;
- i) prevent access to the danger zone;
- j) have their interlocking devices adequately protected from dirt, dust and corrosion, if necessary;
- k) take positive action, i.e. acting in a positive mode; and
- l) not entail additional risks;
- m) have dimensions as provided on Item A of Annex I of this Standard.

6.4.1 When the protection is made of a discontinued material, shall be noted the safety distances to prevent access to danger zones, as provided in Annex I, Item A of this Standard.

6.5 The protection shall be moveable when the access to a danger zone is required one or more times per shift, noting that:

- a) the protection shall be associated with an interlocking device when its opening does not allow access to the danger zone before the elimination of risk; and
- b) the protection shall be associated with an interlocking device with lock when its opening allow access to the danger zone before the elimination of risk.

6.5.1 For self-propelled machinery and their implements, the protection shall be moveable when access to a danger zone is required more than once per shift.

6.5.2 The machinery and equipment with a moveable protections associated with interlocking devices shall:

- a) operate when the protections are closed only;
- b) stop their hazardous functions when the protections are opened during operation; and
- c) ensure that the closing of the protections alone cannot initiate the dangerous functions.

6.5.2.1 The self-propelled machinery are exempted from meeting the paragraphs "a" and "b" of sub-item 6.5.2 of this Annex for access in maintenance and inspection operations, provided these operations are performed by trained or qualified worker.

6.5.3 For the self-propelled machinery, it is allowed the use of mechanical interlocking device of single actuation and not-monitored to protect the engine compartment.

6.5.4 The interlocking devices with lock associated to the moveable protections of machinery and equipment shall:

- a) allow operation while the protection is closed and locked only;
- b) keep the protection closed and locked until the injury risk have been eliminated due to hazardous functions of the machinery or equipment;
- c) ensure that the closure and lock of the protection by itself can not initiate the dangerous functions of the machinery or equipment.

6.5.4.1 Self-propelled machines are not required to comply with sub-item 6.5.4 "a" and "b" for access in maintenance and inspection operations, provided they are performed by a skilled or qualified worker. *(Amended by Ordinance MTb No. 1,110 of September 21, 2016)*

6.6 The power transmissions and the moveable components connected to them, accessible or exposed, shall be protected by fixed or moveable protections with interlocking devices, which prevents access from all sides, with the exception the provided on sub-item 6.1.1 of this Annex and the exceptions provided on Table II of this Annex.

6.6.1 When used moveable protections to confine the power transmissions that have inertia, shall be used interlocking devices with lock.

6.6.1.1 In harvesters, in a maintenance or inspection situation, when guards are opened or accessed by exposing machine elements that still rotate or move after power interruption, visible evidence shall be provided in the area near the opening. of rotation, or indication of rotation beep or appropriate safety sticker. *(Inserted by MTE Ordinance No. 1,893, of December 9, 2013)*

6.6.2 The harvester protections must: *(Inserted by MTE Ordinance No. 1,893, of December 9, 2013)*

- a) be designed taking into account the risk to the operator and the generation of other hazards, such as preventing debris build-up and fire hazard;
- b) reach the maximum extension, considering the functionality of the harvester;
- c) be flagged for risk;
- d) have an indication of the risk information contained in the instruction manual.

6.7 The drive shaft (cardan) shall have adequate protection, in perfect condition in its full length, fixed in the machine power take-off from the cross head to the coupling of the implement or equipment.

6.8 The machinery and equipment that provide a risk of rupture of its parts, projection of parts or materials in processing, shall have protections to ensure health and safety of workers, unless the exceptions shown on Tables I and II of this Annex.

6.8.1 The brush cutters shall have protective devices against the throw of solid materials.

6.9 The machinery to cut, chop, triturate, grind, shred and similar shall have safety systems that prevents the contact of the operator or all other persons with the danger zones.

6.10 On protections away from stationary machinery, where there is a possibility of someone getting into the danger zone, shall be adopted additional safety measures of collective protection to prevent starting the machine while there are persons in that area.

6.11 The openings for supply of machinery or implements that are located at the support point level of the operator or below him, shall have protection to prevent the persons to fall inside.

6.12 When the machinery or implement characteristics require that the protections are also used as a means of access, they shall meet the strength and safety requirements appropriate for both purposes.

6.12.1 The bottom of the steps or the stair shall have protection - riser, whenever a protruding part of the foot or hand of the worker can contact a hazardous zone.

6.13 Hoses, pipes and pressurized components of self-propelled machinery and their implements must be located or protected so that in a ruptured situation the fluid is not discharged directly to the operator when at the operating station. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

6.13.1 For hoses with a working pressure greater than 50 bar, the danger of “whipping” must be prevented by fixed guards and / or securing means such as chains, cables or supports. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

6.13.1.1 In addition, the ratio between working pressure and hose burst pressure shall be at least 3.5. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

6.13.1.2 Alternatively, to prevent “whipping”, hoses and terminals may be used to prevent hose tearing at the connection and unintentional disassembly, using at least two steel weft and flanged, shaped or the use of penetrating ring terminals - washers - in contact with the flexible element is prohibited. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

6.14 For self-propelled machines, hot surfaces that may be unintentionally touched by the operator during normal machine operation shall be protected. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

7. The batteries shall meet the following minimum safety requirements:

- a) located so that their maintenance and replacement can be performed easily from the ground or from a support platform;
- b) setting up and fixing in order to have no accidental displacement; and
- c) positive terminal protection in order to prevent accidental contact and short circuit.

8. The self-propelled machinery manufactured from May 2008 under the auspices of NR 31 Regulatory Standard given by the Governmental Decree No. 86, March 3rd, 2005, shall have headlights, rear position

lamps, horn, rear view mirror and automatic backup alarm coupled to the transmission system, unless the exceptions listed in Table I of this Annex.

9. The self-propelled machinery shall have Rollover Protective Structure - ROPS and seat belts, except those listed in Table II of this Annex, which shall be used in accordance with the specifications and recommendations given in the manufacturer manuals.

10. The self-propelled machinery during the operation that shows risks of falling objects on the workstation shall have Falling Object Protective Structure - FOPS.

11. In power take-off - PTO of agricultural tractors, shall be installed a protection that covers the top and the sides, as shown in Figure 1 of this Annex.

12. The tractive machinery and equipment shall have coupling systems for towing by the drive system, in order to ensure the easy and safe coupling and decoupling, as well as to prevent the accidental decoupling during use.

12.1 The indication for use of coupling systems cited on item 12 shall be in place for easy visualization and fixed in a place near the connection.

12.2 The tractive implement, if the weight of the tow bar so requires, shall have support device that enables the reduction of efforts and the safe connection to the drive system.

13. The conveyor belts shall have:

- a) braking system along the spaces where there are access to workers;
- b) device that stops its actuation when necessary;
- c) start preceded by audible signal in the entire operation area which indicate its actuation;
- d) falling material protection system, when a risk of accidents to workers during operation or movement in its vicinity;
- e) systems and walkways allowing that maintenance works are developed in a safe manner;
- f) walkways with falling protection system along the full high length where may be circulation of workers; and
- g) locking system to be used in maintenance.

13.1 Are excepted from the requirement of item 13 the conveyor belts installed on self-propelled machinery, implements and in conveyor belts for loading and unloading.

14. The machinery and equipment shall have instruction manuals supplied by the manufacturer or importer with information relating to safety at all stages of transport, assembly, installation, adjustment, operation, cleaning, maintenance, inspection, deactivation, dismantling.

14.1 The manuals shall:

- a) be written in Portuguese Language - Brazil, with characters of type and size to allow the better readability possible, followed by explanatory illustrations;
- b) be objective, clear, unambiguous and easy understanding language;
- c) have signs or warnings regarding to safety; and

d) remain available to all users in the workplaces.

14.2 The manuals of machinery and equipment manufactured in Brazil or imported shall contain, at least, the following information:

- a) legal name, corporate identity number (CNPJ) and address of manufacturer or importer, if any;
- b) type and model;
- c) serial number or identification number and year of manufacture;
- d) detailed description of the machinery or equipment and their accessories;
- e) diagrams, including electrical circuits, especially the schematic representation of the safety functions, as appropriate, for stationary machinery.
- f) definition of the intended use of the machinery or equipment;
- g) risks where the users are exposed;
- h) definition of existing safety measures and those to be adopted by the users;
- i) technical specifications and limitations for its use with safety, including the criteria for slope work for machinery and implements, as appropriate;
- j) risks that can result from tampering or removal of protections and safety devices;
- k) risks that can result from uses other than those prescribed in the design;
- l) procedures for the use of machinery or equipment safely;
- m) procedures and schedule for inspections and maintenance;
- n) basic procedures to be adopted in emergencies.

15. Machinery, equipment and implements shall have accesses permanently fixed and secured at all their points of operation, supply, raw materials insertion and removal of products worked, preparation, maintenance and constant intervention.

15.1 Are considered means of access lifts, ramps, walkways, platforms or stairs.

15.1.1 In the technical impossibility of applying the means provided on sub-item 15.1, may be used a ship-type ladder.

15.1.2 The self-propelled machinery and implements with technical impossibility to adopt the means of access provided on sub-item 15.1, where the presence of the worker is required for inspection and maintenance and that are not accessible from the ground shall have support means such as handles or handrails, bars, footrest or steps with slip-resistant surface, ensuring the operator to maintain support contact at three points throughout the access time in order to make it safe, as set forth on item 15.21 of this Annex.

15.1.2.1 Shall be used a safe mean of access indicated in the operation manual, in situations that do not apply the means provided on sub-item 15.1.2.

15.2 The places or worksites above ground level where there is access for workers for interventions shall have stable and safe working platforms.

15.3 Shall be provided means of access if the height from the ground or from the floor to the operator station of machinery is greater than 0.55 m (fifty-five centimeters).

15.4 In self-propelled machinery used in the construction industry with agroforestry application, the means of access shall be provided if the height from the ground to the operator station is greater than 0.60 m (sixty centimeters).

15.5 In rice harvesters, harvesters equipped with conveyor belts and other harvesters equipped with self-leveling system, means of access shall be provided if the height from the ground to the operator station is greater than 0.70 m (seventy centimeters).

15.6 In machinery, equipment and implements, the permanent means of access shall be located and installed in order to prevent risks of accidents and facilitate their use by workers.

15.7 The means of access of stationary machinery, except elevator and ship-type ladder, shall have falling protection system with the following characteristics:

- a) be sized, built and secured in a safe and resistant manner, in order to withstand the stresses;
- b) be made of material resistant to weathering and corrosion;
- c) having upper cross member from 1.10 m (one meter and ten centimeters) to 1.20 m (one meter and twenty centimeters) in height from the floor along the entire length on both sides;
- d) the upper cross member shall not have flat surface, in order to prevent the placement of objects; and
- e) have skirting-board of at least 0.20 m (twenty centimeters) in height and intermediate cross member to 0.70 m (seventy centimeters) in height from the floor, located between the skirting-board and the upper cross member.

15.7.1 If there is danger of falling objects and materials, the clearance between the skirting-board and the upper cross member of the railing shall receive fixed, full and resistant protection.

15.7.1.1 The protection cited on item 15.7.1 may be formed of resistant screen, provided its mesh does not allow the passage of any object or material that can cause injuries to the workers.

15.7.2 For the falling protection system in platforms used in supply operations or that accumulate dirty is allowed the adoption of the dimensions of Figure 5 of Annex III.

15.8 The use of the means of access for stationary machinery shall consider the pitch angle as shown in Figure 1 of Annex III.

15.9 The catwalks, platforms, ramps and stairs shall provide safe working conditions, circulation, movement and handling of materials and:

- a) be sized, built and secured in a safe and resistant manner, in order to withstand the stresses and safe movement of workers;
- b) have floors and steps made of slip-resistant materials or coatings;
- c) be kept clear; and
- d) be located and installed as to prevent risk of falling, slipping, tripping and excessive physical efforts by workers to use them.

15.10 The ramps with slopes between 10° (ten) and 20° (twenty) degrees from the horizontal plane shall have horizontal cross parts securely attached to prevent slipping, spaced with each other 0.40 m (forty centimeters) in all its entire length when the floor is not slip-resistant.

15.11 It is prohibited to build ramps with slopes greater than 20° (twenty) degrees from the floor.

15.12 The catwalks, platforms and ramps shall have the following characteristics:

- a) minimum useful width of 0.60 m (sixty centimeters) for machinery, except for self-propelled machinery and implements which have to meet the minimum width determined according to specific technical standard;
- b) means of drainage, if necessary; and
- c) cannot have skirting-board in the access clearance.

15.12.1 The working width of planter inspection and maintenance platforms shall be at least 0.3m (30cm) per ISO 4254-9 or later. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

15.13 In stationary machinery, the stairs with riser shall have:

- a) width of 0.60 m (sixty centimeters);
- b) steps with a minimum depth of 0.20 m (twenty centimeters);
- c) uniform steps and flights, leveled and without protrusions;
- d) height between the steps of 0.20 m (twenty centimeters) to 0.25 m (twenty-five centimeters);
- e) rest platform with 0.60 m (sixty centimeters) to 0.80 m (eighty centimeters) of width and length at intervals of not more than 3.00 m (three meters) in height.

15.14 In stationary machinery, the stairs without riser shall have:

- a) minimum width of 0.60 m (sixty centimeters);
- b) steps with a minimum depth of 0.15 m (fifteen centimeters);
- c) uniform steps and flights, leveled and without protrusions;
- d) maximum height between steps of 0.25 m (twenty-five centimeters);
- e) rest platform with 0.60 m (sixty centimeters) to 0.80 m (eighty centimeters) of width and length at intervals of not more than 3.00 m (three meters) in height;
- f) minimum projection of at least 0.01 m (ten millimeters) of one step on the other; and
- g) steps with depth that meets the formula: $600 \leq g + 2h \leq 660$ (dimensions in millimeters) as shown in Figure 2 of this Annex.

15.15 In stationary machinery, the fixed ship-type ladders shall have:

- a) safe and resistant sizing, construction and fastening to withstand stresses; *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*

- b) provision of materials or coatings resistant to weathering and corrosion, if they are exposed to corrosive or external environment;
- c) roll cages, in the event to have a height greater than 3.50 m (three meters and fifty centimeters), installed from 2.0 m (two meters) from the floor, exceeding the rest platform or the top floor in at least 1.10 m (one meter and ten centimeters) to 1.20 m (one meter and twenty centimeters);
- d) handrail or continuation of the stair pillars exceeding the rest platform or the top floor of 1.10 m (one meter and ten centimeters) to 1.20 m (one meter and twenty centimeters);
- e) width of 0.40 m (forty centimeters) to 0.60 m (sixty centimeters), as shown in Figure 3 of Annex III;
- f) maximum total height of 10.00 meters (ten meters), if a single flight;
- g) horizontal bar spacing from 0.25 m (twenty five centimeters) to 0.30 m (thirty centimeters), as shown in Figure 3 of Annex III to this Standard; *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*
- h) spacing between bars of 0.25 m (twenty-five centimeters) to 0.30 meters (thirty centimeters), as shown in Figure 3 of Annex III;
- i) distance from the structure to which it is fixed is at least 0.15 m (fifteen centimeters), as shown in Figure 4C of Annex III to this Standard; *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*
- j) horizontal bars 0.025m (twenty five millimeters) to 0.038m thirty eight millimeters) in diameter or thickness; and *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*
- k) horizontal bars with surfaces, shapes or grooves to prevent slippage. *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*
- l) bars with surfaces, shapes or grooves to prevent slippage.

15.15.1 The protective cages shall have a diameter of 0.65m (sixty-five centimeters) to 0.80m (eighty centimeters), as shown in Figure 4 C of Annex III and: *(Amended by Ordinance MTE No. 1,893, of 09 December 2013)*

- a) have vertical bars with a maximum spacing of 0.30m (thirty centimeters) from each other and a
- b) maximum distance of 1.50m (one meter and fifty centimeters) between arches, as shown in figures 4A and 4B of Annex III; or *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*
- c) Spans between arches of a maximum of 0.30 m (thirty centimeters), as shown in Figure 3 of Annex III, with a vertical bar supporting the arches. *(Amended by Ordinance MTE No. 1,893, of December 9, 2013)*

15.16 The means of access for self-propelled machinery and implements, shall have the following characteristics:

- a) be sized, built and secured in a safe and resistant manner, in order to withstand the stresses;
- b) be made of material resistant to weathering and corrosion; and
- c) the upper cross member shall not have flat surface, in order to prevent the placement of objects.

15.17 The steering wheel cannot be considered support handle.

15.18 The tires, hubs, wheels and fenders are not considered steps for access to the operator stations.

15.19 The fenders can be considered as steps to reach provided they are designed for that purpose.

15.20 In crawler machinery, the track shoes and the supporting surface of the track shoes can be used as access steps provided they are designed for that purpose and if is guaranteed to the operator support in three-points of contact throughout the access time.

15.21 The self-propelled machinery and implements shall be provided with handrails or handles - handgrips, in one or both sides of the means of access that provides a risk of falling or access to danger areas, which shall have:

- a) design so that the operator can keep support contact at three points throughout the access time;
- b) cross section width of 0.025 m (twenty-five millimeters) and 0.038 m (thirty-eight millimeters);
- c) lower end in at least one handrail or handle located up to 1600 mm (one thousand six hundred millimeters) from the ground surface;
- d) minimum clearance of 0.050 m (fifty millimeters) between the handrail or handle and the adjacent parts for hand access, except in the attachment points;
- e) a handle installed from the last top step of the mean of access to a height of 0.85 m (eighty-five centimeters) to 1.10 meters (one meter and ten centimeters); and
- f) handle with minimum length of 0.15 m (fifteen centimeters).

15.21.1 The support points for hands shall be at least 0.30 meters (thirty centimeters) from any articulation element.

15.22 Ladders used for access to the operating station of self-propelled machinery and implements must meet one of the following requirements:

- a) the slope α shall be between 70° (seventy degrees) and 90° (ninety degrees) in relation to the horizontal, as shown in Figure 2 of this Annex; or (*Amended by MTPS Ordinance No. 211 of December 9, 2015*)
- b) In the case of an α slope of less than 70° (seventy degrees), the dimensions of the steps shall meet the equation $(2B + G) \leq 700$ mm, where B is the vertical distance in mm and G the horizontal distance in mm between steps, the remaining dimensions remaining as shown in Figure 2 of this Annex. (*Amended by MTPS Ordinance No. 211 of December 9, 2015*)

15.22.1 The steps shall have:

- a) slip-resistant surface;
- b) vertical stops on both sides;
- c) projection to minimize the water and dirt accumulation, in normal working conditions;
- d) height of the first step reached with the largest tires suitable for the machine;
- e) appropriate clearance on the rear, when used without riser, so as to provide a reliable support for the feet;
- f) dimensions as shown in Figure 2 of this Annex; (*Amended by MTPS Ordinance No. 211 of December 9, 2015*)

- g) height of the first one from the ground up to 700 mm (seven millimeters) for rice harvesters or harvesters equipped with tracks and other harvesters equipped with self-leveling system; and
- h) height of the first one from the ground up to 600 mm (six hundred mm) for self-propelled machinery use in construction industry with agroforestry application.

15.22.2 The connection between the first step and the second step can be articulated.

15.22.3 There shall be no risk of cutting, crushing or uncontrollable movement for the operator in the movement of moveable means of access.

15.23 The self-propelled machinery platforms and implements that shows risk of falling for the workers shall be accessed by steps and have falling protection system according to the dimensions of Figure 5 of Annex III of this Standard.

15.23.1 The fall protection system for platforms other than harvester operation is not required to comply with the requirements of Annex III, figure 5, provided that they have an upper bar mounted on one side at a height of 1m (one meter). 1.1m (one meter and ten centimeters) from the floor and intermediate bar installed from 0.4m (forty centimeter) to 0.6m (sixty centimeters) below the upper bar. *(Inserted by MTE Ordinance No. 1,893, of December 9, 2013)*

15.23.1.1 The platforms indicated in item 15.23.1 can only be accessed when the machine is stopped. *(Inserted by MTE Ordinance No. 1,893, of December 9, 2013)*

15.24 The operation platform or work floor of self-propelled machinery and implements shall:

- a) be flat, level and secured in a safe and resistant manner;
- b) have slip-resistant surface;
- c) having means of drainage, if necessary;
- d) be continuous, except for tractors called "superimposed," and that could be of two levels; and
- e) not have skirting board in the platform clearance.

15.24.1 The moveable or retractable means of access of platforms and cabs, for transportation purposes, shall have restraint system of access clearance.

15.25 The filler neck of fuel tank and other materials shall be located no more than 1.5 m (one meter and fifty centimeters) above support point of the operator.

15.25.1 If the provisions of sub-item 15.25 cannot be met for the fueling operations and other materials, in self-propelled machinery shall be fitted access step with handles to ensure three points of contact throughout the task.

15.25.2 If the provisions of sub-item 15.25 cannot be met for the fueling operations of self-propelled machinery that have the tank located on the rear or side, can be used platform or external stair which will serve as a support for safe performance of the task.

16. Self-propelled machinery and implements are excluded from the requirements of item 12.122 of the general part of NR-12, and safety signs must be adopted in accordance with current regulations. *(Inserted by MTPS Ordinance No. 211 of December 9, 2015)*

17. Self-propelled machines and their implements must have in a visible place the indelible information, containing at least: *(Item and paragraphs inserted by MTPS Ordinance No. 211 of December 9, 2015)*

- a) Company name, CNPJ and address of the manufacturer or importer;
- b) information on model, engine power for tractors and capacity where applicable to the type of equipment (eg transport or lifting equipment);
- c) serial number and year of manufacture when not included in the serial number.

Figure 1
Protective cover of the PTO for agricultural tractors

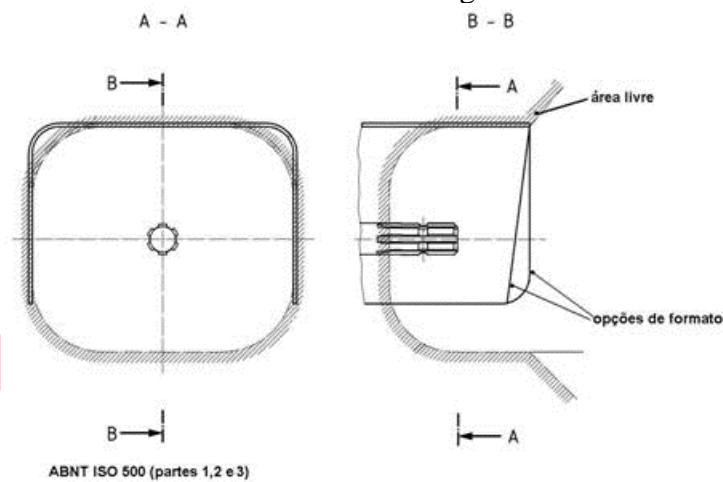
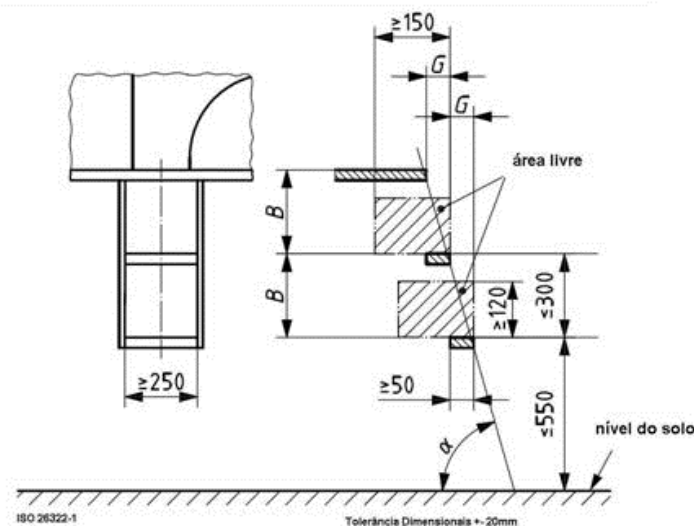


Figure 2
Dimensions in millimeters of means of access for self-propelled machinery



Subtitle:

- B: vertical distance between successive steps
- G: horizontal distance between successive steps
- α : angle of inclination from the horizontal

Table I - Machinery excluded

Machinery Type	Item 9 ROPS	Item 9 Seat belt	Sub-item 6.8 Guard against projection of material processing	Item 8 Backup Alarm coupled to The transmission system and rear-view Mirror	Item 8 Headlights, horn and rear position lamps
Power cultivators	X	X	X	X	X
Other microtractor and self-propelled lawnmowers (total gross weight below 600 kg)	X	X	X	X	X
Self-propelled sprayers	X				
Self-propelled and tractive fertilizer	X		X		
Grain, cereal, forage, coffee, sugar cane, cotton and orange harvesters among others.	X		X		
Hydraulic excavators	X				
Tractive planters	X	X	X	X	X
Implement holder platform (coupled to power cultivator)	X	X	X	X	X

Table II - Exclusions to the protection in moveable parts (sub-items 6.1.1 and 6.6)

Machinery-implement	Description of exclusion
Power cultivators	Area of the active part of the implement coupled according to the application.
Other microtractor and self-propelled lawnmowers (total gross weight below 600 kg)	Area of the lawnmower, underneath the machine, protected by side protections.
Self-propelled and tractive fertilizer	Distribution area - Distributor area (disk or tube); Area of transportation and helical tracks.

Grain or cereal harvesters	Cutting and feeding or capture area (cut/gathering platform); Area of expulsion and projection of waste (straw spreader); Area of unloading (grain unloader pipe).
Sugar cane harvesters	Cutting or gathering area of sugar cane to be processed (cut/gathering units); Area of material projection/unloading (chopper and material conveyor).
Cotton harvesters	Area of gathering the cotton fiber; Area of unloading of bale of cotton.
Coffee harvesters	Area of vibrating rods assembly, retractable blades, conveyors and unloading.
Orange harvesters	Area of vibrating rods assembly, retractable blades, conveyors and unloading.
Hydraulic excavators, feller bunchers and harvesters	Area of cutting, delimiting, processing or loading logs.
Tractive and self-propelled foragers	Area of cutting or gathering of the plant to be processed (cut or gathering platform); Area of unloading/projection of the triturated material.
Tractive planters	Cutting lines of straw and its components; Planting lines and their components; Area of distribution of seeds and fertilizers.

ANNEX XII LIFTING EQUIPMENT FOR PEOPLE LIFTING AND WORKING AT HEIGHT

(Inserted by Ordinance SIT No. 293 of December 8, 2011)

(Writing by Ordinance MTb No. 1,110 of September 21, 2016)

AERIAL BASKET: Vehicle equipment intended for lifting persons to perform work at height, provided with a movable, articulated, telescopic or mixed arm, with a bucket or platform, with or without electrical isolation, and, provided it is designed for this purpose, may also lift material by winch and boom (JIB), complying with the manufacturer's specifications.

COUPLED BASKET: Bucket or platform attached to a vehicle crane for lifting people and performing work at heights, with or without electrical insulation, and can also lift support material indispensable for carrying out the service.

SUSPENDED BASKET: Assembly consisting of the suspension system and the bucket or platform suspended by hoisting equipment that meets the safety requirements of this annex for use at work at heights.

1. For the purposes of this Annex, the following definitions are considered: Nominal working height (for overhead baskets and attached baskets): Distance measured at the maximum elevation from the bottom of the bucket to the ground, plus 1.5 m.

Cradle: Crane boom support bracket in its stowed position.

Bucket or platform (see figure 1): Component designed to accommodate and move people to the working position.

Nominal Load (Gross Load): Capacity established by the manufacturer or by a Legally Qualified Professional for certain configuration of crane and platform equipment.

Nominal Bucket or Platform Capacity: The maximum bucket capacity established by the manufacturer in terms of weight and expected number of occupants.

Chassis (see figure 1): It is the structure of the whole assembly where the rotating mechanism, column, arms and lances are mounted, as well as the stabilizer system.

Load Capacity Rating (load chart): Set of rated loads for stipulated crane equipment configurations and operating conditions.

Command: System responsible for executing a function.

Control: Interface actuator between operator and control.

Insulating Bowl or Liner: Component designed to be accommodated within the bucket, platform or similar support capable of modifying the electrical properties of the bucket / platform. It can be of two natures:

- **Insulating Liner / Bowl:** Bucket accessory designed to ensure electrical insulation in Insulated Overhead Baskets, applicable according to insulation class and working method.
- **Conductive Liner / Tub:** Bucket accessory for potential equalization between the network, the metal parts and the electrician, for work by the potential method.

Non Destructive Testing: Examination of Air Baskets or their components without altering their original characteristics. Therefore, they (Air Basket and components), after undergoing these tests, should function as before. These include, but are not limited to: Visual Inspection, Acoustic Emission, Magnetic Particle / Penetrating Liquid, Ultrasound and Dielectric tests.

Trolley up and down traction device: System or device that controls the motorized lifting or lowering of the bucket or platform, preventing free fall.

Sling, sling or sling: A device made up of cables and accessories designed to interconnect the hoisting equipment with the bucket or platform.

Stabilizers (see figure 1): Devices and systems used to stabilize the overhead basket, attached basket or hoisting equipment.

Stabilize / Stability: Safe working condition provided by the manufacturer to prevent tipping.

Brake: Device used to slow or stop movement.

Automatic brake: Device that slows or stops movement without operator action when equipment-specific operating parameters are reached.

Swivel (see figure 1): Rotational movement of the column or tower, boom or movable arm about the vertical axis.

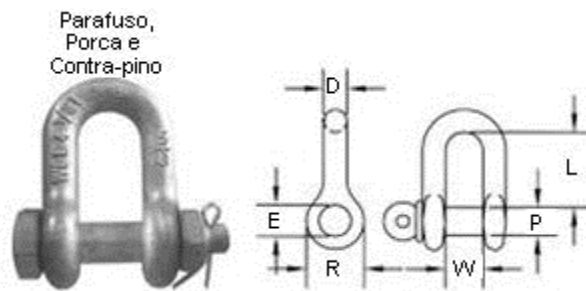
Insulation degree: Baskets isolated areas are classified according to their electrical insulation class, defined in 3 categories according to ABNT NBR 16092: 2012.

Vehicle Crane: Vehicle hydraulic equipment with articulated, telescopic or mixed movable arm designed to lift loads.

JIB: Auxiliary boom attached to the main boom end for the purpose of lifting or supporting additional loads.

Boom or movable arm (see figure 1): Articulated, extendable or mixed component that supports and moves the bucket or platform.

Shackle: Accessory for moving or securing cargo, consisting of two easily detachable parts consisting of body and pin.



Cargo handling plan (Rigging Plan): It consists of the formal planning of a moving with a mobile or fixed crane, aiming at the optimization of the resources applied in the operation (equipment, accessories and others) to avoid accidents and wasted time. It indicates, by studying the load to be hoisted, the machines available, accessories, ground conditions and wind action, which are the best solutions for safe and efficient lifting.

Attachment (s): Place in the bucket or platform for connection to the suspension system.

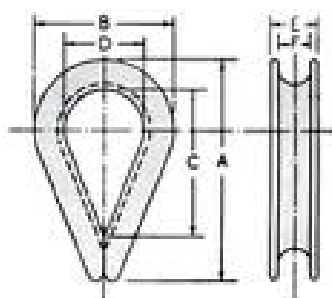
Access Position: Position that allows access to the platform or bucket. Access position and transport position may be identical.

Transport Position: The transport position of the platform or hopper is the manufacturer's recommended position in which the overhead basket or attached basket is transported / moved to the place of use on public roads or inside construction sites.

Transport position for coupled basket: Transport position is that defined by the manufacturer when the crane booms are positioned on the cradle or on the truck body, provided that the transport dimensions (width and height) are not exceeded in accordance with current legislation.

Cargo Handling Professional (Rigger): Responsible for the planning and preparation of the cargo handling plan, as provided for in item 12.138 of this Standard.

Sneaker: Element used for wire rope eye protection.

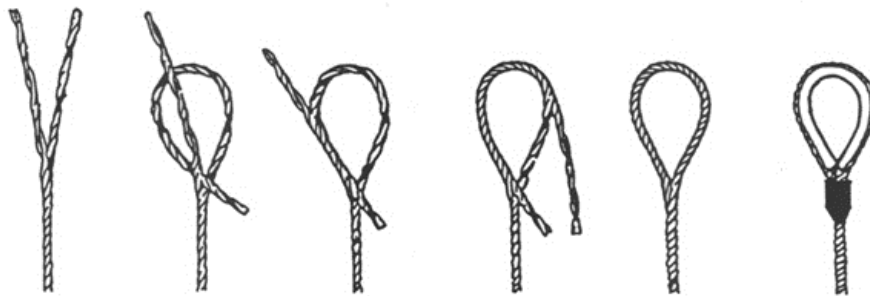


Suspension System: Cable or slings and other components, including fasteners, used to attach hoisting equipment to the bucket or platform.

Dedicated Suspension System: This is the one that can only be used for operation in conjunction with the bucket. When the safety requirements of this annex are met, it may be fitted with a coupled basket or hanging basket.

Moment Limiting System: Safety system that operates when the limit of the moment of loading is reached, preventing movements that increase the moment of loading.

Super Loop: Eyelet made by opening the end of the cable in two halves. One half is bent to form an eye, and then the other half is woven into the empty space of the first.



Work by potential method: Methodology of work in electrical networks with voltages greater than 60kV, where, through clothing and other specific means, the worker is equalized at the same potential of the electrical network (same voltage level), enabling work in contact direct with the electrical conductor.

Check Valve: Safety valve that prevents unintentional and unwanted movement of hydraulic equipment in case of hose rupture and / or loss of hydraulic pressure.

Counterbalance Valve: Safety valve with the function of eliminating oscillations (pulses) generated by the dynamic action of the output pulse and the braking impulse, when moving up and down the mobile arm of a hydraulic equipment, making its movement smoother and safe for the operator.

Holding Valve: Safety valve with combined counterbalance and retention functions. It also has a feature that allows its manual operation to retract the movable arm of hydraulic equipment in case of hose rupture and / or loss of hydraulic pressure.

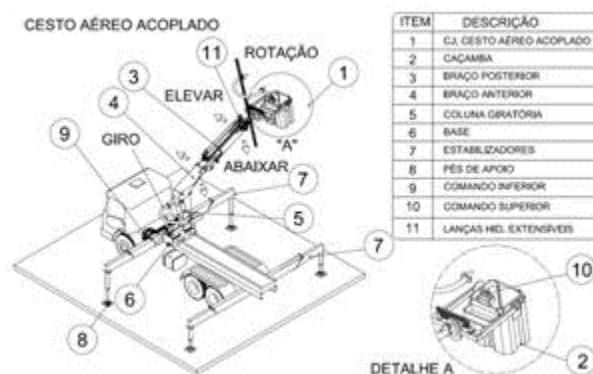


Figure 1: Example of coupled basket arrangement

2. AIR BASKETS

2.1 Air baskets shall have:

- a) harness anchor, according to the manufacturer's design and signaling;
- b) all controls clearly identified as to their functions and protected against inadvertent and accidental use;

- c) Top and bottom hopper movement controls, which shall return to the neutral position when released by the operator, except the control of hydraulic tools;
- d) lower and upper controls for winch and pressure valve operation to limit the load on winch-equipped aerial baskets and “JIB” for lifting material if fitted with this accessory;
- e) safety locking device to prevent inadvertent actuation of the upper controls;
- f) upper controls on or beside the bucket and readily accessible to the operator;
- g) readily accessible lower controls provided with a means of overriding upper control of bucket movement;
- h) emergency stop device at the upper and lower controls and shall remain functional in both cases;
- i) check valves on the stabilizer shoe hydraulic cylinders and check and counterbalance or holding valves on the swingarm hydraulic cylinders to prevent undesirable movement in the event of pressure loss in the hydraulic system;
- j) stabilizer system, with tilt indicator installed, in a location that allows viewing during stabilizer operation to show if the equipment is positioned within the lateral tilt limits allowed by the manufacturer;
- k) inadvertent outrigger controls that return to the neutral position when released by the operator, located at the base of the mobile unit, so that the operator can see the outriggers moving;
- l) selector valve, next to the outrigger control, which in one position blocks the operation of the outriggers and in the other position, the movement controls of the bucket (s);
- m) system that prevents the operation of the stabilizer shoes without prior retraction of the movable arm to a safe transport position;
- n) emergency operation system that allows the movement of the arms and rotation of the tower in case of failure, except in the case provided for in point “o”;
- o) emergency operation feature that allows the movement of the arms and rotation of the tower in case of rupture of hydraulic hoses;
- p) point for grounding.

2.2 The bucket or platform must be sized to support and accommodate the operator (s) and tools required to perform the service.

2.2.1 Buckets (non-conductive):

- a) Buckets made of non-conductive material must meet the requirements of ABNT NBR 16092: 2012 and its Annex “C”;
- b) the bucket of insulated overhead baskets shall be provided with a liner, except for work by the potential method;
- c) There shall be no openings or passageways in insulated overhead buckets except for potential method work.

2.2.2 Metal platforms (conductive):

a) shall have a fall protection system of at least 990 mm in height and other requirements of items 12.70, paragraphs “a”, “b”, “d” and “e”, 12.71, 12.71.1 and 12.73, points “ a ”,“ b ”and“ c ”of this Regulatory Standard;

b) When access to the platform is by means of a gate, it shall not be capable of opening outwards and shall have a locking system that prevents accidental opening.

2.3 Insulated and non-insulated overhead baskets shall have an automatic and active bucket leveling system through a mechanical or hydraulic system that works integrally with the movements of the movable arm and independent of the action of the gravity force.

2.3.1 Baskets uninsulated areas with up to 10 years of use, counted from the validity of this annex, are exempt from the requirement of item 2.3, and may have a gravity bucket leveling system.

2.3.2 The use of non-insulated aerial baskets that do not have an active and automatic bucket leveling system is prohibited.

2.4 For services on lines, networks and energized installations with voltages above 1,000V, a isolated aerial basket must be used, which has the degree of isolation, categories A, B or C, according to ABNT NBR 16092: 2012 standard, and other collective protective measures shall be taken to prevent the risk of electric shock in accordance with NR-10. *(Amended by Ordinance MTb n.º 1.083, on December 18th, 2018)*

2.5 For services on lines, networks and energized installations with voltages equal to or below 1,000V, the bucket must have its own insulation and be equipped with an insulating tub (liner), thus ensuring the proper degree of insulation, and other collective protective measures shall be taken to prevent the risk of electric shock in accordance with NR-10. *(Amended by Ordinance MTb n.º 1.083, on December 18th, 2018)*

2.6 For services in the vicinity of energized or accidentally energized lines, networks and installations where the worker may enter the controlled area with a part of his body or with conductive extensions, the equipment shall also be of adequate insulation, noting that:

a) if the work is performed near voltages above 1,000 V, the aerial basket shall be isolated, as provided in item 2.4 of this Annex;

b) if the work is close to voltages equal to or less than 1,000 V, the bucket must guarantee the insulation, as provided in item 2.5 of this Annex;

c) other collective protective measures shall be adopted to prevent the risk of electric shock, in accordance with NR-10.

2.7 In overhead buckets with two buckets, the upper controls shall be positioned within the reach of the operators without disengaging their seat belt.

2.8 Lower air basket controls should not be operated with bucket workers except in emergency situations or when the operation or activity so requires.

2.9 The movement of cargo in overhead baskets is prohibited, except the tools, equipment and materials for the safe carrying of the task.

2.10 The tools, equipment and materials to be transported must not have dimensions that may bring risks or discomfort to workers.

2.11 The total weight of workers, tools, equipment and materials may not exceed the rated load capacity of the bucket at any time.

2.12 Aerial baskets shall have an identification plate located at the bottom of the equipment which shall contain at least the following information:

- a) brand;
- b) model;
- c) isolated or not isolated;
- d) qualification test and test date, if applicable;
- e) serial number;
- f) date of manufacture (month and year);
- g) nominal load capacity;
- h) nominal working height;
- i) hydraulic system pressure;
- j) number of buckets;
- k) air basket insulation category, if applicable;
- l) Company name and CNPJ of the manufacturer or importer;
- m) installation company;
- n) existence of material handling accessories (winch and JIB);
- o) indication that the equipment complies with ABNT NBR 16092: 2012.

2.13 Air baskets shall be provided with safety signs, complying with the requirements of this NR, and shall also include:

- a) risks involved in the operation of the equipment;
- b) load capacity of the bucket and material handling equipment (winch and JIB);
- c) information regarding air basket usage and load capacity for multiple configurations.

2.14 Aircraft basket controls shall be marked with symbols and / or inscriptions describing their functions.

2.15 Air baskets shall be subjected to the inspections and tests provided for in ABNT NBR 16092: 2012.

2.16 In the case of transfer of ownership, it is the buyer's responsibility to inform the airframe manufacturer within 30 days of receipt of the equipment, its model and serial number, as well as the CNPJ number and the address of the new owner.

2.17 The seller shall provide and deliver the air basket manual to the buyer.

3. COUPLED BASKETS

3.1 Coupled baskets shall have:

- a) harness anchor, according to the manufacturer's design and signaling;
- b) all controls clearly identified as to their functions and protected against inadvertent and accidental use;
- c) upper and lower hopper movement controls that return to the neutral position when released by the operator;
- d) safety device or system that prevents inadvertent actuation of the upper controls;
- e) upper controls on or beside the bucket and readily accessible to the operator;
- f) readily accessible lower controls provided with a means of overriding the upper body handling control;
- g) emergency stop device in the upper and lower controls, and should remain functional in both cases;
- h) check valves on the stabilizer shoe hydraulic cylinders, and check and counterbalance or holding valves on the swingarm hydraulic cylinders to prevent undesirable movement in the event of pressure loss in the hydraulic system;
- i) inadvertent outrigger controls that return to neutral when released by the operator, located at the base of the crane, so that the operator can see the outriggers moving;
- j) valve or selector switch, with the outrigger control, which in one position blocks the operation of the outriggers and in the other position the movement controls of the hoisting equipment;
- k) system that prevents the operation of the stabilizer shoes without the prior retraction of the movable arm to a safe transport position;
- l) emergency operation system that allows the movement of the arms and rotation of the tower in case of failure, except in the case provided for in sub-paragraph "m";
- m) resource for emergency operation that allows the movement of the arms and rotation of the tower in case of rupture of hydraulic hoses;
- n) stabilizer system with tilt indicator installed next to the outrigger controls on both sides to show if the equipment is positioned within the tilt limits allowed by the manufacturer;
- o) Load moment limiter system which, when the load moment limit is reached, automatically emits a visual and audible alert and prevents movement of loads above the crane's maximum capacity, as well as blocking functions that increase the load moment. .
- p) point for grounding in the hoisting equipment;
- q) active and automatic mechanical and / or hydraulic system that promotes basket leveling, avoids tilting the basket and ensures that the basket level does not fluctuate beyond 5 degrees from the horizontal plane during movements of the movable arm to which the basket basket is attached.

3.2 The bucket or platform must be sized to support and accommodate the operator (s) and tools required to perform the service.

3.2.1 Buckets made of non-conductive material shall comply with the dimensions of Annex “C” of ABNT NBR 16092: 2012.

3.2.2 Metal (conductive) platforms:

- a) shall have a fall protection system of at least 990 mm in height and other requirements of items 12.70, paragraphs “a”, “b”, “d” and “e”, 12.71, 12.71.1 and 12.73, points “ a ”, “ b ” and “ c ” of this Regulatory Standard;
- b) when access to the platform is by means of a gate, it shall not allow opening outwards and shall have a locking system to prevent accidental opening;
- c) have a floor with a non-slip surface and drainage system whose openings do not allow the passage of a sphere with a diameter of 15 mm;
- d) It has a step, with non-slip surface, to facilitate the entry of the operator when the height between the platform access level and the floor on which it is located is greater than 0.55 m;
- e) have a border with rounded corners.

3.3 For services on lines, networks and energized installations with voltages above 1,000V, the bucket and the hoisting equipment shall have insulation, ensuring the degree of insulation, grades A, B or C, according to ABNT NBR 16092: 2012 standard, and other collective protective measures shall be taken to prevent the risk of electric shock in accordance with NR-10 (*Amended by Ordinance MTb n.º 1.083, on December 18th, 2018*)

3.4 For services on lines, networks and energized installations with voltages equal to or below 1,000V, the bucket must have its own insulation and be equipped with an insulating tub (liner), thus ensuring the proper degree of insulation, and other collective protective measures shall be taken to prevent the risk of electric shock in accordance with NR-10. (*Amended by Ordinance MTb n.º 1.083, on December 18th, 2018*)

3.5 For services in the vicinity of energized or accidentally energized lines, networks and installations where the worker may enter the controlled area with a part of his body or with conductive extensions, the equipment shall also be of adequate insulation, noting that:

- a) if work is performed near voltages greater than 1,000 V, the bucket and hoisting equipment shall be insulated as provided in item 3.3 of this annex;
- b) If the work is close to voltages equal to or less than 1.000 V, the bucket must guarantee the insulation, as provided in item 3.4 of this annex.
- c) other collective protective measures shall be adopted to prevent the risk of electric shock, in accordance with NR-10.

3.6 The working position of the hoisting equipment, together with the lower controls, must not allow the operator to have contact with the ground when performing services in the vicinity of electricity.

3.6.1 The workstation shall be fixed to the underside of the hoisting equipment or to the vehicle chassis.

3.7 Hoisting equipment that has more than one lower control assembly shall have means to prevent unintended operation of the controls while one of the controls is being operated.

3.8 In baskets coupled with two buckets, the upper controls should be positioned within reach of the operators without disengaging their seat belt.

3.9 Lower crane controls should not be operated with bucket workers except in emergency situations or when operation or activity so requires.

3.10 When the access of the bucket is through the gate, it cannot allow the opening to be outwards and must have a locking system that prevents accidental opening.

3.11 The stabilization system should be used as directed by the manufacturer to ensure the stability of the crane / basket assembly.

3.12 The coupled crane / basket assembly shall be tested at a load of 1.5 times the rated capacity to be applied to the center of the bucket at its maximum tipping position as recorded in the test report.

3.13 Side extension outriggers shall be designed to prevent their unintentional opening and shall have their maximum travel limited by mechanical stops or hydraulic cylinders designed for this function.

3.14 Coupled basket buckets must have a nameplate which contains at least the following information:

- a) company name and CNPJ of the manufacturer or importer;
- b) model;
- c) date of manufacture;
- d) nominal load capacity;
- e) number of occupants;
- f) any restrictions on use;
- g) degree of electrical insulation of the bucket, if applicable.

3.15 Buckets shall be signaled, meeting the requirements of this Regulatory Standard, highlighting the nominal load capacity, the number of occupants and the maximum tension of use, when applicable.

3.16 Hoisting equipment that receives coupled baskets for lifting people should be subjected to periodic testing and inspections to ensure their proper functioning and structural integrity.

3.16.1 Tests must be performed that prove the structural integrity, such as ultrasound and / or acoustic emission, according to ABNT NBR 14768: 2015.

3.17 The movement of suspended loads on the hook of the hoisting equipment at the same time as the movement of persons within the coupled basket is prohibited.

4. SUSPENDED BASKETS

4.1 Provided that there is no possibility of contact with or proximity to energized or energizing networks, a hanging basket hoisted by hoisting equipment may be used, meeting the minimum requirements set out in this Annex, without prejudice to the other Regulatory Standards and official technical standards. applicable to the activity, in the following situations:

- a) in activities where it is technically impracticable to use an Aerial Work Platform - PTA, Aerial Basket or Coupled Basket; or
- b) in activities in which the use of an Aerial Work Platform - PTA, Aerial Basket or Coupled Basket or other work process represents a higher risk of accidents for its accomplishment.

4.2 The use of suspended basket in the hypothesis provided for in the item above, must be proven by means of a technical report and preceded by a risk analysis performed by a legally qualified professional with respective Technical Responsibility Annotation - ART.

4.3 The movement of persons at the same time as cargo is prohibited, except for the safely packaged tools, equipment and materials for carrying out the task.

4.4 The tools, equipment and materials to be transported must not have dimensions that may cause risks or discomfort to workers.

4.5 The total weight of workers, tools, equipment and materials may not exceed the rated load capacity of the bucket at any time.

4.6 For suspended baskets, the total weight of the hoist load including the block, cable harness, bucket, workers, tools and material shall not exceed 50% of the nominal load capacity of the hoisting equipment.

4.7 The use of hanging baskets should be formally planned, including the following steps:

- a) conducting risk analysis;
- b) specification of materials and tools required;
- c) elaboration of movement plan of people;
- d) elaboration of operational and emergency procedures;
- e) issuance of work permit to move people.

4.8 The use of the suspended basket must be under the technical responsibility of a Legally Qualified Professional.

4.9 Overhead basket operation supervision shall be performed by an Occupational Safety Engineer or Occupational Safety Technician.

4.10 The operation will have the physical presence of a trained cargo handling professional from planning to completion.

4.11 The risk analysis of the operation shall provide for emergency operation to remove the worker from the bucket or platform or to be placed in a safe place in case of system failure.

4.12 The risk analysis shall consider possible interference with the surroundings, in particular the operation of other handling equipment, in which case simultaneous handling or an anti-collision system shall be prevented when cranes are used.

4.13 Before lifting workers into suspended baskets, operational lifting tests should be performed with the bucket each shift and after any change of installation location, lifting equipment configuration, or operator.

4.14 Lifting tests shall be performed to assess the correct installation and configuration of the lifting equipment, the operation of safety systems, the loading capacities and the presence of any harmful interference.

4.15 In the test lift, the bucket must be loaded with the load intended for lifting workers and moved to the position where the maximum loading moment of the planned operation occurs.

4.16 The suspended basket must be designed by a legally qualified professional, containing the construction specifications and the respective calculation memory, accompanied by ART.

4.17 For sizing purposes, the nominal load with the following safety factors shall be considered:

- a) five for the structural elements of the bucket;
- b) seven for the single-point suspension system;
- c) five for suspension systems with two or more lift points.

4.18 The bucket must have:

- a) a minimum capacity of 136 kg;
- b) Fall protection system with a minimum height of 990 mm and other requirements of items 12.70, paragraphs “a”, “b”, “d” and “e”, 12.71, 12.71.1 and 12.73, points “a”, “B” and “c” of this NR;
- c) floor with non-slip surface and drainage system whose openings do not allow the passage of a sphere with a diameter of 15 mm;
- d) at least structural assembly, floor and fall protection system made of metallic material;
- e) attachment point (s) for harness-type harness anchorage in any working position, signaled and sized to the maximum number of bucket occupants and capable of withstanding impact loads in the event of a fall;
- f) a fixed bar at its inner perimeter, not less than 990 mm high, with a minimum internal projection of 50 mm from the uppermost limit of the fall protection system for support and hand protection and capable of withstanding the stresses mentioned in item “g” of this item;
- g) gate that does not allow opening outwards and with a locking system that prevents accidental opening.

4.19 The hopper must have an easy-to-read indelible nameplate attached to it, with at least the following information:

- a) identification of the manufacturer;
 - b) date of manufacture;
 - c) bucket load capacity by weight and number of occupants;
 - d) bucket model and identification number that allows project traceability;
 - e) weight of empty hanging basket (bucket and suspension system).
- 4.20** Whenever the suspended basket undergoes changes that imply a change in the information on the nameplate, it shall be updated.

4.20 Whenever or withdrawal of changes that imply changes to the information on the nameplate, it shall be used.

4.21 The lifting of the suspended basket can only be done by means of wire rope, with identification cable or system for identification and tracking provided by the INMETRO - General Purpose Steel Cable Conformity Assessment Regulation, INMETRO / MDIC Ordinance no. 176, of 06/16/2009.

4.22 The use of chains, ropes of natural or synthetic fibers in the lifting and / or support of the suspended basket is prohibited.

4.23 The suspension system shall minimize tilting due to personnel movement in the body and shall not allow tilting of more than ten degrees outside the horizontal plane.

4.24 Suspension systems shall be dedicated and may not be used for other purposes and shall meet the following requirements:

- a) The mechanically bonded superstring cable suspension system shall be designed with a foot in all eyes and the use of clamps, wedge sockets or knots shall be prohibited.
- b) the cable suspension system with socket end connections with holes shall be designed in accordance with the manufacturer's instructions;
- c) All sling suspension systems shall be fitted with a main connection for attaching to the lug of the lifting equipment or to the clevis with nut and pin.
- d) the loads shall be evenly distributed between the suspension points of the suspension system;
- e) the set of cables (loops) intended to suspend the bucket must have its nominal load identified;
- f) shackles, if used in the suspension system, shall be of the nut and cotter pin type;
- g) there shall be a spare element between the block hook and the slings of the suspension system to ensure the continuity of support of the system should the first element be broken;
- h) the hooks shall be fitted with a distorting system and security lock;
- i) The cables and their connections must meet the requirements of ABNT NBR 11900 - Wire rope ends.

4.25 When the risk analysis indicates the need for stabilization of the bucket by external auxiliary, it must be done by non-conductive material elements, sealing the use of natural fibers.

4.26 Hoisting equipment used to move persons in the suspended basket shall have at least:

- a) anemometer which gives a visual and audible warning to the crane operator when a wind speed of 35 km / h or greater is detected;
- b) Boom radius and operating angle indicators, with automatic movement interruption devices (load moment limiting device), which automatically give a visual and audible warning and prevent loads from moving above the crane's maximum capacity;
- c) indicators of longitudinal and transverse levels;
- d) Rise height limiter of the block that stops its rise when it reaches the preset height;
- e) Climb up and down traction device that prevents the falling of the bucket or platform in free fall (toe);
- f) identification hooks and safety locks;
- g) electrical grounding;
- h) hydraulic valves on all hydraulic cylinders to avoid undesirable movement in case of pressure loss in the hydraulic system when using cranes;
- i) controls that shall return to neutral when released by the operator;
- j) emergency stop device;

k) the vertical displacement speed limiting device for the suspended basket to ensure that it is maintained at a maximum of thirty meters per minute (30m / min).

4.27 If a crane is used, it must have at least:

- a) maximum moment limiter by means of a safety system monitored by a safety interface;
- b) Maximum load limiter for locking the lifting device by means of a safety system monitored by a safety interface;
- c) Limit limiter for the boom carriage at both ends by means of a safety system monitored by a safety interface;
- d) height limiter that allows safe braking for the block, by means of a safety system monitored by a safety interface;
- e) audible alarm to be triggered by the operator in risk and alert situations, as well as automatic activation, when the load limiter or moment is acting;
- f) Allowable load indicative plates along the boom as specified by the manufacturer;
- g) obstacle light (pilot lamp);
- h) safety lock on the block hook;
- i) guide ropes for securing the lifeline for access to the tower, boom and counter boom;
- j) swing limiter, when the crane has no electric collector;
- k) anemometer which gives a visual and audible warning to the crane operator when a wind speed of 35 km / h or greater is detected;
- l) device installed on the pulleys that prevents accidental escape of the wire rope;
- m) limiting the movement of cranes on rails by means of a safety system monitored by a safety interface;
- n) Travel limit for boom movement - mandatory item for mobile or retractable boom cranes;
- o) electrical grounding;
- p) emergency stop device;
- q) vertical hanging basket speed limiting device to ensure that it is maintained at a maximum of 30 meters per minute (30m / min).

4.28 It is compulsory, immediately before the movement, to perform:

- a) safety meeting on the operation with those involved, including the activities to be developed, the work process, the risks and the protective measures, as per risk analysis, recorded in a document to be filed containing the legible name and signature of the participants;
- b) visual inspection of the suspended basket;
- c) checking the operation of the radio;

d) confirmation that the signals are known to all involved in the operation.

4.29 The safety meeting should instruct all work staff, among others involved in the operation, at least on the following hazards:

- a) impact with structures external to the platform;
- b) unexpected movement of the platform;
- c) fall in height;
- d) other specifics associated with lifting.

4.30 The work team is made up of the basket occupant (s), crane equipment operator, designated signalman and operation supervisor.

4.31 The bucket, suspension system and attachment points should be inspected at least once a day before use by a trained worker. The inspection shall include at least the items in Checklist 1 of this annex, those indicated by the bucket manufacturer and the legally qualified professional responsible for the use of the basket.

4.32 Any hazardous conditions encountered must be corrected prior to lifting personnel.

4.33 Inspections shall be recorded in specific documents and electronic means may be adopted.

4.34 The work team must carry a communicating radio operating in a safe and exclusive range.

4.35 Basket occupants shall carry a communicating radio for operation and an additional radio in the basket.

4.36 There shall be permanent communication between the basket occupants and the crane operator.

4.37 If communication between the crane operator and the basket occupant is interrupted, the movement of the basket shall be interrupted until communication is restored.

4.38 Hand signals shall follow international rules and additional signals may be created provided that they are known to the team and do not conflict with those already established by the international rule.

4.39 Signs or placards containing the representation of hand signals shall be displayed visibly within the hopper and at any control and motion signaling locations of the hanging basket.

4.40 Among basket occupants, at least one worker must be trained in cargo handling signaling code.

4.41 Work is prohibited during lightning storms or in adverse weather or any other metrological condition that may affect the safety of workers.

4.42 When using the suspended basket, the distance from the live nets must be guaranteed.

5. The safety systems provided for in this annex shall achieve safety performance by combining components of different technologies (eg mechanical, hydraulic, pneumatic and electronic) and selecting the category of each component taking into account the technology used.

6. All documentation provided for in this annex shall remain in the establishment at the disposal of the Labor Tax Auditors, the representatives of the Internal Accident Prevention Commission (CIPA) and the representatives of the unions representing the category, being filed for a minimum of 5 (five years).) years.

7. For specific transshipment operations on offshore platforms, the transfer basket approved by the Brazilian Navy Port and Coast Directorate (DPC) shall be used.

7.1 The work team must be trained with a Basic Platform Safety Course (NORMAM 24) and a life jacket.

7.2 Vessel adequacy procedures, free deck area and environmental conditions shall be performed.

7.3 The use of Suspended Basket for the transshipment of people between quay and boat, must additionally meet the following requirements: *(Inserted by Ordinance MTb no. 98, of February 8, 2018)*

a) a work permit shall be issued for the operation, the validity of which shall be at most that of the working day of the crane equipment operator;

b) the name of each transshipment shall be recorded;

c) A safety instruction shall be carried out before the transshipment enters the hopper, both on board the vessel and at the quay, on the rules to be observed by them during the transshipment;

d) For water activities, all transhipped persons must wear life jackets approved by the Brazilian Navy Ports and Coasts Directorate.

8. Maintenance services of live transmission line power plants and busbars for potential work shall meet the safety requirements of NR-10.

