

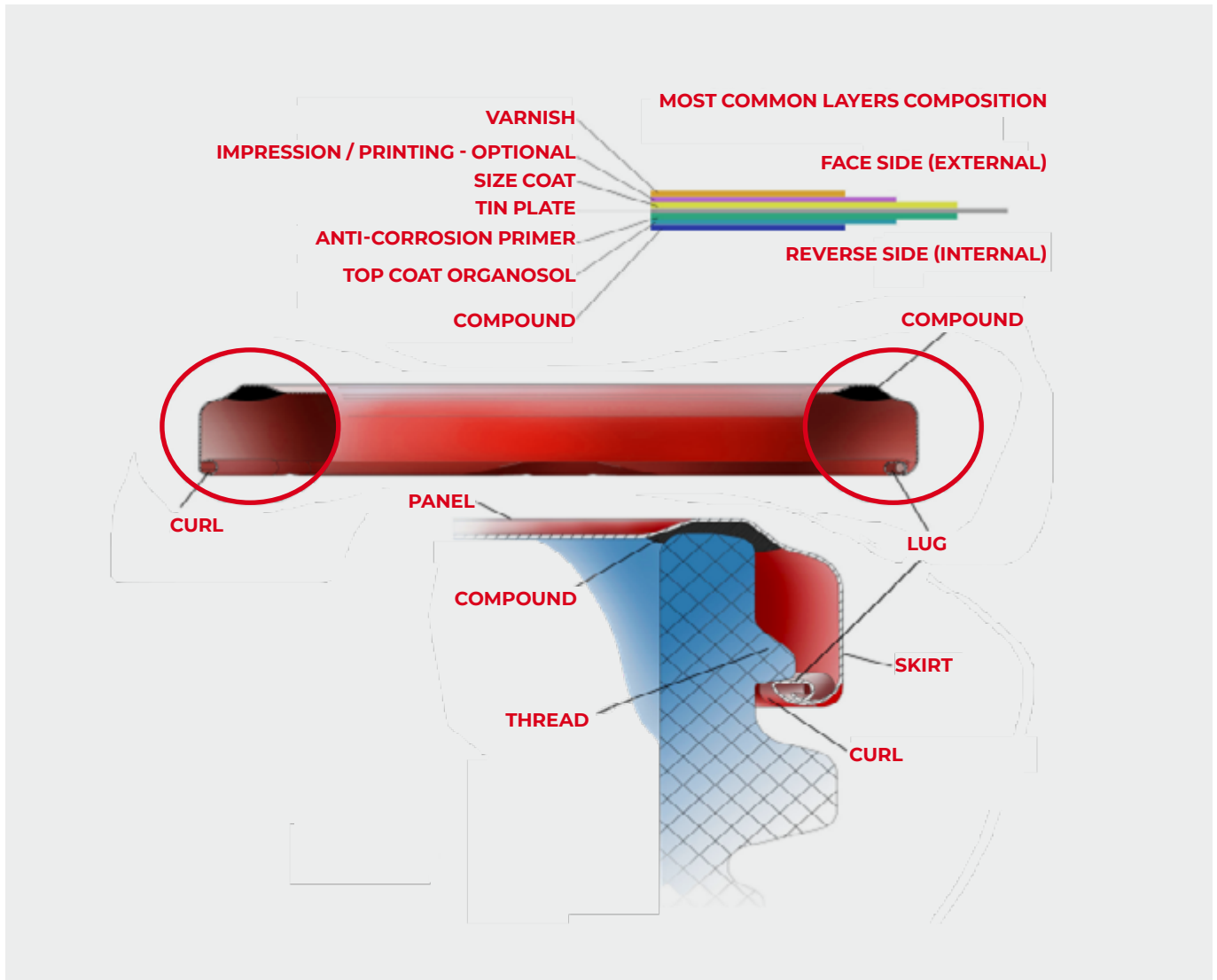
TWIST-OFF

LIDS GUIDE



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INTRODUCTION



TWIST-OFF LIDS DESCRIPTION

Twist-Off closures are primarily made from double-sided tinplate. This metal closure with a compound inner lining, is designed to fit various glass finishes under various processing conditions. The closure, if properly used, is designed to ensure packaging integrity throughout the packaging's lifecycle and to keep the product safe.

In respect of the intended food product contact, sheets are lacquered on the reverse side with anti-corrosion primer, as well as an adhesion-promoting Topcoat layer (organosol BPA NI). Depending on the decorative aspects, the sheets are printed on the face side with one or more layers of printing ink and finished with a clear varnish. These semifinished sheets, called "finish plate", is cut in circular blanks.

The cut edges are open and unpainted. In the forming process that follows, these edges are carefully curled, lugs are formed, and the closure receives its final shape. In the last manufacturing step, the sealant, which produces the gas-and liquid-proof packaging system, is injected into the closure and finally dried in a curing oven.

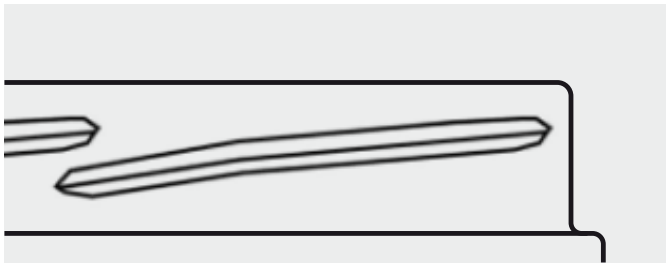
The tinplate used is of varying thickness and hardness according to the closure type and its intended application. Closure types with the requirement to withstand high mechanical stress during heat treatment are generally produced with thicker material. Usually, the thickness of sheets used for Twist-Off closures is in the range between 0.13mm – 0.24mm.

GLASS FINISHES

TWIST-OFF LIDS GLASS FINISH TYPES

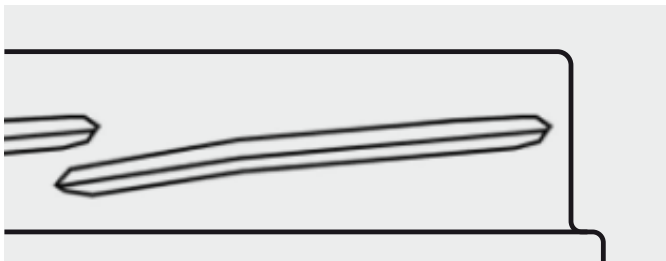
Twist-off finish mouths are all designed for the same closing function and method. However, to maximise process results, they are made in three different versions: HELIX that is standard, so the most common, then SPECIAL HELIX that is divided into 3 segments and, in the end, the ANGLE FLAT that has a stop system that impedes over screwing. Hereby explicative chart with technical drawings.

HELIX (REGULAR)



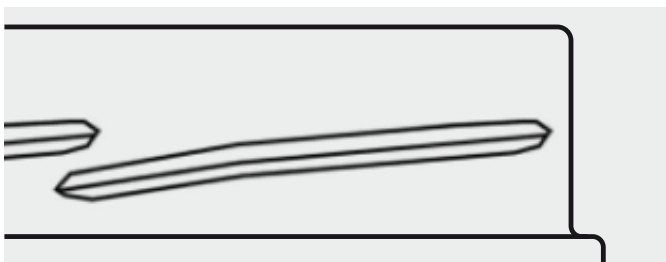
Helical thread without stop function (angle). Closure lugs progressively tighten, under the thread, while twisting on. A classic example is finish T.O. 82 FD 130 of item 10145 P2 V ORTO 580 T 82 PG.

HELIX DEEP H14



Same thread shape as Helix, but different height of mouth, that can be 14mm. Deep mouths can be closed only with Deep lids, same diameter but regular height is not compatible.

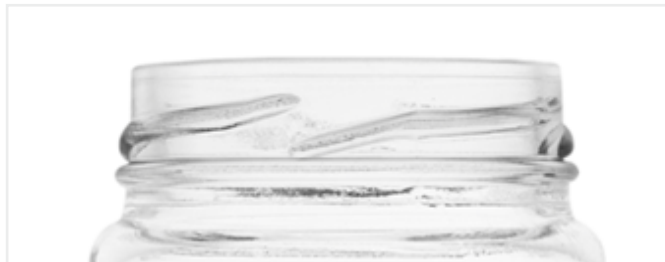
HELIX EXTRA DEEP H18



Same thread shape as Helix, but different height of mouth, that can be 18mm. It is important to choose with care among Height 14 and 18mm. Regular lids are not compatible.

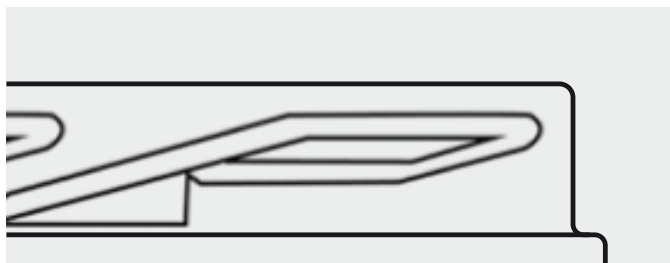
GLASS FINISHES

SPECIAL HELIX (REGULAR)



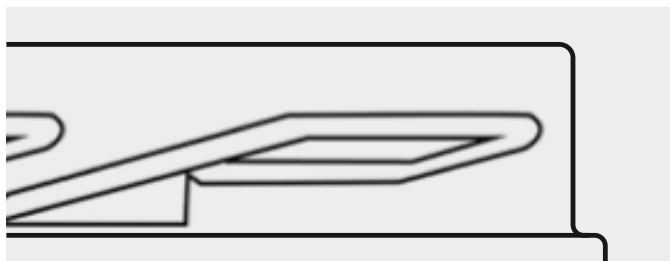
Helical thread without stop function, special for his double slant. Usually only for closure diameters 43mm - 48mm. This double incline helps screwing-on and avoids over tightening.

ANGLE FLAT (REGULAR)



It is the "stop" finish, indeed its thread has, at the end of central horizontal segment, a real angle that impedes to screw on further. It is used usually in small diameters, up to 43 and 48mm.

ANGLE FLAT DEEP



Thread shape is the same but, finish height may change, and as happens for regular helix ones, H is indicated in mm. Such kind of mouth is largely used for fruit juices and sauces.

PT FINISH



PT finish is used in the Baby Food industry. PT finish matches PT lids with compound both on the inner panel and the inner side. Glass creates the impression on the compound.

PROFILES

TWIST-OFF LIDS PROFILES

Twist-off lids profiles differentiate both for aesthetic and functional characteristics. Main functional feature is surely the version with or without safety button, that indicates the presence of vacuum. Other profile characteristics are step and slanting side.

RSB-RTS (REGULAR)



Lids with Step (RSB = Regular Step Button – RTS = Regular Twist Step). The Step is a profile with the purpose of having a higher compound thickness perpendicular on the glass brim contact area. It is the most used, especially the Flip (Button) version in medium and big diameters 53-110mm.

RTB-RTO (REGULAR)



Lids with flat edge without step (RTB = Regular Twist Button – RTO = Regular Twist Off). Easy to be identified because the area above the compound is flat. Mainly used on small diameters 30-48mm.

DWB-DWO (DEEP)



Deep lids with higher side without step (DWB = Deep Twist Button – DWO = Deep Twist Off). They are produced in Deep H14mm and Deep H18mm version. The Deep H14 lids are generally workable in all capping machines, while the Deep H18 ones need a specifically designed equipment.

FSB-FTS (FLUTED REGULAR)



Fluted lids (FSB = Fluted Step Button – FTS = Fluted Twist Step) have same profile as RSB-RTS, but with side indented grip holds that help unscrewing. They are used seldom by big food industries, and only on massive productions for large-scale retail trade.

ECO (WITH/WITHOUT BUTTON)



Eco lids have slanting side profile, not vertical as all the other ones. They are very particular, by now only used by a few big customers that buy them directly to produce lines for large-scale retail trade.

COMPOUNDS

COMPOUND ACRONYMS AND DESCRIPTION

There are acronyms, for all lids, to indicate various compounds.

REGARDING THERMAL TREATMENT THAT COMPOUND CAN STAND:

C & M: Jams, Marmelade and Honey. This compound is for cold closing, after filling with cold products, or hot and left to cool. Compound is not for products containing fats-oil.

P: Pasteurization (~100°C Max)

S: Sterilization (~120-126°C Max)

REGARDING PLASTICISERS COMPLIANCE WITH OIL:

CEL: Esbo Light

EF: Esbo Free

ENI: Esbo Not Intended (not intentional presence of Esbo) for Pasteurization, it's a compound made by Eviosys equivalent to Esbo Free

PVCFREE: Without PVC or ESBO, but made of thermoplastic elastomers (TPE)

Note: EL-EF-ENI can be P or S (past or ster). Also PVCFREE usually are P or S, but recently a version for cold closing has been developed (a sort of C&M without Pvc), even if its use is quite complicated.

LEGISLATION & INFO ABOUT COMPOUNDS AND MIGRATION WITH OIL

The plasticizer ESBO (Epoxidized Soy-Bean Oil), has been prohibited because it has been found out that it is subject to migration in presence of oils and/or animal fats. For this reason, specific laws have been issued, and our products are in compliance with them.

FAT-OIL MIGRATIONS

Regulation EU no. 10/2011 – states the following Migration limits:

- **Containers >500ml** with fat-oil, limit is 60mg/Kg on foodstuff
- **Containers <500ml** with fat-oil, limit is 10mg/dm² on contact surface

PVC FREE COMPOUND

This compound (made of thermoplastic elastomers - TPE) has been created to prevent current and possibly future migration issues. This type of gasket is the best in class concerning very low overall migration, according to EU legislation and its control methods. It is very popular in Germany because, at the beginning, it has been developed by a German company. It is a solution both with positive and negatives aspects:

Pros:

- Lower migrations vs. EF/EL
- Migration is constant on the long-term period (EF/EL raise)
- Higher sustainability
- Ideal for big company with fast processing lines (fish industries, pesto industries)

Cons:

- High MOQ
- Long lead time
- Needs capping machine with steam, for a proper closing
- Hard at room temperature, not easy to use, especially for cold closing

BISPHENOL A

Bisphenol A has been prohibited, too. Regulation EU no. 213/2018 added restrictions and decreased Migration limit from 0,6mg/kg to 0,5mg/kg = 5ppm. It is banned on coatings, varnish, and polymers. Since years ago, all productions for Berlin Packaging are in BPA NI varnish, that is without intentional presence of Bisphenol.

COMPOUNDS

IDENTIFICATION OF PROPER COMPOUND

It is necessary to provide the following information, to identify the ideal compound and the proper lid:

- Product?
- Product contains free oil?
- Will product have a thermal treatment? Which one?
- Closure is manual or by capping machine?
- Has customer the chance to pre-heat lids or use steam flow?
- Is Flip safety button requested?
- Does product contain aggressive elements?

We can find the correct type by matching the above packaging conditions in the following chart.

PRODUCT CATEGORIES	CONTAINS FAT AND/OR OIL	THERMAL TREATMENT	COMPLIANCE WITH OIL	COMPOUND	NOTES
Honey, jams, cfruit conserves, dry food, products w/o oil	NO	NONE	Not necessary	C&M	"Cold closing"
Jams to be pasteurized	NO	PASTEURIZATION	EL-EF-ENI but not necessary	PAST	
Marinated vegetables or preserved in oil, other products w oil	YES	PASTEURIZATION	EL-EF-ENI	PAST	
Meat, fish, legumes, truffle, foodstuff with high bacterial load - preserved in oil	YES	STERILIZATION	EL-EF-ENI	STER	
Products w relevant contents of oil and long expiry date (shelf life)	YES	PASTEURIZATION OR STERILIZATION	PVCFREE	PAST O STER	Ideal for capping machines with steam flow
AGGRESSIVE PRODUCTS (W AND W/O OIL)	RISKY COMPONENTS (AGGRESSIVE)	THERMAL TREATMENT	COMPLIANCE WITH OIL	COMPOUND	NOTES
Onions, gherkins, pickles of any kind and vegetables in vinegar, asparagus	SO2 > 50ppm pH > 4,0 Salt > 10% Chloride and/or NaCl > 50ppm	PASTEURIZATION OR STERILIZATION (depending on each product)	EL-EF-ENI or PVCFREE	PAST O STER	Need specific protection inside, production on demand. To be verified before ordering.

Identification of compound is an extremely delicate operation. It is done once on a product/lid/process lifetime, so it has to be done correctly. If a autoclave is used for the thermal treatment, both with pasteurization and sterilization temperatures, in presence of counter-pressure, use of sterilization compound has to be carefully analyzed.

CAP REQUIREMENT

CAP REQUIREMENT FORM

When a twist-off lid has to be produced on demand for a specific customer, it is necessary to have customer filling the Cap Requirement Form, prior to order definition and production schedule. This form contains all necessary technical details to identify the correct style and compound, it must be used to define specs of the proper lids for customer process. Filled CRF is sent Producer for technical evaluation before production and, if there are any details that do not comply, investigation will be started with customer until clarification.



Cap Requirement: Technical questionnaire Twist Off Cap			
Customer name:	<input type="text"/>		
Confirmation order number:	<input type="text"/>		
Cap			
Cap diameter	<input type="text"/>	Profile	<input type="text"/>
Mat varnish	<input type="checkbox"/>	Sparkle varnish	<input type="checkbox"/>
		With Flap?	<input type="checkbox"/>
		BPANI?	<input type="checkbox"/>
		Compound	<input type="text"/>
Drawing origin			
Artwork	<input type="checkbox"/>	Film	<input type="checkbox"/>
Copy	<input type="checkbox"/>	E-File	<input type="checkbox"/>
Paper label	<input type="checkbox"/>		
Additional Comments	<input type="text"/>		
Product Range			
Product description	<input type="text"/>	Heat treatment	<input type="text"/>
pH	<input type="text"/>	SO ₂ (ppm)	<input type="text"/>
% salt	<input type="text"/>	Shelf life (years)	<input type="text"/>
Altri component aggressiv/corrosiv?	<input type="checkbox"/>		
Does it contain free fats/oil?	<input type="checkbox"/>		
% of oil or fat	<input type="text"/>	Jar volume (ml o cc)	<input type="text"/>
Cap Application			
Application method	<input type="text"/>	Machine type	<input type="text"/>
With/without steam	<input type="text"/>	Line speed (/min)	<input type="text"/>
Is Dud-detector used?	<input type="checkbox"/>	Vacuum level at dud-detector (kPa)	<input type="text"/>
Heat Treatment			
Headspace (%)	<input type="text"/>	Fianl vacuum (KPa)	<input type="text"/>
Fill temperature (°C)	<input type="text"/>	Temperature when palletised (°C)	<input type="text"/>
Process temperature (°C)	<input type="text"/>	Holding Time (min)	<input type="text"/>
Vacuum ex capper (kPa)	<input type="text"/>	Counter pressure (bar)	<input type="text"/>
round speed (rpm)	<input type="text"/>	Name and model of autoclave	<input type="text"/>

FILLING

FILLING PHASE

Filling is a very important and delicate action. The good result of the subsequent operations strictly depends on filling. Therefore, for a correct and efficient filling, we suggest avoiding:

- Causing glass a thermal shock. Recommended difference, between product temperature and jar, is not over 35°C;
- Processing cold lids. On the contrary, it is suggested to harmonize lids to average temperature of +18°C before use (preferably at least 24 hours at room temperature), notwithstanding pre-heating during process;
- Product contamination on finish surface, dirty and/or product traces (both oily and fragments) can compromise lid hold;
- That product contains, in its mixture, air in excess. Air bubbles can impede vacuum formation and increase inner pressure during thermal treatment;
- Having excess of product, overfilling may cause loss of seal and contamination risk;
- Contact and sediment of products with high rate of starch or sugar with glass mouth, they can adversely affect jar opening;
- Contact with strongly acid food products, please refer to chart paragraph, to identify proper compound for aggressive products.

MANUAL FILLING AND COLD CLOSING

This section is dedicated to who does not have a capping machine, neither a lids heating system; it is possible to maximize result, thanks to right expedients, despite manual processing. First of all, avoid putting closed jars upside down. Correct jars position (as well as bottles) is always only upright, for all their life, from producer to consumer. In an upside jar, product goes into direct contact with inner lid surface, and this may have negative effects. The aim of this turning operation, by now outdated, was to warm compound up.

But, to obtain an efficient lid pre-heating, and a better compound performance, we suggest to:

- Fill jars one by one with hot product, always avoiding thermal shock;
- At the same time, put immediately lid on top of jar, counter-screw until it is in flat position, then screw on with two fingers until it stops, without tightening;
- Let the lids warm up, thanks to hot product induction, for at least 3 minutes while continuing filling and capping other jars;
- Screw on and tighten first jars whose lids, after 3 minutes exposition, will be heated and perform better;
- Since it is a sequence of manual operations, it's better if done by 2 people: first one taking care of filling, the other applying lids and, after 3 minutes, executing the final screwing.

HEAD SPACE

ASSESSMENT OF CORRECT HEAD SPACE

Head space, directly connected to filling, is a determining parameter to start a good closing. It is generated by multiple variables but, must be adjusted and kept under control because it influences internal pressure and vacuum formation. Hence, we want to outline fundamental principles for a correct head space:

- An approximate average value of head space is 7% of the whole container (brimful) volume. Possible different process circumstances make such value flexible. A habit for many customers, not scientific but statistic, is to reach 10/12mm from mouth brim line;
- In case of hot filling, then natural cooling without pasteurization, head space can be lowered by 1-2%;
- In case of cold filling, then pasteurization, head space can be increased by 1-2%;
- In case of hot filling, then pasteurization, head space can be unchanged or decreased by 1%;
- In case of hot filling, then sterilization, head space can be unchanged or decreased by 1%;
- The higher the head space, the lower the internal pressure, and vice versa;
- The higher the product temperature, the lower the internal pressure, and vice versa;
- A relevant internal pressure increase, especially during thermal treatment in autoclave, must be balanced by counterpressure applied by the machine;
- A head space that, during cooling, increases a lot compared to maximum temperature, will be helpful to pull flip of the lid down.

Last, but not least, head space has to be always set in order to avoid product leaking out of the jar, because of volume enlargement due to temperature increase. If, by chance, a leaking during thermal treatment occurs, head space must be increased immediately (by reducing filling level).

THERMAL TREATMENTS

COLD FILLING, PASTEURIZATION, STERILIZATION

Generally speaking, products can be packed cold, or hot and left to cool down, or thermally treated with Pasteurization or Sterilization to preserve them. For cold-hot filling, please go back to specific section above.

PASTEURIZATION

It allows to obtain stability in products with pH less than 4.5 when temperature is same or higher than 85°C (185°F) in any area inside jar. For pasteurization operations using a tunnel (without over-pressure), filling product temperature should not be more than 10°C less than pasteurization temperature. Such temperature gap is essential for PT capsules. For pasteurization operations using a closed tunnel (with over-pressure), it is possible to have a lower filling temperature and a higher pasteurization temperature, but it should be done after a proper technical trial test. As already mentioned in section regarding head space, it needs to avoid product excess that, thanks to pasteurization that makes it increase volume, could pour out of the jar. Typical pasteurization temperature range: over 85°C until 100°C, respecting parameters indicated in technical sheet of the lid.

STERILIZATION

Products with a pH equivalent or larger than 4.5 can be sterilized with temperatures >100 °C until 121°C to extend their shelf life. This treatment offers a food safety guaranteed by the interaction of time and temperature, to have a sterilization optimised process; such combination is fixed by qualified organisations, for most of foodstuffs. It is fundamental to keep pressure under control, both inside and outside jar, to maintain package hermetically closed under any condition. Sterilization temperature range: until 121°C, in a process with counter pressure, respecting parameters indicated in technical sheet of the lid. In case of temperature out of range, a double check with producer technical lab is needed.

COUNTER PRESSURE

When a product requires a thermal treatment over 100°C, and it is used an autoclave equipment, it is necessary to have a counter pressure to balance inner pressure, caused by volume increase of product. Generally speaking, recommended counter pressure inside autoclave is 2,0-2,2 bar, but the setting target is to have it the closest possible to inner pressure. In order to avoid damages that may occur (compound cut, vacuum loss), because of excessive counter pressure, it should not be over 0,5-0,7 bar than the inner one.

VACUUM

Because of thermal treatments, a vacuum will be created, easily visible by pull down of safety button (see paragraph of profiles) of the lid top. Vacuum value, to be obtained, changes by the style of lid, by the filling temperature, and type of treatment. A vacuum between 0,3 and 0,5 bar, can be considered acceptable on average but, also for this parameter, it needs to take into account variables connected to diameter and temperature. To have precise referring values, verify producer technical sheet of item in use. Visual check of vacuum, that is button down, for consumer states guaranteed product integrity, and for producer is the certainty of a well-made package that preserves until expiry date. Therefore, it is always recommended a vacuum check system (dud detector) and automatic lids with button up reject, in the filling and production line. For a broad range check, it is ideal to have a dud detector right after capping machine, to avoid jars without vacuum entering Pasteurization/Sterilization section; and second detector at the exit of Pasteurization tunnel or autoclave, before jars arrive to labelling machine.

CRITICAL ISSUES

USEFUL WARNINGS ABOUT THERMAL TREATMENTS

Plastic layers

Inappropriate sheets (layers), worn-out and/or damaged can cause damages to external varnish of lids. We recommend use of neoprene layers. Neoprene layers, on one hand do not cause migrations and avoid leaving traces on caps, on the other hand have an important function of vibration absorbing, during process in autoclave, in the end, they protect closure integrity.

Process water

Quality of water used during process is an important factor for the closing result. To avoid and reduce corrosion problems, damages or stains on external lid surface, it is recommended to respect the following parameters:

pH 7.0 – 8.0

Water hardness (as CaCO₃) 30 – 150 ppm

Chlorine content < 50 ppm

In case of doubts, or specific needs, see technical specs of the item in use. When water is softened by the base exchange process, calcium and magnesium ions are replaced by sodium ions, it can turn into a highly corrosive water whose alkalinity increases significantly at sterilisation temperatures. Such kind of waters can cause breakdown of external coatings.

Water supply machinery and service pipes, as well as autoclaves and procedures using softened water, must have an appropriate water treatment system to minimise unwanted effects coming from base exchange. Avoid cooling with highly chlorinated water. In general, chlorine level under 10 ppm of total does not cause corrosion and, on the contrary, if level is over 20 ppm the risk is considerable.

Jars position

Ensure that upper layer of jars, be minimum 15cm under the water level used for the treatment, in full immersion autoclaves. A space of 15cm between water level and autoclave top must be ensured, too. All this will minimize pressure fluctuation during sterilization and cooling.

Product leak and mix up with process water

Always avoid product mix up with process water. Some products (for example tomato based) may cause a colour change on the lid during process, and it is important to use new pure water (without traces of products contained in the jar) for the treatment, after breakage of jars. Obviously, brine leak can cause problems, especially of corrosion.

PULL UP

When process involves closing a Twist-off lid, it needs to check screwing (pull up), seal security and compound impression.

LID SCREWING, PULL UP

Pull up, technically the tightening, must be measured and kept under control. The basic premise is that lids do not benefit from an excessive tightening but, on the contrary, it brings high risk of deformation and vacuum loss. Control operations are quite easy, they are listed hereby and shown in the picture at page 18:

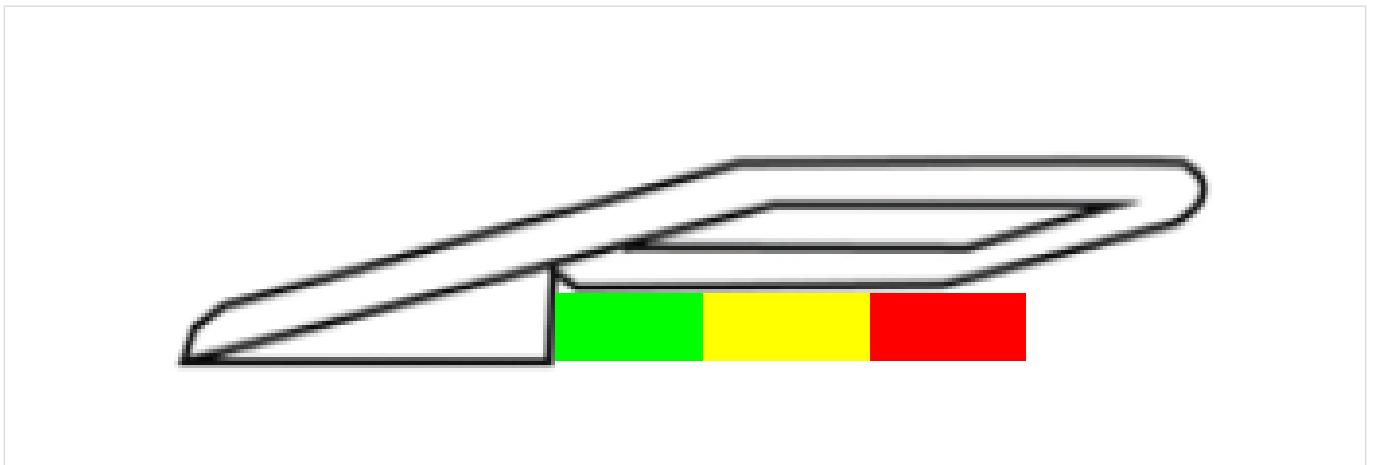
1. Identify mould seam line in the neck ring;
2. Close the lid normally;
3. Draw a line connecting the mould seam to the lid;
4. Draw a perpendicular line on the edge of the lid lug (left far end, nr. 3 in the picture);
5. Distance value in mm, from line 2 (seam line) and 3 (edge of lid lug), is the Pull Up.

It is possible to determine a minimum pull up, that may change from a producer to another, and from different lid styles. Most recommended value is 8-9mm, decreased by 1-2mm in case of PvcFree compound.

Note: Please remind that 8-9mm is the recommended limit not to be overcome, but it doesn't need to strain lid to necessarily reach this quote; there is no problem if compound has such a strong grip stopping the lid at a longer distance, excessive screw-on (tightening) is the only dangerous action. Obviously, a pull up leaving a wide distance (for example more than 25mm) between mold seam line and edge of lid lug, is probably too much and needs to be inspected. The goal of pull up distance check is to be sure that lid has a correct level of minimal screwing, but it's important never getting close, or even, over the seam line.

For ANGLE FLAT finish (with stop) jars, it is understood that lid can be screwed until the stop point, that hasn't necessarily to be matched. A closing statistical trend of 4 jars out 5 at stop point, and balance at the center of the horizontal side of the thread, is a correct average.

Hereby an exemplifying picture:



SEAL SECURITY

SEAL SECURITY

The closing security check (Seal Security), that measures the compound resilience, indicates how compound will perform as gasket. Compound is a sort of “alive gasket” and, if it works properly, will have a dynamic action. Seal security check, as a matter of fact, verifies compound reaction by reproducing use of final consumer: it needs to open the lid (as if to consume a bit of product), then close again jar to store in the freeze, if compound maintained its properties, it will stretch when lid is screwed off, so that the screw-on turn will be decreased.

This lower re-screwing is quantifiable by measuring distance between position before opening and quote after opened and closed again, that is distance in millimeters between lines 1 and 2 shown in the picture.

SS values too can change according to diameter size, compound type, and from different producers but, also in this case (as well as for pull up) it's more relevant to respect the fundamental concept, rather than only a simple value number, therefore:

- At capping machine value will be indicatively about 4-5mm with around ± 2 mm tolerance;
- SS value will decrease after thermal treatment, reaching approximately 2-3mm with about ± 2 mm tolerance;
- SS value must not ever be negative, neither at capping machine, nor after thermal treatment;
- SS value is always higher at the capping machine, than stabilized after thermal treatment;
- SS value is lower with higher lug diameters (\varnothing 77-110mm);
- SS value is slightly lower in lids with Sterilization compound, compared to Pasteurization one.

**IN CASE OF DOUBTS OR IN-DEPTH ANALYSIS NEED,
PLEASE CONTACT OUR CUSTOMER SERVICE.**

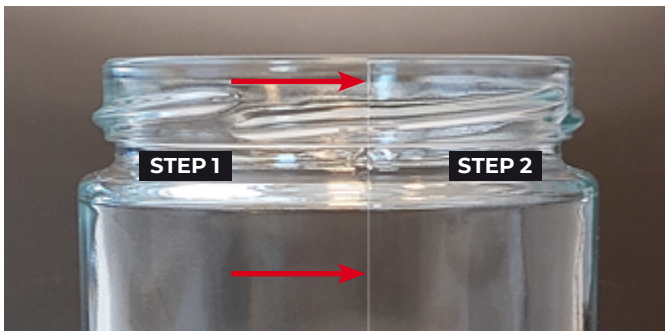


CHECK

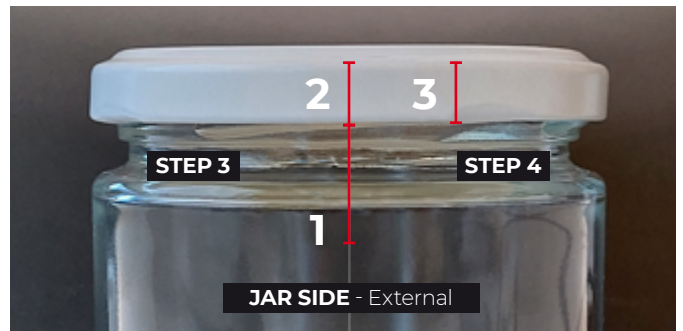
LID FINAL CHECK: PULL UP AND SEAL SECURITY

Final checks, after jar closing, and its thermal process (if sterilization or pasteurization are done) are basically important to guarantee sale distribution of a sure food safe product. Pull Up and Seal Security checks, if part of a whole Quality Check Procedure, bring to awareness of their own importance therefore, they ensure the correct use of the "jar + lid" set. The lack of such checks could jeopardize all efforts made to engineer packaging.

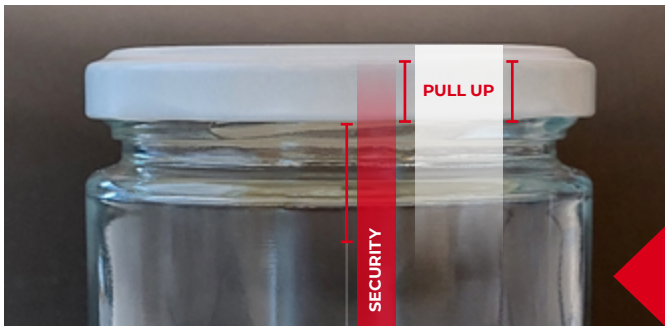
A) Identify mold seam line



B) Draw lines as follows



C) Open and re-close with only 2 fingers without tightening



PULL-UP: distance in mm between lines 2 & 3
SEAL SECURITY: distance in mm between lines 1 & 2

COMPOUND IMPRESSION

ACHIEVEMENT OF CORRECT IMPRESSION

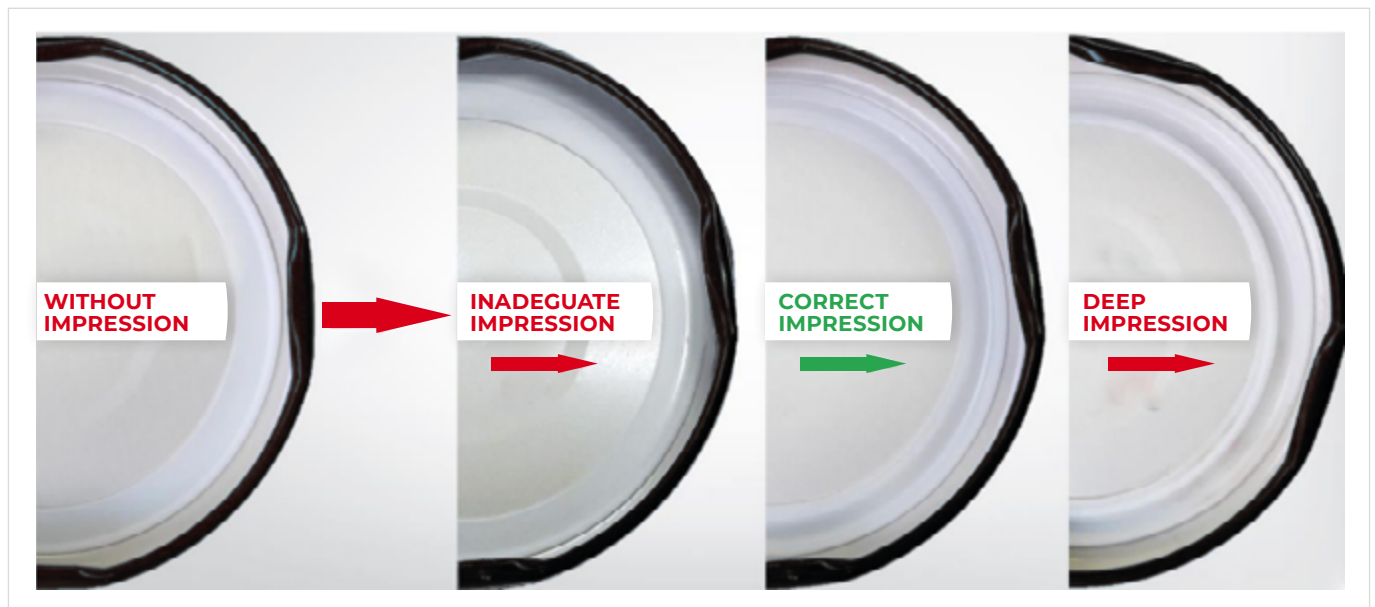
The compound impression shows how it gets shaped, in order to stick to mouth glass profile, then sealing after cooling and stabilization.

The sign can be deeper in compounds with PVC, and less deep in the PVC Free ones that, for their own properties, are harder, for this reason pre-heating and impression check are important tests.

Impression must be visible and continuous along the entire circumference, deep enough to have a proper contact surface, but not too deep to reach metal.

If such conditions are not respected, a corrective action will be necessary. If impression is shallow, usually it needs to increase pre-heating and, if not enough, put additional pressure on the spring inside the closing section of the machine; in case of too deep impression, go for the contrary actions.

To make it simple, it's easy to find out how a correct impression is, from the pictures below.



FINAL STEPS

JARS COOLING AND DRYING

COOLING

Cooling is an important aspect that, when overlooked, can cause problems, more in Sterilization than Pasteurization. It must be absolutely prearranged a harmonic and gradual cooling so that, in temperatures diagram, a curve line without net angles is generated. A drop of many degrees, when comes in in a very short time, is surely cause of thermal shock, with the consequences initially mentioned also in filling stage: glass molecular tension and/or possible breakage. Avoid letting in, at the end of thermal cycle, direct tap water because its temperature is always far from jars one.

DRYING

Water drops settle, and stay until end of thermal treatment, inside lid, especially in lugs areas, is a potential risk of rust formation after process. The only factor that originates lids oxidation is the presence of corrosive water deposits. Therefore, it is necessary to meticulously dry jars and closed lids, after process, in order to remove all water, including micro drops trapped in between outside glass finish and inner surface of lid. The drying process can be executed with proper blowing air heads, better if placed both looking down on, and from below to the top, and air flow must necessarily reach the entire mouth circumference.



FINISHED PRODUCT CHECK

Once thermal treatment is completed and production has been dried up, finished product has to be checked. It is recommended to let the product get stabilized and allow compound to cool down and harden. It is correct to execute a series of random checks to verify everything that makes product in compliance for sale:

- Correctly screwed on lids
- Clean lids without traces and processing residuals
- Intact lids, without physical/mechanical damages
- Jars with evident product shortage
- Jars with product leakage traces
- Presence of vacuum in jars closed with a button lid (RTB, RSB, DWB)
- Minimal re-opening test
- Absence of product problems visible from outside (traces of mould, foreign bodies, etc.)
- Precisely positioned and correctly applied labels
- Any other aspect that might generate a non-conformity of package.

STORAGE OF PRODUCT – LIDS AND CLOSED JARS

Storage of products, both semifinished (glass and closures) and finished, is extremely important for the efficiency and conformity at the moment of purchase.

Glass must be always stored protected from water, mist, bitter cold and from all atmospheric agents that may cause formation of condensation and relevant temperature changes in short time. Ideal storing conditions for lids are between +5°C and +30°C, with air humidity not over 70% in a well-ventilated space. Lids partially used must be placed in the original plastic bag, that must be sealed and put inside box, box must be closed with duct tape. Maximum stack of lids pallets, composed of intact boxes, is 2 pallets.

Finished product, both unpackaged and in parcels or boxes, must always stowed correctly regarding weights distribution and eventual torsion and or bending forces. It is recommended non to stack jars earlier than 24 hours from end of process (jars stabilized at room temperature). To avoid vacuum loss during stacking and storing, minimal temperature of warehouse must be not less than 10-15°C (50-60 °F). Indicatively it is possible to stack maximum 3 pallets of about 1.000Kg.

MACHINES

CAPPING MACHINES

THEY ARE THE NATURAL COMPLETION OF BERLIN PACKAGING OFFER:

GLASS CONTAINER + CAPS + CAPPING MACHINE

SEMI-AUTOMATIC CAPPERS

Semi-automatic closing machines are machines suitable for closing a few jars per minute. They are essentially dedicated to small productions or artisanal productions or samples.

They are extremely simple to use and guarantee a correct closure of the capsule because they have the possibility to set the closing torque, which is not possible in the "hand" closure.

Normally these semi-automatic machines do not have a "steam" function, therefore, they do not create vacuum in the vessel. The capsule in these cases is used without flip.

Technically a modification to provide it with steam / vacuum is possible, but not recommended.

In case it is necessary to guarantee the vacuum in the vase, the straight-line automatic machine is strongly recommended.

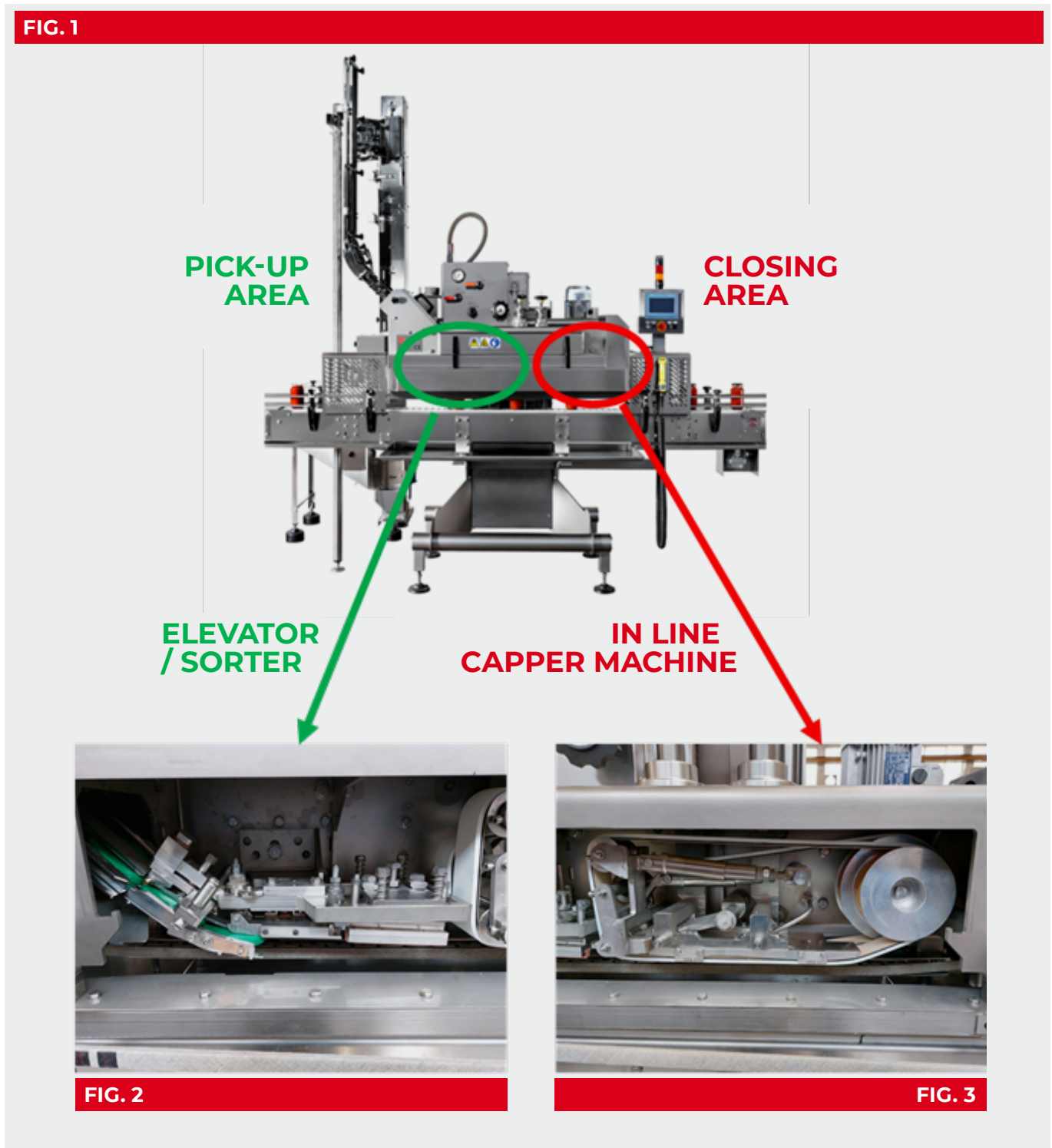
These semi-automatic machines have an average cost of under 5,000 euros. Even more complex but always automatic solutions with a rotating head should not exceed 15,000 euros.



IN-LINE AUTOMATIC CAPPING MACHINES

For the industrial part, we will now focus on automatic in-line machines.

These machines are normally composed of the closing machine, part on the right of figure (1) and of a sorter/elevator, left part of figure (1), which sorts the capsules all in the same direction (up / down) to convey them through a chute to the pick-up group figure (2) and then to the closing group figure (3).



MACHINES

CLOSING SPEED

The closing machines are normally divided according to the maximum closing speed. This certainly depends on the jar and its neck finish, on the cap and not least on the stability of the product contained in the jar.

Generally, in optimal conditions, with a jar and a stable product and a 53 mm capsule they are divided into:

- **LOW SPEED** UP TO 150 PIECES / MINUTE
- **MEDIUM SPEED** UP TO 350 PIECES / MINUTE
- **HIGH SPEED** OVER 350 PIECES / MINUTE

The operating principles are common and often also the picking and closing groups are common or similar, what differentiates them are above all the structures (and therefore the weight), and the control and format change systems. This type of locking machines can be used:

- in a controlled atmosphere environment, or rather, aseptic
- or in a saturated environment with water steam which, upon cooling, ensures the vacuum in the container
- technically they can also be used without steam and without subsequent heat treatment of the product, thus doing without vacuum in the container

In the second case, a jet of steam oriented to the mouth of the jar, between the capsule picking and its positioning on the jar itself, "washes" the air present on the jar replacing it with steam.

The decrease in specific volume, after subsequent cooling - whether following pasteurization or sterilization - ensures the vacuum in the jar itself. The check list for identifying the recommended closing machine should be of the type:

BASIC

- A)** determination of the required closing speed
- B)** definition of the system to inert or steam
- C)** definition of the products to be packed and their chemical, physical peculiarities (pH, salts, etc.)
- D)** definition of the packaging jars (mouth, structure, strength, etc.)
- E)** definition of the diameters and types of capsules used

ADVANCED

- F)** need for the elevator / sorter and its sizing
- G)** distance of the elevator / sorter from the closing machine: sizing of the capsules chute
- H)** type of system in which the capper is inserted
- I)** necessary control systems and PLCs already present on the line - interlock and control loop

PRE-ENGINEERING

- J)** analysis of any machine stability problems
- K)** definition of a rough lay-out and identification of bottlenecks
- L)** definition of the steam / water / compressed air / electrical / data circuits interfaces

Don't forget the opportunities of Industry 4.0 financing

We would like to recall here also other peculiarities or qualities of these equipment. This list with comments is useful both for sale people when presenting the machine or identifying it through the needs of the customer, both for the Customer who can use it for the evaluation of the equipment itself:

1. SECURITY

It is certainly the most important parameter. CE certification and full compliance with regulations is mandatory, as well as manuals and training for use.

2. EASE OF ACCESS

It reduces the set up time of format change and maintenance

3. HYGIENE

Of fundamental importance in a food environment, especially considering the use of primary packaging, it goes at the same pace as the following point

4. ERGONOMIC DESIGN

Electronic and video check controls, convenient design for use make the equipment reliable and productive

5. QUICK FORMAT CHANGES

of primary importance, in multi-brand and multi-packaging operations

6. MINIMUM MAINTENANCE (TIME AND COSTS)

it reduces maintenance costs but also the need of super-specialized operators

7. ELECTRONIC SPEED CONTROL

it is in the group of automatisms and leads to the high efficiencies typical of this kind of equipment

8. STANDARD REPLACEMENT PARTS

if there are more closing machines in the same plant and, in any case, the standardization of spare parts avoids special high-cost parts

9. ENTIRELY IN STAINLESS STEEL

Equipment completely in AISI304 is recommended (including nuts and bolts and supports). With AISI316 withdrawal and closing groups - in contact with food and almost always in a superheated steam atmosphere.

10. GROUP FOR MANAGING SUPERHEATED STEAM

ACCESSORIES

AVAILABLE ACCESSORIES GROUPS

- **CAPSULE FEEDER**

VERTICAL SORTER FOR METAL TWIST-OFF CAPS

- **CAPSULES CHUTE**

SINGLE OR DUAL CHANNEL CAPSULE CHUTE WITH ELECTRIC PANEL SELECTABLE EXCHANGE

- **DUD-DETECTOR**

FOR VACUUM CONTROL

- **STEAM OVERHEATER**

TO AVOID CONDENSATION DROPS INSIDE THE LID, NECESSARY IN PRESENCE OF PRODUCTS LIKE MAYONNAISE, HONEY, CHOCOLATE, ETC.

- **CONNECTION SYSTEM**

TO THE COMPANY NETWORK WITH ASSIGNED ETHERNET PORT

- **CONTROL SYSTEM**

REMOTE MAINTENANCE AND TROUBLESHOOTING



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