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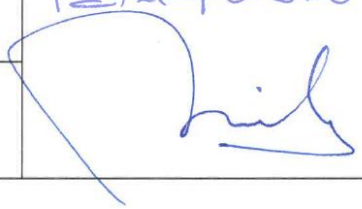
Approved by	Technology Group Director Fdez. De Mendiola, Javier	

Reason for a new issue	***Document updated.*** ***| News marked to the left of the paragraph with a vertical bar.*** ***The most important information is shaded in yellow***
Canceled & replaced version	X.00.00034 – v02 *Machine adjustment recommendations for reduced wall, head & cap design tubes, are included.*

INDEX

1. OBJETIVE

The objective of this document is providing a guideline or recommendation to optimize the sealing process of EXTRUDED PE plastic tubes by means of hot air sealing systems.

These instructions and recommendations are based on our experience and the test performed with our hot air sealing machine.

Customers must adjust the sealing parameters to the characteristics of their own processes, machines, and tools.

2. SCOPE

- Extruded polyethylene plastic tubes

3. DEFINITIONS - ABBREVIATIONS

See glossary, in CTL-TH Packaging internal document, code **X.00.00000**.

4. QUICK SETTING GUIDE

(Work base that must be adapted according to the machine and tooling of each client)

Temperate the tubes in the conditioning room, at least 24 hours before.

Recommendations for extruded PE tubes sealing base on our machine and tooling.

KX 501 – Speed 42t/min - Cooling temp: 18°C – Jaws distance around 0.2~0.3 mm – With outer ring (center) – HA nozzle with 3 three rows of holes

1st step: SELECT THE CORRECT NOZZLE DIAMETER

- Measure the inside diameter of the tube
- Select the appropriate

NOTE: They may be small differences in the inner tube diameter depending on the extrusion material.

Inner tube Ø	**WITH** Outer Ring	**WITHOUT** Outer Ring
Measure Inner tube Ø	Nozzle Ø = Inner tube Ø – 0,2mm	Nozzle Ø = Inner tube Ø – 0,2mm

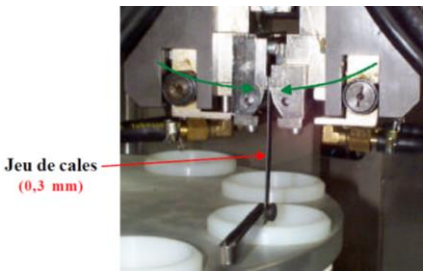
2nd step: USE OUTER RING

Tube **ROUND**	***OUTER RING*** ▼▼▼ RECOMMENDED	**ADVANTAGE**
	ECO-f tubes (reduced wall) ***OUTER RING*** ▼▼▼ HIGHLY RECOMMENDED	➢ Homogeneus sealing ➢ Shorter setting times ➢ HA temperature lower ➢ Less appearance defects
Tube **ELLIPTIC**	***OUTER RING*** ▼▼▼ HIGHLY RECOMMENDED	

3rd step: REGULATE TRIMMING HEIGHT

The height of the hot air nozzle should be aligned with the compression jaws and the trimming unit.

4th step: ADJUST THE COMPRESSION OF THE JAWS



- Clean of any residue.
- Correctly **aligned and parallel**.
- **Separation around 0.2mm and 0.3mm in closed position**.
- Water-cooled approximately between 16º and 18ºC

5th step: ADJUST HOT AIR TEMPERATURE

Select a Low Temperature, which the tube doesn't get to seal correctly.

- If it doesn't seal anything at all, raise about 25ºC, then,
- If it is close to achieving a correct seal, but it still doesn't comply, increase the temperature 10ºC until the sealing is correct. Then increase between 5º to 15ºC more to have a safety margin.

RESISTANCE TEST: Leave the tube to cool for 5 minutes, then check the seal blowing inside the tube with air at 3 bar for 10 seconds.

NOTE: In the case of PE tubes, the extrusion materials also influence the sealing temperatures, so if we use different PE materials the temperature could be different.

6th step: OTHERS SETTINGS

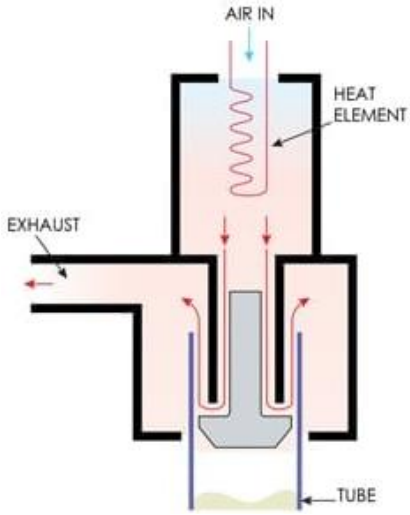
(To adapt also according to each machine)

5. DESCRIPTION OF ACTIVITIES

5.1. PRINCIPLE OF THE SYSTEM

Hot air sealing is based on the following:

1. Heat the inner part of the tube, where it is to be sealed, by means of hot air. The hot air is generated by an electric air heater and its temperature can reach up to 650º C.
2. Subsequently, the tube is sealed by two water cooled jaws (clamps).
3. Finally, the finish of the tube is made by trimming the edge of the sealed area.



5.2. RECOMMENDATIONS

5.2.1. Recommendations before the tube filling phase

It is very important to consider a series of recommendations for the handling of the tubes before to the filling and sealing process.

- Stored tubes must be in perfectly closed boxes and in a clean (not greasy) environment.
- The tubes before the filling and sealing process should be tempered in the conditioning room for at least 24 hours especially if storage is carried out at relatively lower temperatures than the conditioning room.
- Different batches of tubes should not be mixed. They could have slight differences in their inner diameters and will lead to problems in the sealing. (It would be recommended to adjust the diameter of the hot air nozzle)
- The tubes should not be touched or held internally by fingers.
- The tubes must not be exposed in open boxes for long periods of time. They could be charged with static electricity, with the consequent absorption of dirt, which directly affects the quality of the product and the sealing.

5.2.2. Recommendations for filling/sealing tubes with high alcohol concentration bulks

Due to the nature of the products with high alcoholic concentration, depending on the characteristics of the machine, filling system, conditioning room ... it is recommended to carry out a complete risk assessment of the filling and sealing process of the tubes, considering the following aspects:

- Product safety data sheet (percentage alcohol concentration, flammable limits - LEL, UEL- ...)
- Review of the product filling phase (product container/tank, dosing system, probability of accumulation of dangerous vapors ...)
- Review of the tube sealing phase (balancing the hot air blowing / vacuuming process, absence of possible sources of ignition, electrical elements ...)
- Review of the conditioning room, air recirculation...

Based on the experience and knowledge acquired by manufacturers of filling machines and users, it can be estimated that the risks (generation of vapors ...) derived from filling can be of the same nature both in filling tubes and other packaging. (PET-jars, cans...)

The solutions that have been adopted by some manufacturers and users of filling machines are oriented to the following aspects:

- Monitoring devices (volume flow) detection of accumulation of gases / vapors.
- Controlled extraction of gases / vapors.
- Move electrical elements (temperature regulators...) to potentially non-dangerous areas.
- Increased air recirculation in the conditioning room or zone.
- Others

5.2.3. Recommendations for reduced wall, head & cap design tubes

It is recommended to consider the following aspects when sealing PE tubes with reduced wall and low-profile caps with hot air sealing systems.

These recommendations are generic, it will be necessary to evaluate each case, considering the machine and the available tools.

5.2.3.1. Feeding of reduced wall tubes and caps with low profile

Because the tube is less thick, the tube feeding phase should be reviewed to avoid deformations or wrinkles in the tube skirt due to excess pressure or force.

Because it's a low-profile cap, the length (area) of the tube skirt on the tube holder is longer (*see photos below*). The tube adjustment in the tube holders will not be made at the shoulder / cap, it is made on the body of the tube, which could cause marks on the tube if the spring grip is too strong.

Tube in holders due to cap height differences

(LEFT) Fit over cap, on standard tube
(CEN) Fit over tube body, in tube with low-profile cap

It may be necessary to:

- Modify the bottom of the tube holder (higher) to adapt the new height of the cap in such a way that the tube holder adjustment remains on the shoulder / tube cap.
- Reduce the force or the number of springs, to avoid marking the body of the tube or deforming the base of the tube in the feeding system.

5.2.3.2. Heating

Heating nozzle: it is recommended to use a nozzle with an outer diameter of approximately -0.2mm, relative to the inner diameter of the tube.

The thickness of this new type of tube is less than that of a traditional PE tube. It is likely that a lower temperature is required compared to a tube of the same material, but of greater thickness.

It is recommended to start the adjustment from a lower temperature than usual and increase the temperature, until the minimum necessary to guarantee the quality and resistance of the sealing, is found.

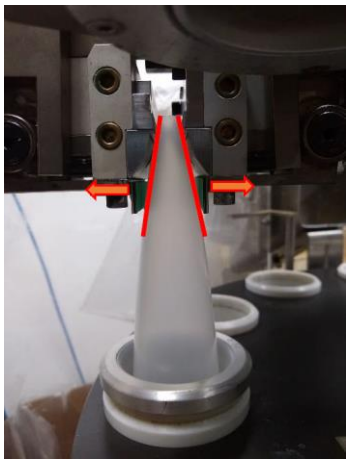
An excess of temperature, in addition to giving us a deteriorated appearance (wrinkles, ears ...) can give us poor sealing resistance.

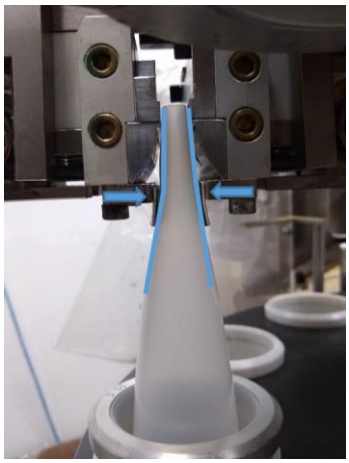
The use of an outer cooling ring is highly recommended, since it allows us to keep the tube centered and round and reduce small deformations. In this way, it will allow a more efficient heating of the tube inside the tube around its perimeter.

In addition, the use of this cooling ring helps us to reduce the appearance of wrinkles under the seal or "ears" at the ends.

5.2.3.3. Crimping

In the tests carried out on our machine, we have observed that the accompanying jaws or pre-jaws that are slightly tighter improve the quality of the seal. (*See photos below*)





5.2.4. Recommendations on the factors affecting the sealing during the filling of the tubes

The following factors, variables, and parameters to be regulated in each machine significantly affect the quality of the final seal:

- Tube body material
- Feeding station
- Bulk dosing unit
- Hot air nozzles
- Cleanliness of the hot air nozzle
- Outer ring (cooling ring)
- Hot air pressure
- Hot air temperature
- Speed (tubes/minute)
- Crimping
- Other settings

5.2.4.1. Tube body material

Different materials or mix of polyethylene materials of the tube body, for example, HDPE, MDPE, LDPE or PE-PCR, PE-Green could make vary:

- Slightly the inner diameter of the tube and, therefore, the diameter of the hot air nozzle.
- Sealing temperatures.

5.2.4.2. Feeding station

It is very important that the tube feed is done correctly in the tube holders, for that:

- It is recommended that the tube be controlled in the step from the feeding ramp to the tube holder, by means of vacuum or other system, in such a way that the placement of the tube in the tube holder is as effective and controlled as possible.
- The tubes must be held in the tube holders, if they have slack or move easily, can cause them to not fit properly in the hot air nozzle and the sealing is not correct.
- However, the tubes should also not get too hard, or the conical feeding pusher should not be push over-pressure, to avoid deforming the tubes which can also cause the sealing to be incorrect.
- The tube holders design, in shape and size, should be suitable for each tube format. (*Pay attention to the nominal outside diameter – see the measurement table*)

5.2.4.3. Bulk dosing unit

The filler nozzle or pipe must be having the proper diameter and shape depending on the type of tube, to avoid touching the inside the tube. This will prevent staining or deterioration of the tube.

It should be avoided that the dosage will stain the inner area of the tube where the sealing will be carried out with splashed of the product, even if the surface is minimal, as with micro drops, because it will negatively affect the quality/functionality of the sealing.

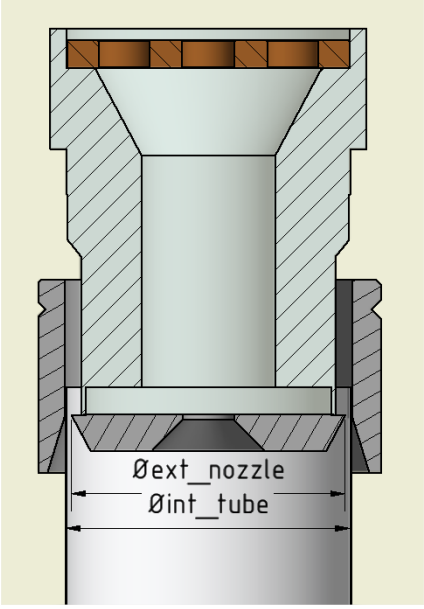
5.2.4.4. Hot air nozzle

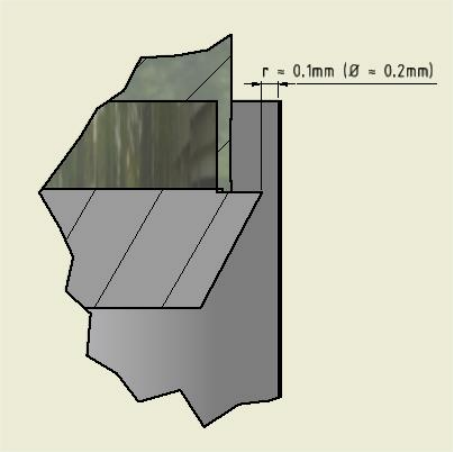
- ***Measure the inside diameter of the tube***: we use a tool (see picture below), made-in-house by Tuboplast, which allows us to easily visualize the inside diameter of the tube (*for more information on this tool, contact our sales department*).

- ***Select the appropriate nozzle diameter***, based on the inside diameter measured with the tooling. For the following cases:

$$\boldsymbol{\emptyset inner_{tube} - \emptyset outer_{nozzle} \cong 0,2\ mm\ (in\ diameter)}$$

NOTE: Two batches with different extrusion material o even two different fabrications of the same tube reference, could have slight differences in the inner diameter of the tube, so we always recommend measuring the inner diameter of each batch, to ensure that the selected nozzle is appropriate.

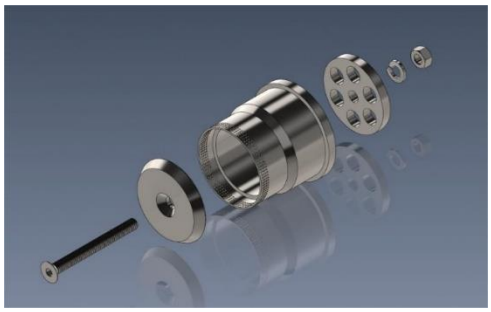


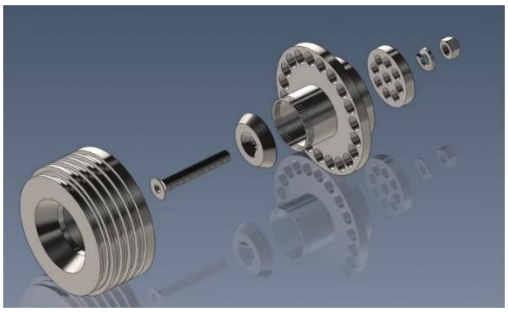


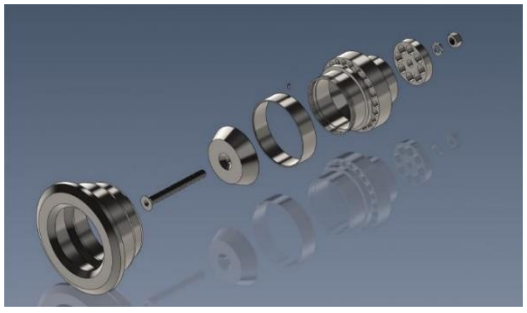
For each batch, the inside diameter of the tubes must be checked to select the hot air nozzle which outside diameter is suitable.

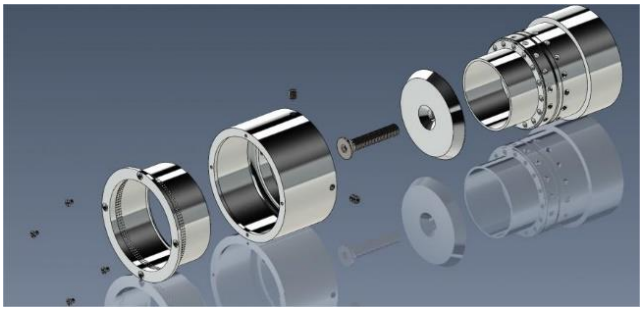
Depending on each sealing machine manufacturer, to adapt the diameter of the nozzle to the diameter of the tube, it must change the entire nozzle or just the washer.

Below it can see different nozzle designs, depending on each manufacturer:









A nozzle bad selected can lead to defects such as:

- **Nozzle too large:** it can generate friction when introducing and removing the nozzle from the tube and that implies risk of:
  - Damage the sealing area.
  - Spot the nozzle with molten material.
  - Moving the tube, therefore, will seal incorrectly.

- **Nozzle too small:**
  - The hot air does not properly heat the sealing area. It will require a higher temperature than if a suitable nozzle was selected for the inner diameter of the tube.
  - Small wrinkles under the seal.

This table shows the inner diameter of each kind of PE tubes and its tolerances. (Valid at the date of this document, for an updated information request it to your CTL-TH Packaging Group contact.

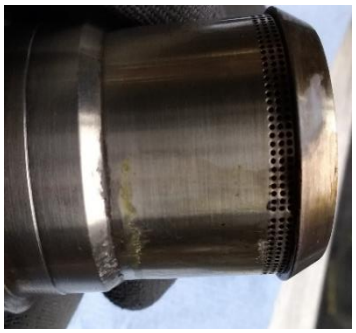
	PE Extruded Plastic Tubes		
	Ø Outer Nominal	Ø Inner Nominal	Tolerance
CYLINDRICAL TUBE	Ø 13,5	Ø 12,7	± 0,2
	Ø 16	Ø 15,2	
	Ø 19	Ø 18,2	+ 0,2 - 0,3
	Ø 22	Ø 21,2	
	Ø 25	Ø 24	
	Ø 30	Ø 29	
	Ø 35	Ø 34	+ 0,2 - 0,4
	Ø 40	Ø 39	
	Ø 50	Ø 48,8	+ 0,2 - 0,5
	Ø 56	Ø 54,8	
ELLIPTICAL TUIBE	Ø 30	Ø 29	± 0,3
	Ø 35	Ø 34	
	Ø 40	Ø 39	
	Ø 50	Ø 48,8	+ 0,3 - 0,4
ELLIPTOP TUBE	Ø 40	Ø 39	± 0,3
	Ø 50	Ø 48,8	+ 0,2 - 0,5

The values of the inner diameters are in the following General Standards (NG) defined in the technical specifications of the CTL-TH Packaging Group:

- **NG 113** → E.00.00000 (PE extruded Plastic Tube).

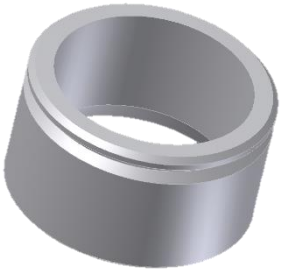
5.2.4.5. Cleanliness of the hot air nozzle

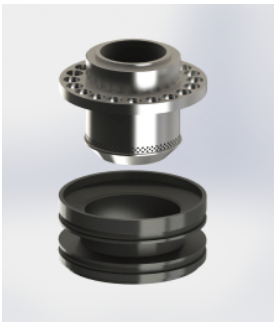
The hot air outlet holes in the nozzle should be perfectly clean and unobstructed. Sometimes they tend to become clogged with molten plastic (***usually when the HA nozzle selected is too large for the inner diameter of the tube***), not allowing the flow of hot air to pass properly and causing sealing problems in that area of the tube.



5.2.4.6. Outer ring (Cooling Ring)

Some hot air sealing machines are equipped to be able to use an outer ring or cooling ring.





Its main function is to ensure that the tube:

- ***Remains as round as possible***
- ***Is centered during the entrance of the nozzle***

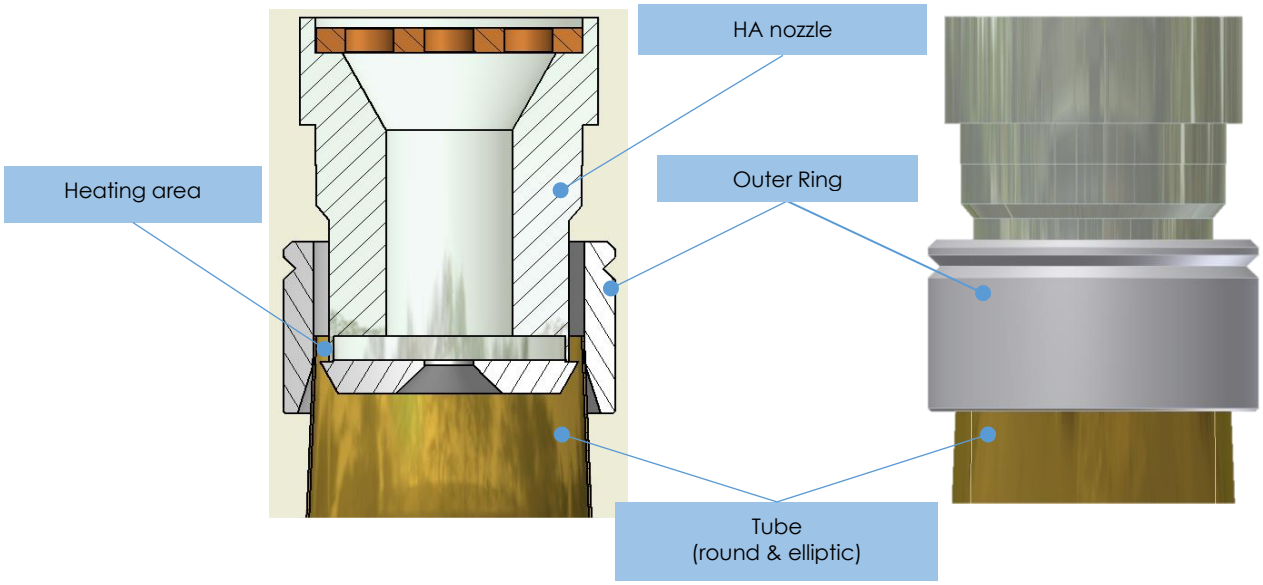
In such a way that the heating of the inside of the tube is as uniform as possible.

In other cases, it is used to cool the outside of the tube.

Each manufacturer has a design of this element, as well as its specific functionality and its machine placement (*It must be adapted to the outer diameter of the tube, considering the maximum manufacturing tolerance*).

In any case, to ensure a uniform heating throughout the inner perimeter of the tube, such that the sealing is correct, we consider the use of the outer ring for PE Extruded plastic tubes:

- **RECOMMEND for cylindrical tubes**
- **HIGHLY RECOMMEND for elliptical tubes**



5.2.4.7. Hot air pressure

According to our experience, the design of the hot air nozzle is specific to each manufacturer of filling machine. The diameter of the holes and number of rows of holes can affect the hot air pressure with which to work.

That is, the hot air pressure can change depending on each manufacturer nozzle design. Therefore, in different types of machines with different types of nozzles, the hot air pressure is completely different.

With our machine and nozzles, we usually work at 0.6bar, although we have had experience with different customers, whose use air pressures up to 4 or 6 bar.

5.2.4.8. Hot air temperature

The temperature of the hot air is directly related to the other parameters that affect the heating of the inside of the tube such as hot air pressure, machine speed, heating time, type of tooling.

In the case of PE tubes, the extrusion materials also influence the sealing temperatures of the tubes, so that if we use different PE materials the sealing temperature could be different.

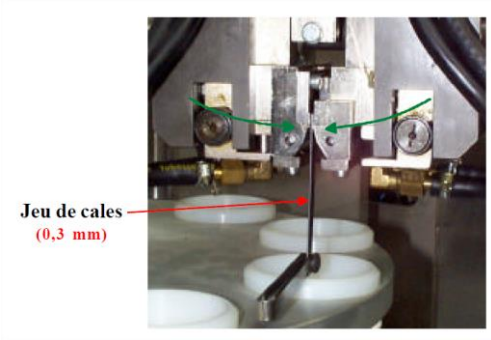
To find the right sealing temperature for each material or material mix of the tube body, we recommend:

Select a Low Temperature, which the tube doesn't get to seal correctly.

- If it doesn't seal anything at all, raise about 25ºC, then,
- If it is close to achieving a correct seal, but it still doesn't comply, increase the temperature 10ºC until the sealing is correct. Then increase between 5º to 15ºC more to have a safety margin.

5.2.4.9. Crimping

The jaws can be flat or grooved, with or without batch marking.
It is recommended to consider the following aspects:



- Clean of any residue.
- Correctly **aligned and parallel**.
- Separation around 0.2mm and 0.3mm in closed position.
- Water-cooled approximately between 16º and 18ºC.

5.2.5. Other settings

5.2.5.1. Heating time

The heating time is the time that the nozzle stays inside the tube heating it. Depending on the manufacturer of the machine, it can be:

- Heating time as a function if the speed of the machine:

- Higher machine speed, shorter heating time.
- Slower machine speed, longer heating time.

o Heating time controlled by an independent parameter. The heating time is selected regardless of the speed of the machine.

5.2.5.2. Sealing thickness

It is recommended to adjust the clamp (jaws) in such a way that the *thickness of the sealing* (defined in the photo) measures approximately *75 – 85% of the total thickness of the tube*.

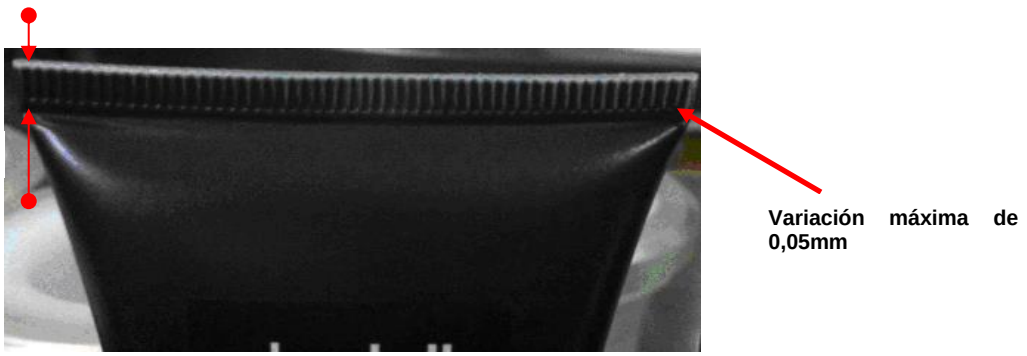
Example:

If the thickness of the tube is 0.43mm, the total thickness would be 0,86mm. Therefore, the sealing thickness should be around 0,64 – 0,74mm (75 – 85%).

If the sealing is too compressed (for example around 0,40mm) there is a risk of rupture of the tube, on the other hand if the sealing is less compressed (for example 0,80mm), the sealing would not be good and there is a risk that the tube could open.

5.2.5.3. Sealing height

It is recommended a sealing height around *5 o 6mm* as shown in the following photo:



The variation of thickness in the sealing line must have maximum difference of 0.05mm, as indicated in the picture. This control is performed to verify the parallelism between the jaws (clamps).

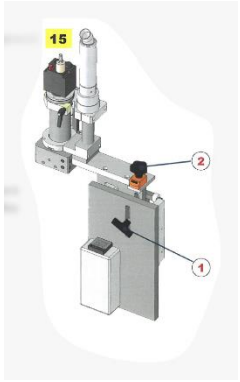
5.2.5.4. Trimming system

The trimming system is used to remove the end of the sealing and give a suitable aesthetic finish to the tube.

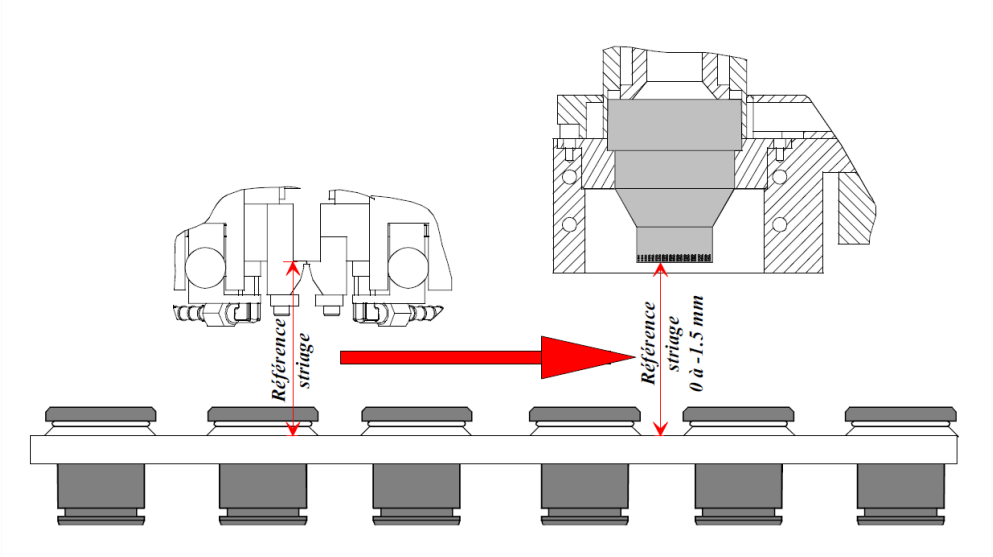
The cutting blade must be perfectly clean, sharp and tight, in order to make a perfect cut that is no made by tearing.

5.2.5.5. Height of hot air nozzle

On some machines the height of the hot air nozzle can be adjusted independently of the rest of the machines movements.



The height of the hot air nozzle should be aligned with the compression jaws and the trimming unit.



5.3. OPERATING METHOD OF SETTING THE FILLING-SEALING MACHINE.

Check that the following parameters are correctly set:

- Hot air nozzle selection, suitable for inner tube diameter.
- Dosing/Filling regulation.
- Hot air pressure regulation.
- Check crimping. Compression of the sealing.
- Check trimming.
- Machine speed, depending on the production.

Then, continue with the hot air temperature selection:

Taking into account the recommended temperature range for each type of tube, select a lower temperature than the established in the table. So we could verify that the tube does not seal correctly.

The temperature is increased by 10º in 10ºC, checking with each increase the quality and resistance of the sealing of the tubes, until reaching the minimum temperature that correctly seals the tubes.

Once we determine the minimum sealing temperature for this batch of tubes, the temperature of the hot air will be increased, as a safety margin of 5ºC to 15ºC

NOTE: It must be borne in mind as explained in previous chapters that a change of machine speed, heating time or air pressure can also affect the quality and resistance of the sealing. It is not recommended to make two changes at the same time, so it is easier to evaluate how the change affects to the tube sealing.

On the other hand, it should be taken into account that if exceed heat is produced on the inner of the tube (by high temperature, high hot air pressure and/or high heating time) it can deteriorate the tube material, causing it to not seal properly.

5.4. ASPECTS TO BE CHECKED AFTER SEALING

5.4.1. Seal testing

There are two methods to verify that the seal resistance is correct:

- Method 1. Internal pressure resistance
- Method 2. External pressure resistance

5.4.1.1. Method 1. Internal pressure resistance

This method is recommended for seal resistance testing of **empty tubes**, the system used may be an "in house" system. It is enough with pressurized air intake, a flow regulator and a nozzle that fits to the head of the tube or cap.

1. The tubes must be tempered in the room where the test is performed.
2. If the tubes are just sealed, wait at least 5 minutes to do the test. So the sealing will be cooled and stabilized.
3. Hold the tube with one hand. Adjust the pressure gauge to 3 bars.
4. Afterwards, with the other hand, insert the blower cone into the head of the tube or the perforation of the cap and circulate the air into the tube for a defined time in the table shown below:

TUBE	PRESSURE	TIME
PE Extruded Plastic Tubes	**3 bars**	**10 sec.**

The results are positive if the seal supports the test without showing deficiencies.

5.4.1.2. Method 2. External pressure resistance

This test method is not used by CTL-TH Packaging as a validation method for tube sealing, however it is used by numerous fillers and customers, so we include it in this guide for information.

This method is recommended for **filled tube** seal resistance tests. The system used is how the supplied by manufacturers like ACRN, JACOMEX, ACF-MEASUREMENT, among others…

JACOMEX – Tube Tester

ACRN – ATS Tube Seal Tester

1. The tubes must be tempered in the room where the test is performed.
2. If the tubes are just sealed, wait at least 5 minutes to do the test. So the sealing will be cooled and stabilized.
3. Adjust the cylinder pressure according to the manufacturers' recommendations, so that an output pressure of 2 bars is generated inside the tube.
4. Place the tube in the base of the system enabled for this purpose. It is recommended/optional to introduce the tube in a plastic bag (type ZIPLOCK) to avoid products projections in case of seal rupture.

5. Close the protection and start the system for the time indicated by the manufacturers (around 10 or 20 seconds).

The results are positive if the seal supports the test without showing deficiencies.

5.5. DIVERS

5.6. TROUBLESHOOTING

5.6.1. Sealing resistance

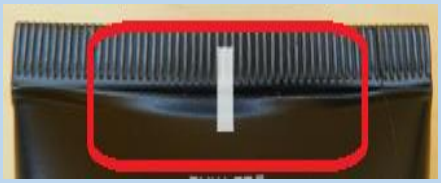
In case of defects after the sealing resistance test, the following table define the possible causes and recommendations to solve it:

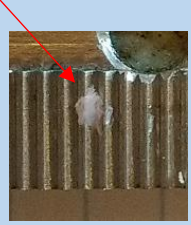
The most typical problems are shaded in yellow:

Possible causes	Recommendations
Nozzle or tooling wrong selection	Check that both, nozzle and tooling are adequate to the characteristics of the tube to be sealed, according to our recommendations (*see chapter 4.2.2.3*)
Hot air pressure and/or temperature settings are wrong at machine speed set	Adapt the hot air pressure and temperature to the machine speed setting.
Incorrect air pressure used in the test for checking the sealing in empty PE tubes. It's recommended 3 bars	Check the air pressure for testing the sealing according to our recommendation (3 bars during 10").
Hot air nozzle and tube are not correctly axial alignment	Ensure concentricity between nozzle and tube, ► if it's possible, use outer ring
Hot air nozzle holes are clogged by molten material	* Clean the hot air nozzle * Ensure concentricity between nozzle and tube * Check that both, nozzle and tooling are adequate to the characteristics of the tube to be sealed, according to our recommendations (*see chapter 4.2.2.3*) * Use outer ring
Incorrect clamp / jaws compression distance/pressure	Check crimping setting Check the parallels between jaws Distance between jaws = 0.2 ~ 0.3
Tubes stained with bulk in the sealing area	Check that the filler nozzle is correctly centered and clean. Check that after dosing the product there is no product residue in the sealing area.
It isn't used the outer ring for cylindrical tube.	Outer ring is recommended. It allows to center properly HA nozzle with respect to the tube and ensure a uniform heating of the inside of the tube.
It isn't used the outer ring for elliptical tube.	It is recommended to use the outer ring. For round the tube and ensure a uniform heating of the inside of the tube.

5.6.2. Appearance

The defects of appearance that can happen and the actions to be performed to correct them, are defined in the following table:

ASPECTS DEFECTS	POSSIBLE CAUSES	CORRECTION FACTORS
EARS 	**Excessive heating**: Temperature too high Hot Air pressure to high **Excessive compression**: The jaws are too closed	**Check sealing parameters:** * Reduce Temperature * Reduce Air Pressure * Check jaws setting.
NON UNIFORM SEALING OR WITH DEFORMATIONS  	Jaws are badly aligned. Unsuitable height adjustment of the hot air nozzle Accompany jaws are badly aligned. Hot air temperature too high Hot Air pressure to high The nozzle is too big for the diameter of the tube	Line up the jaws Adjust the height of the hot air nozzle Line up the accompany jaws. Reduce Temperature Reduce Air Pressure Reduce the diameter of the HA nozzle, according to our recommendations
HOT AIR NOZZLE SPOTTED WITH MOLTEN MATERIAL 	**The nozzle touches in the tube, because:** The tube is not well centered (axially) with respect to the HA nozzle. Outer ring is not used. The nozzle is too big for the diameter of the tube. It is an elliptical tube and the outer ring is not used. The outer ring doesn't round correctly the tube.	Check the alignment between the tube and the HA nozzle. Use the outer ring. Reduce the diameter of the HA nozzle, according to our recommendations (*see chapter 4.2.2.3*) Use the outer ring to round off the elliptical tube.

ASPECTS DEFECTS	POSSIBLE CAUSES	CORRECTION FACTORS
		Check that the outer ring rounded elliptical tube correctly.
JAWS SPOTTED WITH MOLTEN MATERIAL  	**Nozzle too large** The nozzle is too large and drag the molten material out of the tube **Temperature too high** The molten PE material it too fluid due to excess temperature **Crimping compression too large** The molten PE material, with an excessive pressure can remove material residue and leave them in the jaw	Reduce the diameter of the HA nozzle, according to our recommendations (*see chapter 4.2.2.3*) Reduce the temperature Check the crimping pressure Distance between jaws recommended = 0.2 ~ 0.3mm

6. ASPECTS TO CONSIDER

6.1. *HEALTH AND SAFETY*

Make proper use of the sealing machine to avoid entrapment, burns…

6.2. *ENVIRONMENT*

Comply with the Company waste management instruction.

6.3. *SR*

DOES NOT APPLY

7. ASSOCIATED DOCUMENTS

DENOMINATION	DOCUMENT CODE
IMS Glossary	X.00.00000
Technical specifications EXTRUDED PE Plastic Tubes	E.00.00000