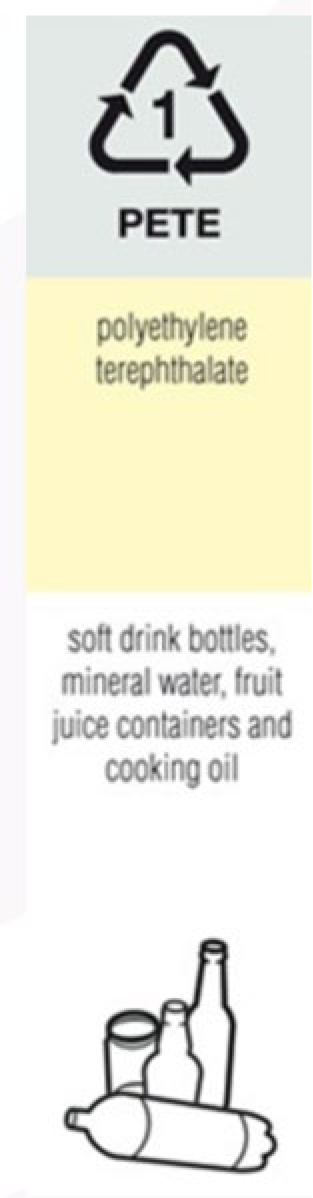
Packaging primario
Rígidos - BOTELLAS

BOTELLA:
PET

BOTELLA: PET

Polyethylene Terephthalate (PET)	durable, rigid high degree of impact resistance & tensile strength good alcohol/chemical and oil barrier not resistant at temp extremes completely recyclable and is the most recycled plastic worldwide Will sink in water	Very transparent glass like clarity, high gloss. It will make a crackling noise when you scrunch the material	Beverage bottles, detergent, BPC bottles, and oil bottles.

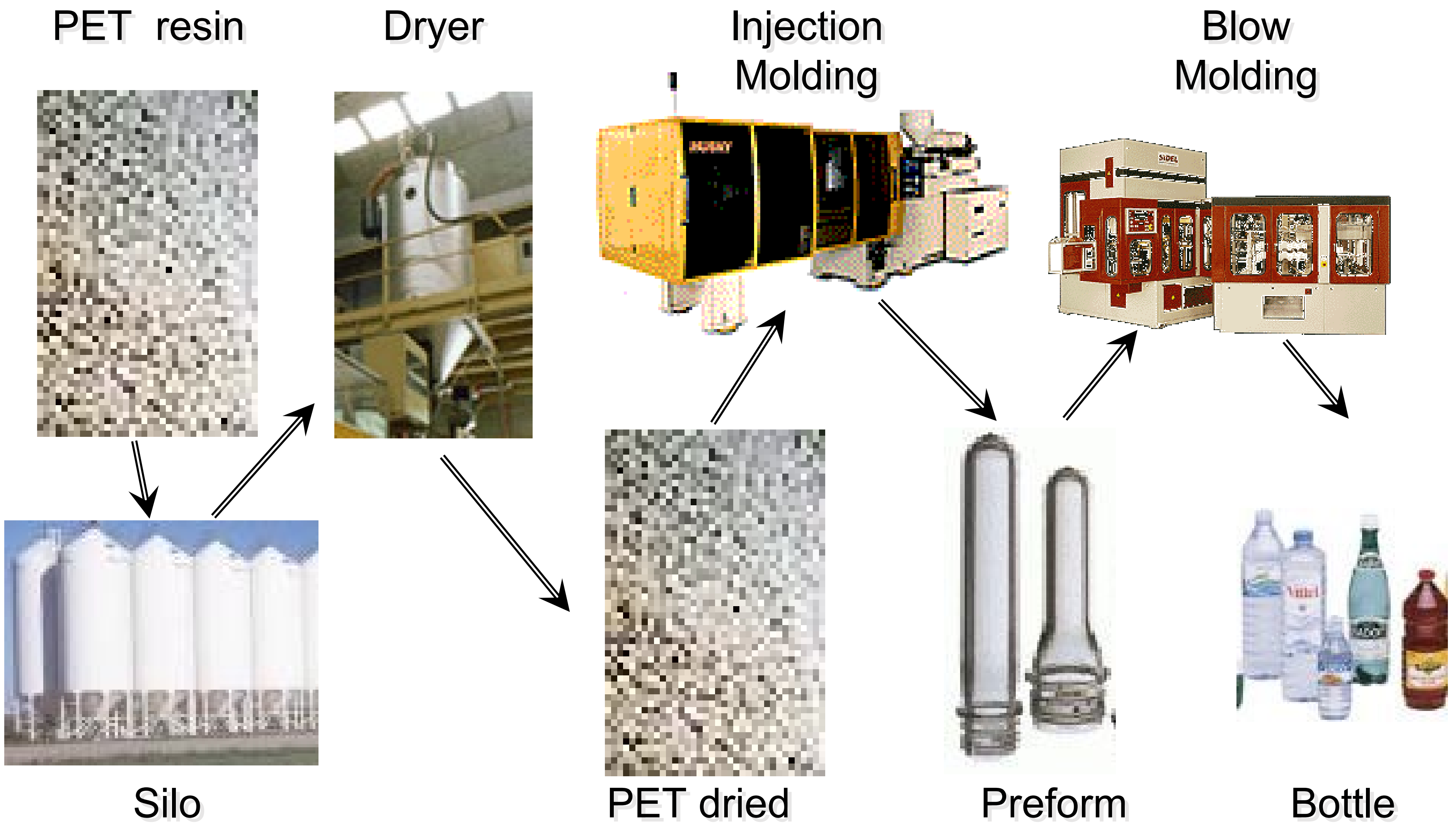


PET introduction

...PET to the Bottle

BOTELLA:

PET



BOTELLA:
PET

PET introduction

What makes PET useful for Bottle applications?

Orientated PET is suitable because of:

- Clarity or glass-like appearance
- Toughness / impact strength
- Good barrier properties (CO2, O2, and H2O)
- Cost

ISBM pet

BOTELLA:
PET

- Single or Two step ISBM?

Nissei

Husky injection

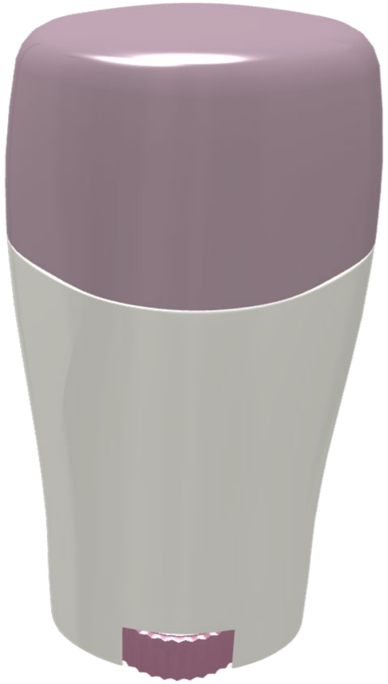
Sidel Blower

Single stage

Two-stage

- The bottle can be made on 1 machine or by a combination of 2 machines...

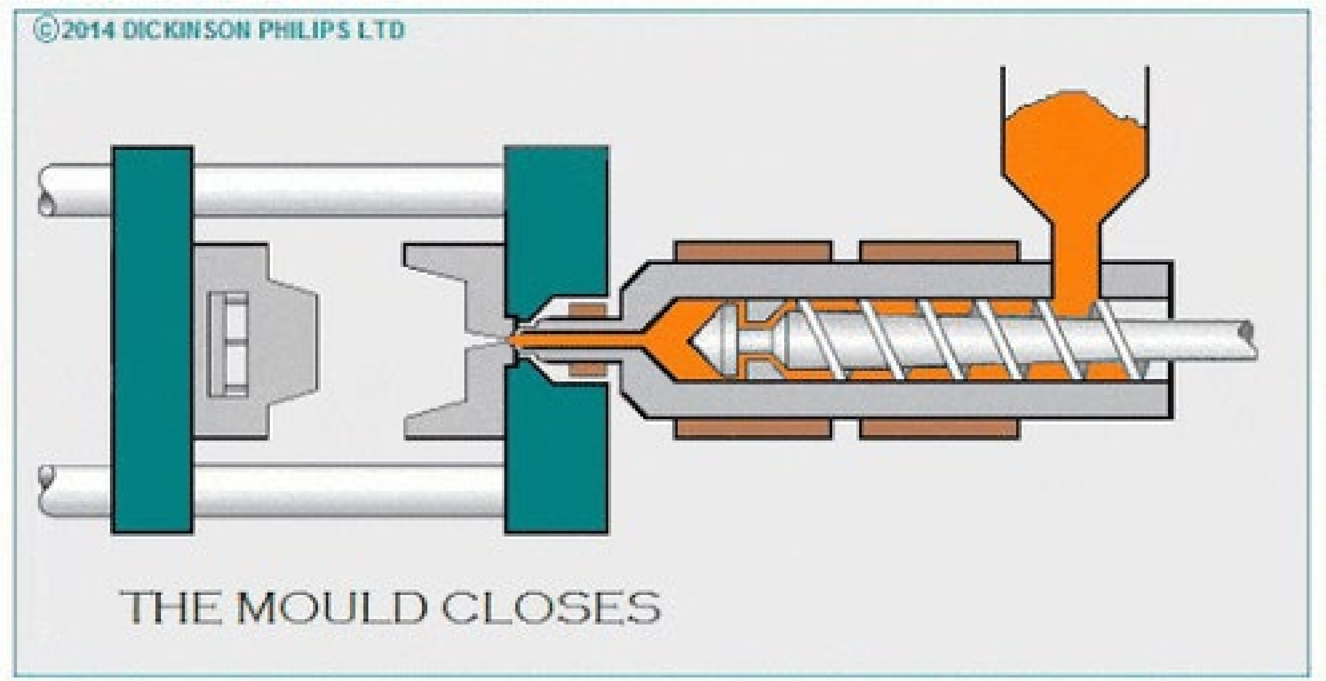
BOTELLA: HDPE

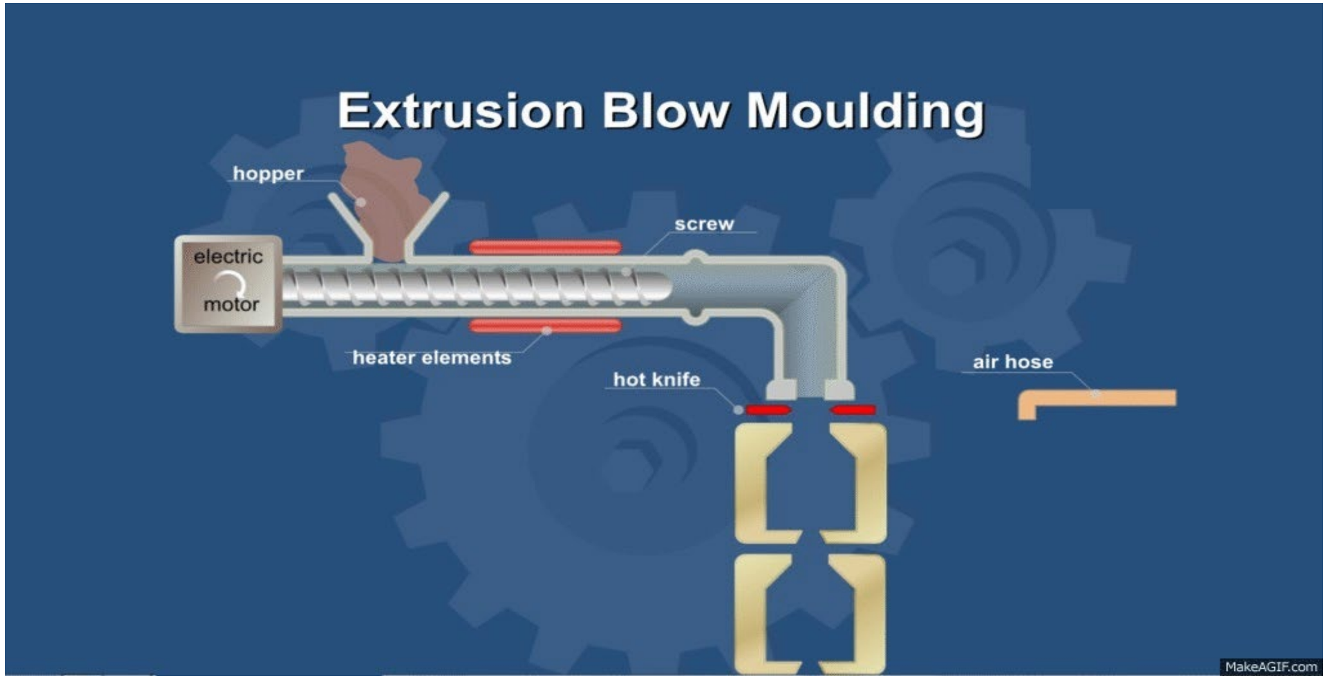


BOTELLA: HDPE

High density polyethylene (HDPE)	hard to semi flexible excellent moisture barrier, impact resistant not recommended for products sensitive to certain chemicals, hot fill products or requiring a hermetic (vacuum) seal Widely recyclable but not as much as PET Will float in water	Naturally translucent, opaque but not glossy in appearance.	Grocery bag, milk shampoo & conditioner, laundry detergent and household cleaning bottles

BOTELLA: HDPE





BOTELLA: HDPE

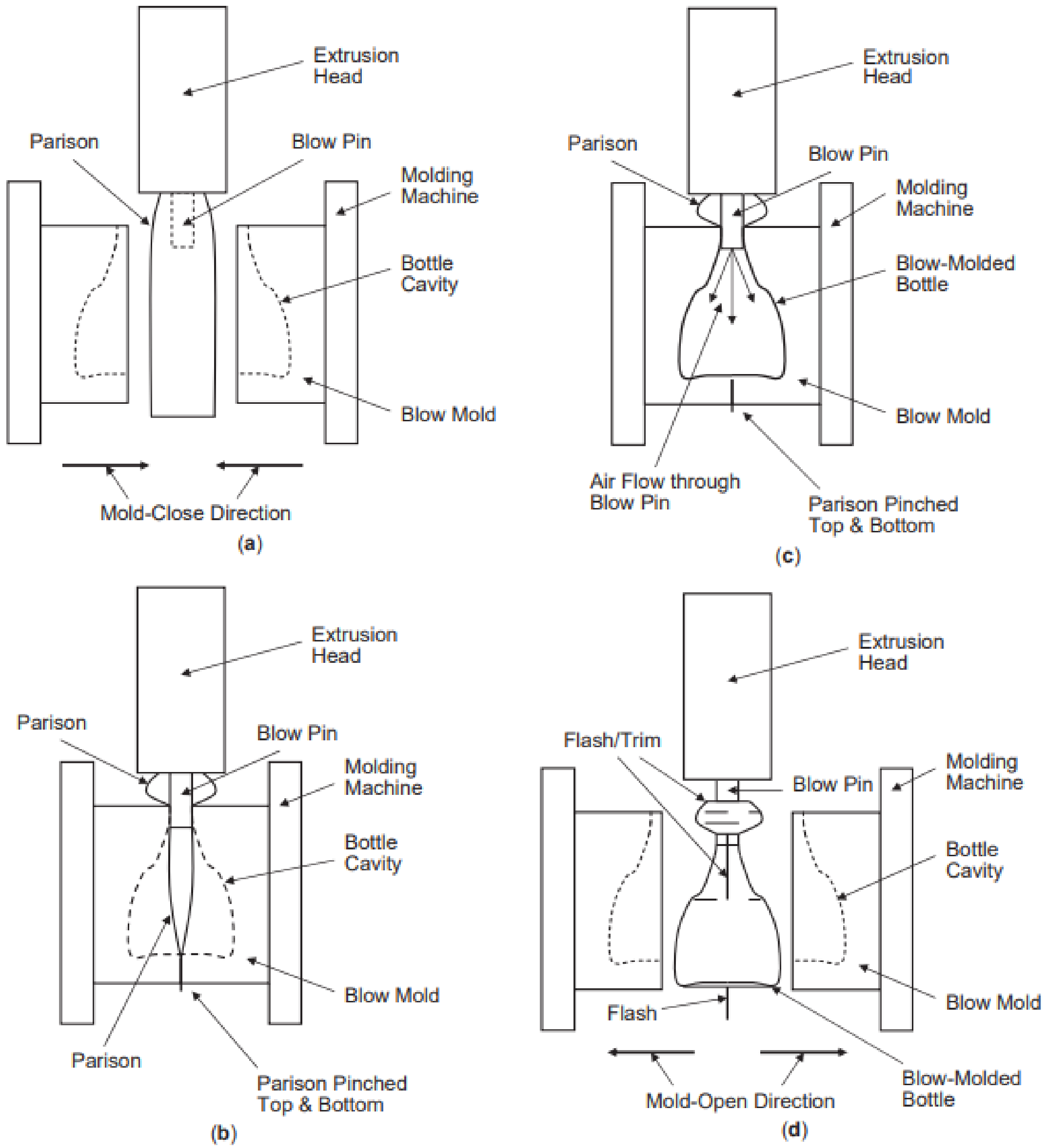


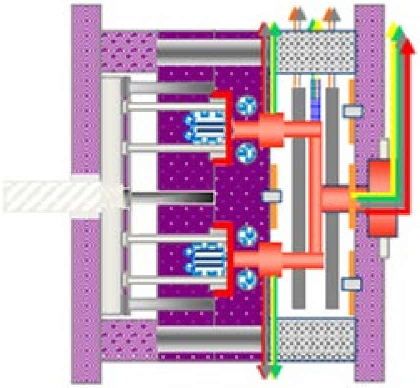
Figure 2. Basic blow-molding process sequence: (**a**) Parison extrusion; (**b**) mold close and parison pinch; (**c**) parison inflation and bottle cool; (**d**) mold open and bottle eject.

BOTELLA:
HDPE

IM MACHINES / MOULDS V BLOW MACHINES / MOULD

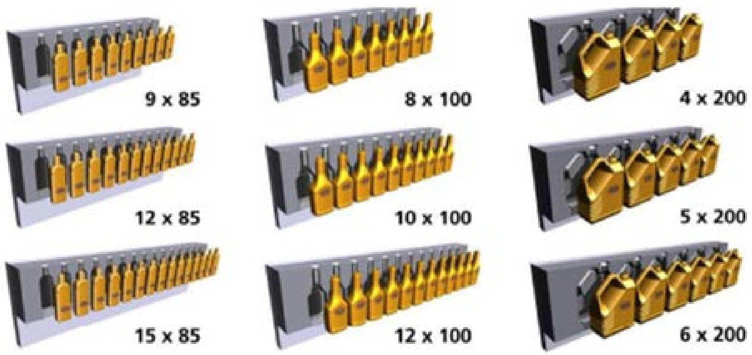
Injection

Complexity is in the mould



Blow

Complexity is in the machine



Standard layout of IM machine

Simple blow cavities

BOTELLA: HDPE

Key Cost Drivers

- Cycle time
- Bottle Weight
- Number of parisons/cavities
- Machine capital
- Moulds capital
- Material i.e HDPE, PP or Co polyester
- Labour
- Electricity
- Utilities : Compressed air, cooling water etc

BOTELLA:
PP

BOTELLA:
PP

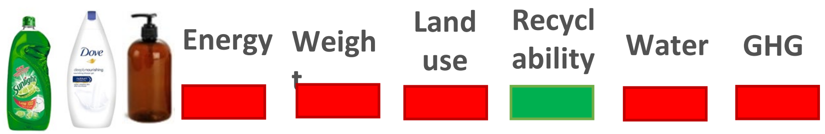
Polypropylene (PP)	semi-rigid, translucent and tough material – can be clarified good chemical and heat resistance and integral hinge properties more flexibility and enhanced clarity are advantageous. Will float in water	Feels smooth and slight blurry, naturally white, waxy and translucent. It stretches in one direction more than the other.	Boxes, barrels, films, bottle caps, shower gel bottles

BOTELLA: VIDRIO

Glass Packaging are one of the first packaging materials reported since bronze age. It can have different composition, but for packaging it usually consists in sand (~70%), soda ash (~20%), limestone (~10%) and cullet, or recycled glass (depending on availability). It requires a huge amount of energy to melt the sand, what can be offset up to 30% by cullet inclusion. Colors are obtained by adding metal and metal oxides in the glassy matrix in the furnace or in the exit of it.
As material, it has a good oxygen, grease and moisture barrier, as well as good top load – not possible to squeeze, thought, therefore a pump is required for thick products. If colored, it has a good UV protection too.
In general, a normal development consist in the brief, the validation of a pilot mold (~10 weeks development time) and a production mold (~16 weeks, 35k€).

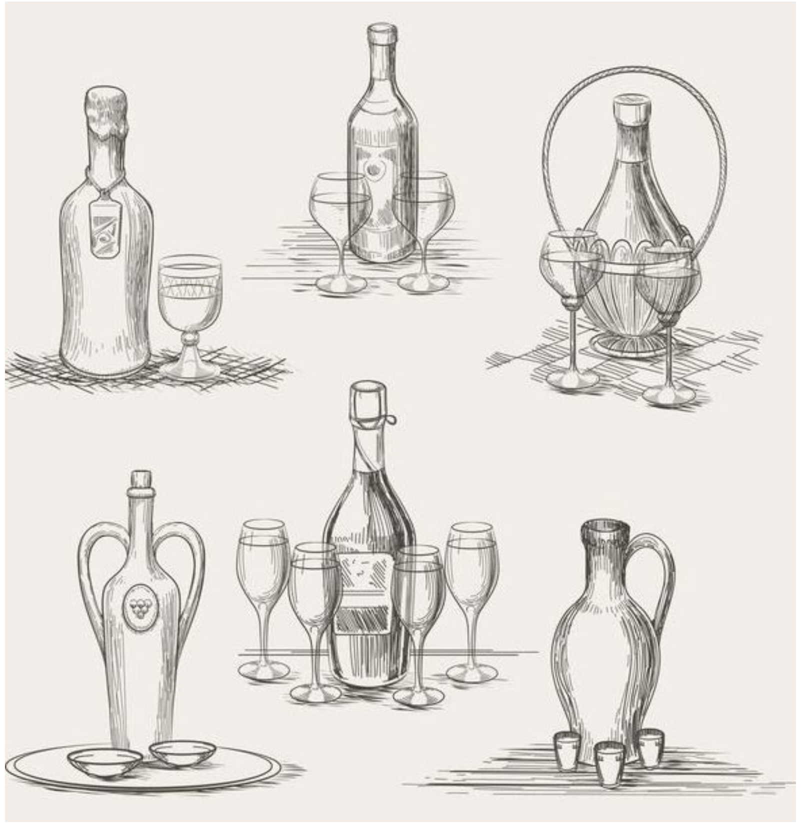
Conversion – The raw materials are melted together in the furnace in a continuous operation (up to 700tons). The forming process consist in the form and blow the molten glass (2 steps). Depending on the neck diameter (wide-mouth or bottle necks) it can be Press&Blow or Blow&Blow. After the forming, a coating is applied to reduce friction and increase resistance for breakage, and it follows to cool slowly and release the internal stress (annealing). Next step is the decoration by printing (the color is achieved in the furnace by raw materials or in the exit of the furnace in the feeder).

Sustainability – As the overall sustainability analysis shows worst results when compared to plastics bottles (both PE and PET). As the weight of glass packaging is higher than the plastic equivalent, it has a big impact in markets where the Recycling Rates are low.



SEAC comparison Glass bottle and (virgin) HDPE or PET bottle.

BOTELLA: VIDRIO



BOTELLA: VIDRIO

Aparición de la botella de vidrio

Aunque su irrupción sucedió a mediados del siglo XVII -la botella de vidrio para vino más antigua que se conserva está datada en febrero de 1657- lo cierto es que **la aparición de las botellas de vidrio fue resultado de siglos de evolución** de técnicas que se remontan a la Venecia del siglo XIII, cuando estudiosos y científicos comenzaron a estudiar las propiedades del vidrio, su composición y manipulación.

Las botellas que se elaboraban por aquel entonces **no tenían la misma forma** que las botellas que conocemos actualmente.

En esa época, **las botellas eran más redondas** y las paredes de la botella, por lo general eran mucho más delgadas, ya que se fabricaban con la técnica del vidrio soplado.

Más adelante, cuando se popularizó el consumo de champagne y otros vinos espumosos, las técnicas de fabricación mejoraron y evolucionaron **para que las botellas pudiesen soportar la presión** producida por el gas carbónico (Co2) característico de este tipo de bebidas, pero no fue hasta el siglo XVIII que se empezaron a fabricar botellas más alargadas.

BOTELLA: OTROS MATERIALES

Tin plate packaging* are basically steel sheets covered with coatings. The most traditional combinations are the *tinplates* (steel sheet with a layer of tin coating – 1 to 11.2g/m²), *tinfree* (TFS – tin free steel or ECCS – Eletrolitc Chromiun Coated Steel).
The fabrication process is 2 pieces can (cheaper, lighter, better quality) or 3 pieces can.

Conversion – The conversion process is usually impact extrusion (a metal coin that is hit by a forming metal bar and take the shape of that, the neck is then carved in its final shape).

Innovation – It is possible to functionalize a metal part to respond to a certain stimuli when using *smart alloys* or *shape memory alloys* (metal blends that will change shape and format upon electricity, pH change, temperature, etc..). They are usually a mix of aluminum, titanium, nickel, zinc, gold or Iron and can be classified as 1-way (from one shape to another) or two ways (from one shape to another and a different shape if in a different condition).
Examples of application would be molds that changes shapes or nozzles that will adjust itself as per the formulation. Capability team has worked in the past in two projects in this area – ask Rigid Packaging team for more information.

Energy	Weight	Land use	Recyclability	Water	GHG	Reuse
						6* Times

SEAC comparison Aluminium Bottle and (virgin) HDPE or PET bottle
** Must be used over 6 times to be better than plastic.*

BOTELLA: OTROS MATERIALES

Aluminium packaging* are a well-known alternative for plastics. It can be achieved through stamp or extrusion and has some advantage in terms of premiuness and shelf life of products. It can be infinitely recycled, reaching recycling rates around 75% in EU. In systems that don't require pressure, can contain up to 60% of PCR. However, the amount of energy required to melt the metal is huge and the final parts are usually two to three times heavier than a plastic container of same size.
The parts can be caps, bottles, jars, tubes. They can be closed with a snap on or screw cap and decorated with direct printing (offset, coating).
The brimful volumes available usually varies from 10mL to 450mL.

Conversion – The conversion process is usually impact extrusion (a metal coin that is hit by a forming metal bar and take the shape of that, the neck is then carved in its final shape).

Innovation – It is possible to functionalize a metal part to respond to a certain stimuli when using *smart alloys* or *shape memory alloys* (metal blends that will change shape and format upon electricity, pH change, temperature, etc..). They are usually a mix of aluminum, titanium, nickel, zinc, gold or Iron and can be classified as 1-way (from one shape to another) or two ways (from one shape to another and a different shape if in a different condition).
Examples of application would be moulds that changes shapes or nozzles that will adjust itself as per the formulation. Capability team has worked in the past in two projects in this area – ask Rigid Packaging team for more information.

Energy	Weight	Land use	Recyclability	Water	GHG	Reuse
						6* Times

SEAC comparison Aluminium Bottle and (virgin) HDPE or PET bottle
** Must be used over 6 times to be better than plastic.*

BOTELLA: OTROS MATERIALES

Ceramic Packaging are mostly not present in Unilever portfolio, apart of few brands in foods (Maille brand, for example). Naturally occurring raw materials are used in this type of packaging – clay, sandstone, silicates and feldspar. It is naturally a strong barrier to oxygen, light, water and water vapor and can extend the shelf life for many years (depending on the O_2 levels in the headspace). Limitations regarding this material are around weight and brittleness, as well as cost. Caps used are plug-type (swing and stoppers) and the process of conversion of those packs is described below.

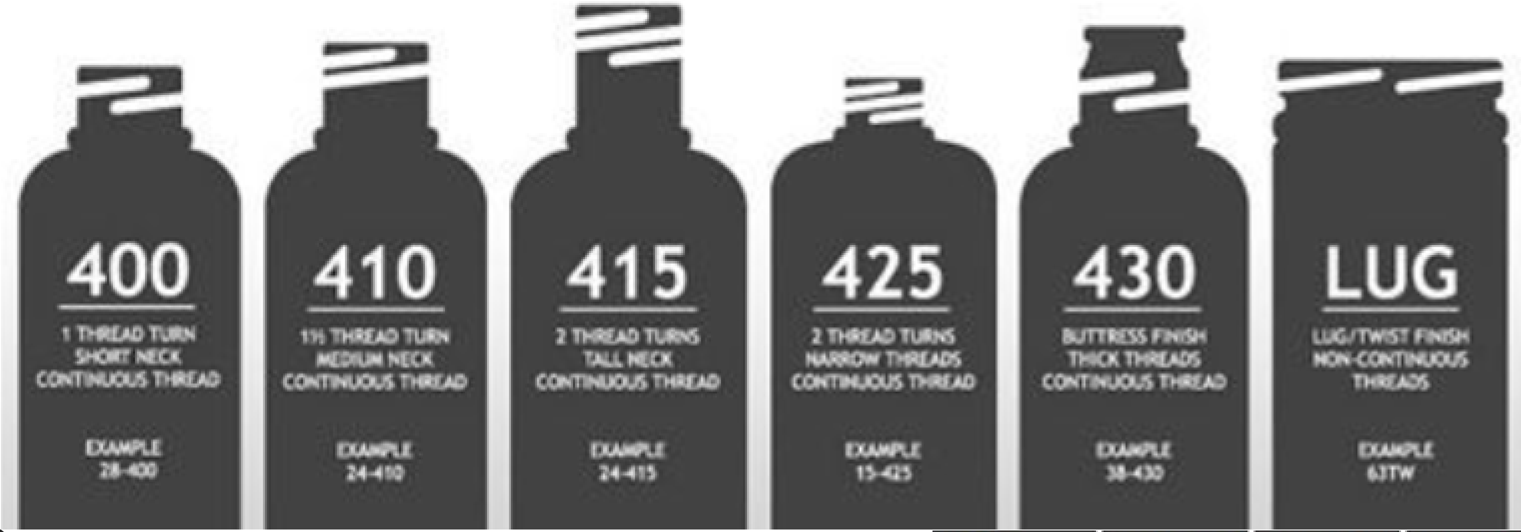
Conversion – The conversion process can vary slightly from one supplier to another. At Digoin the liquid sandstone is poured in plaster mould and the liquid in contact with it will dry and form the wall of the jars. After appr. 20 minutes the liquid is poured out leaving behind the jar. The neck is manually checked and formed, and the jars are sent to dry in the oven. The color is applied by dipping the pack and it is sent to the oven again. At Poterie Normand, a pre-cut lump of clay is placed in a steel mould. The mould opens in 4 parts (like a flower) to receive that lamp, is closed and spins in a very high speed, pushing the clay against the mould, forming the wall of the jar. From the top, a steel forming tool enters the jar and rotates to finish the inside.

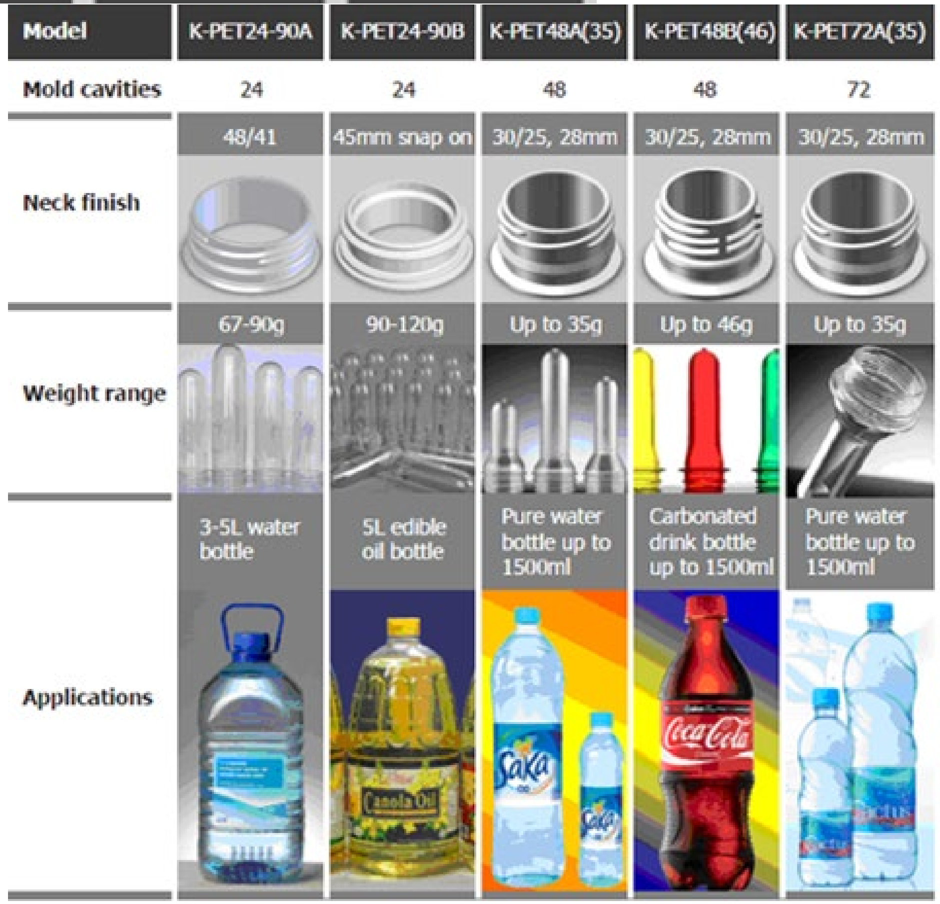
Sustainability – As the overall sustainability analysis shows worst results when compared to plastics bottles (both virgin PE and PET). The energy used in the oven, as well as the weight of ceramic packaging is much higher than the plastic equivalent, topped up by the fact that it is not a recyclable material, has a big impact in the sustainability scores.

Energy	Weigh t	Land use	Recycl ability	Water	GHG

SEAC comparison ceramic jar and (virgin) HDPE or PET bottle.

CUELLO: ROSCA





Model	K-PET24-90A	K-PET24-90B	K-PET48A(35)	K-PET48B(46)	K-PET72A(35)
Mold cavities	24	24	48	48	72
Neck finish	48/41	45mm snap on	30/25, 28mm	30/25, 28mm	30/25, 28mm
Weight range	67-90g	90-120g	Up to 35g	Up to 46g	Up to 35g
Applications	3-5L water bottle	5L edible oil bottle	Pure water bottle up to 1500ml	Carbonated drink bottle up to 1500ml	Pure water bottle up to 1500ml

CUELLO: ROSCA

400 (continuous thread) A 400 neck finish consists of a single thread turn.
410 (continuous thread) A 410 neck finish consists of one and a half turns.
415 (continuous thread) A 415 neck finish consists of two thread turns, but the threads are thinner and neck is typically taller.
425 (continuous thread) A 425 neck finish consists of two thread turns, but is most commonly found on smaller capacity containers such as vials.
485 (continous thread) A 485 neck finish consist of one thread turn, but most commonly found on paragon glass jars. The finish can also take a 400 cap, but is used with spice caps.
430 (continuous thread) A 430 neck finish consists of one or two thread turns. The threads are also deeper than the standard 400 and 415 neck finish. The unique shape of the neck is commonly known as a buttress and is designed to help the user pour product with better accuracy.
DBJ (continuous thread) A DBJ neck finish features a ring beneath the threads that catches on to a detachable ring of a DBJ cap. When the end user unscrews the cap from the container for the first time, the ring will break off from the cap, making it tamper evident.
470 (continuous thread) A 470 neck finish consists of one thread turn and is commonly found on glass mayo jars. The threads of a 470 neck finish are deeper than a 400 finish.
2030 (lug) A 2030 neck finish consists of a single half turn twist. Continuous thread closures will not fit on lug finished closures. The 2030 are most commonly found on glass mayo or mason jars and are used for preserving food.

CUELLO: ROSCA

"T" Dimension

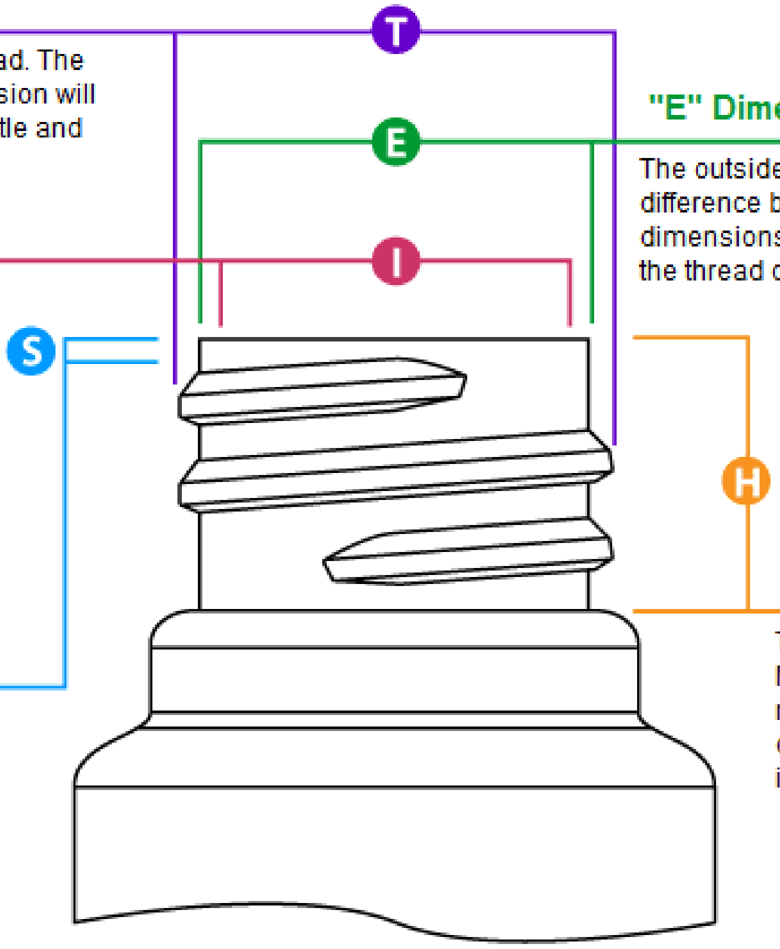
The outside diameter of the thread. The tolerance range of the "T" dimension will determine the mate between bottle and closure.

"I" Dimension

The inner diameter of the bottle neck. Specifications require a minimum "I" to allow sufficient clearance for filling tubes. Linerless closures, with a plug or land seal, and dispensing plugs and fitments require a controlled "I" dimension for a proper fit.

"S" Dimension

Measured from the top of the finish to the top edge of the first thread. The "S" dimension is the key factor that determines the orientation of the closure to the bottle and the amount of thread engagement between the bottle and cap.



"E" Dimension

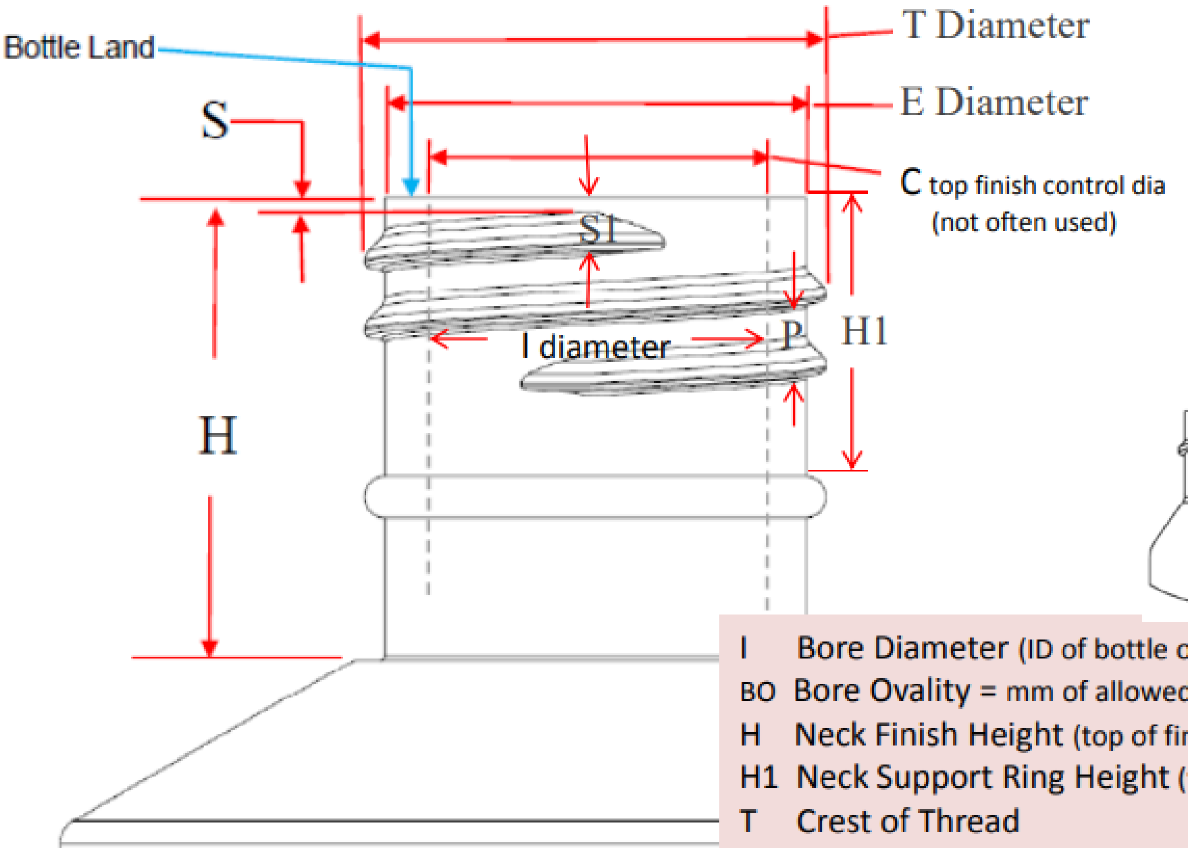
The outside diameter of the neck. The difference between the "E" and "T" dimensions divided by two determines the thread depth.

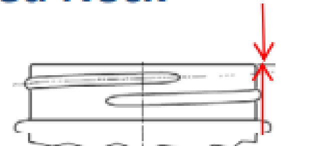
"H" Dimension

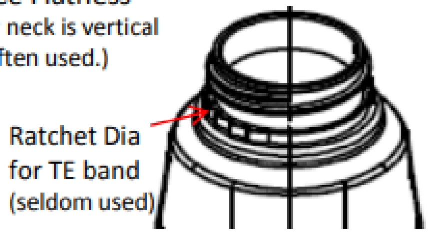
The height of the neck finish. Measured from the top of the neck to the point where the diameter "T", extended down, intersects the shoulder.

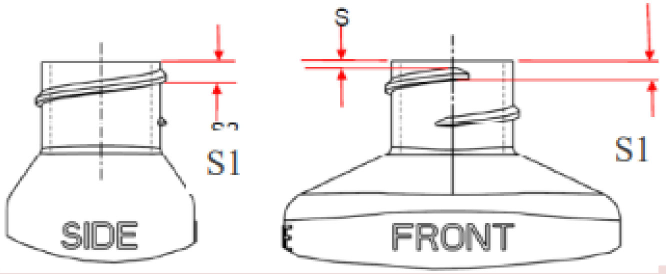
CUELLO: ROSCA

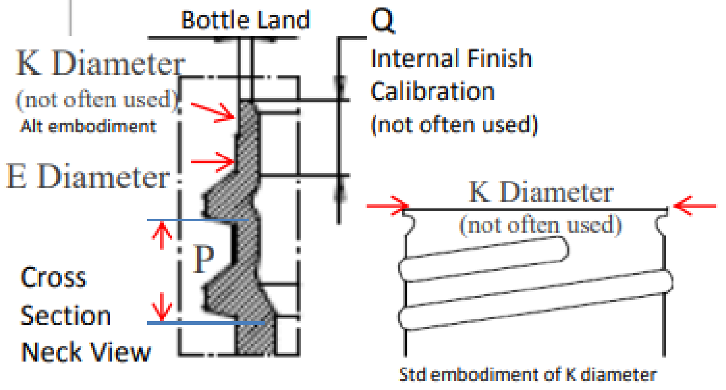
G-Bottle Plastic, Technology Type = **Threaded Neck**







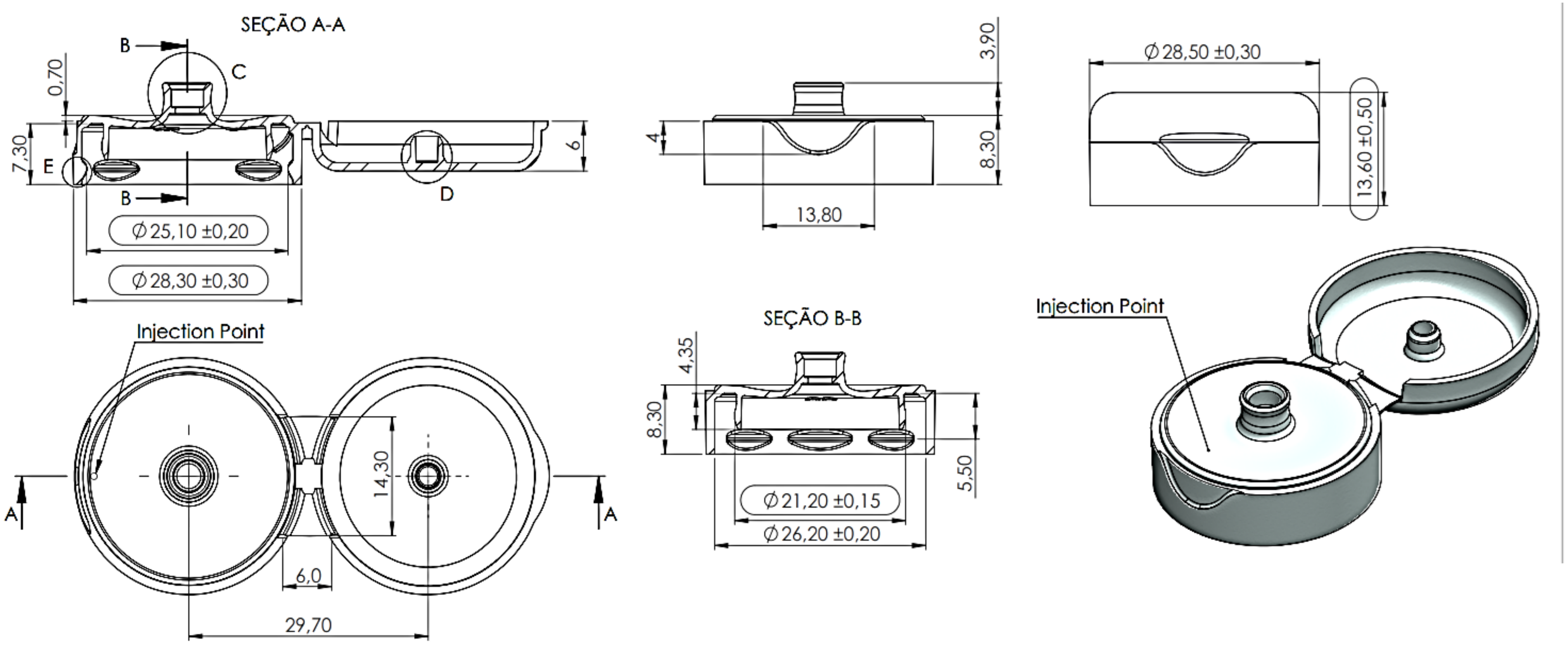




- I — Bore Diameter (ID of bottle opening) (Often I = C)
- BO — Bore Ovality = mm of allowed ovality from round (not shown)
- H — Neck Finish Height (top of finish to shoulder or ring for closure clearance)
- H1 — Neck Support Ring Height (top of finish to top of ring)
- T — Crest of Thread
- E — Root of Thread (neck dia at root of thread)
- S — Top of Thread Start (vertical dim from top land to top of thread start)
- S1 — Bottom of Thread Start (vertical dim from top land to bottom of thread start)
- P — Thread Pitch vertical ht. distance between threads (threads/inch (2.5cm))
- K — Neck Diameter K Dim (for necks with top lip ring diameter or stepped ext dia)
- C — Top Finish Control Diameter (controlled dia at top of opening. Seldom specified) Often C=I)
- Q — Internal Finish Calibration (vertically controlled ht. of C or ID opening. Seldom specified)

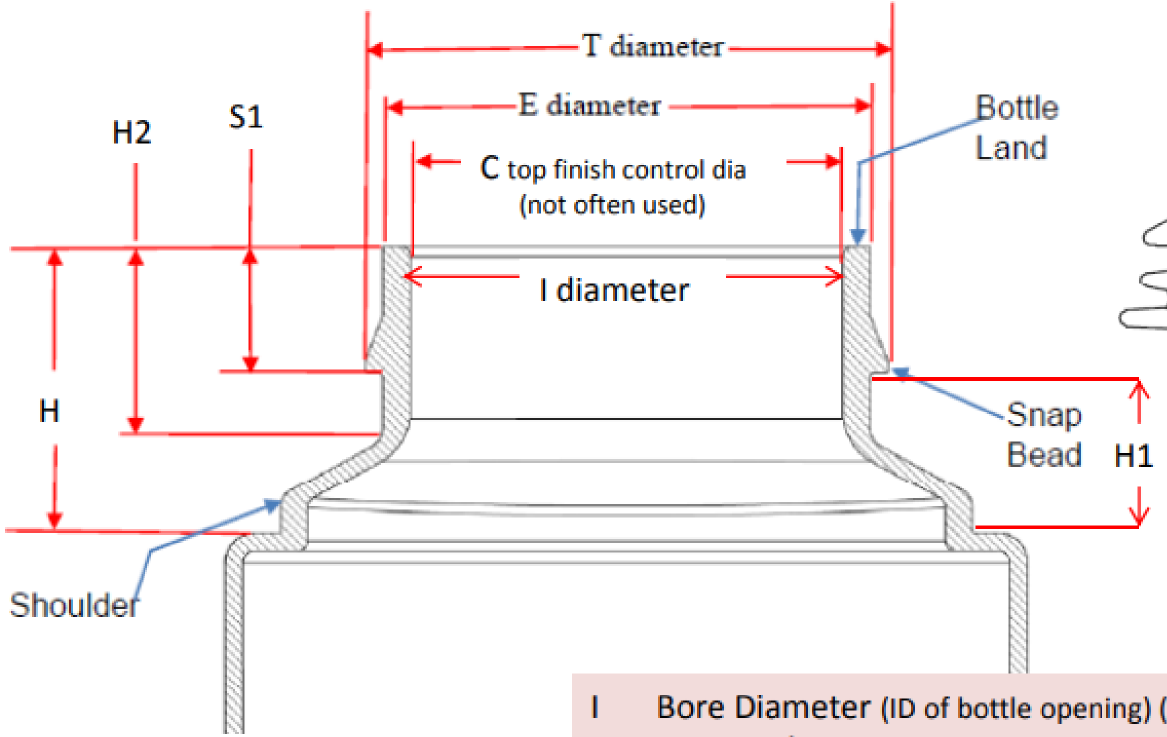
CUELLO:
SNAP ON

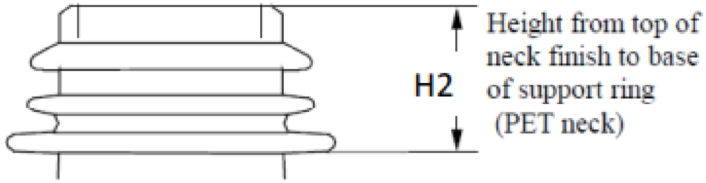
CUELLO:
SNAP ON



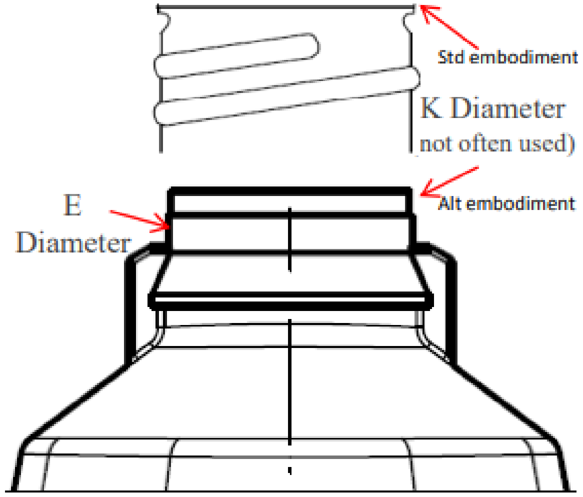
CUELLO: SNAP ON

G-Bottle Plastic, Technology Type = Snap-On Neck





If closure skirt must stop above the support ring because cap diameter will not fit over the ring, then the effective H for cap clearance will be to the top of the support ring. H2 as shown could be important for bottle conveyance.



I	Bore Diameter (ID of bottle opening) (Often I=C)
BO	Bore Ovality = mm of allowed ovality from round (not shown)
H	Neck Finish Height (top of finish to bottom shoulder for closure clearance)
S1	Snap Ring Height top of finish to bottom of ring (can use S1 or H1)
H1	Snap Ring Height shoulder to bottom of snap ring (alternate approach vs. S1)
H2	Height top of finish to top of shoulder slope or to base of neck support ring if present
T	Snap Ring Diameter
E	Root of Thread (neck dia at root of thread)
K	Neck Diameter K Dim (for necks with top lip ring diameter or stepped ext. diameter
C	Top Finish Control Diameter (Controlled diameter at top of opening. Seldom specified. Often C=I)
Q	Internal Finish Calibration (vertically controlled height of C or ID opening. Seldom specified)

PARTES

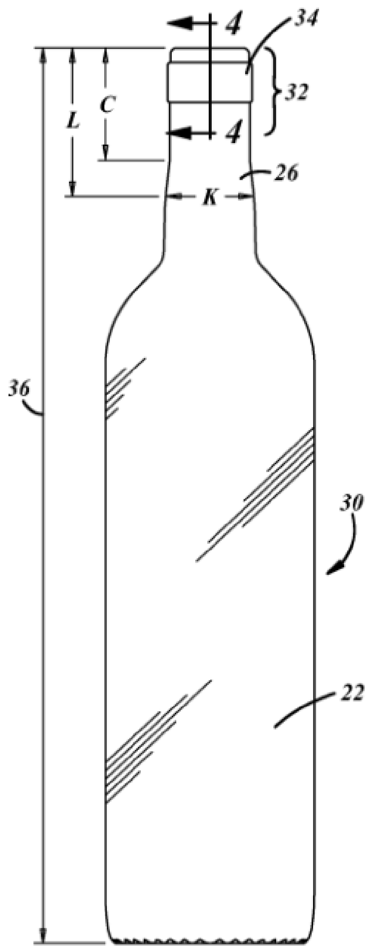


FIG. 3

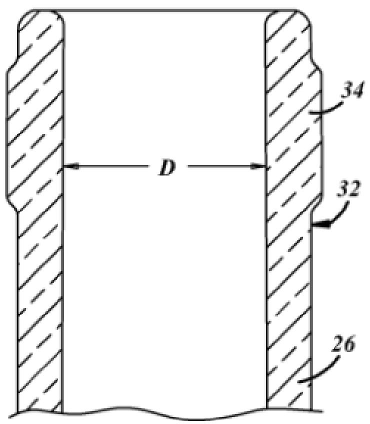
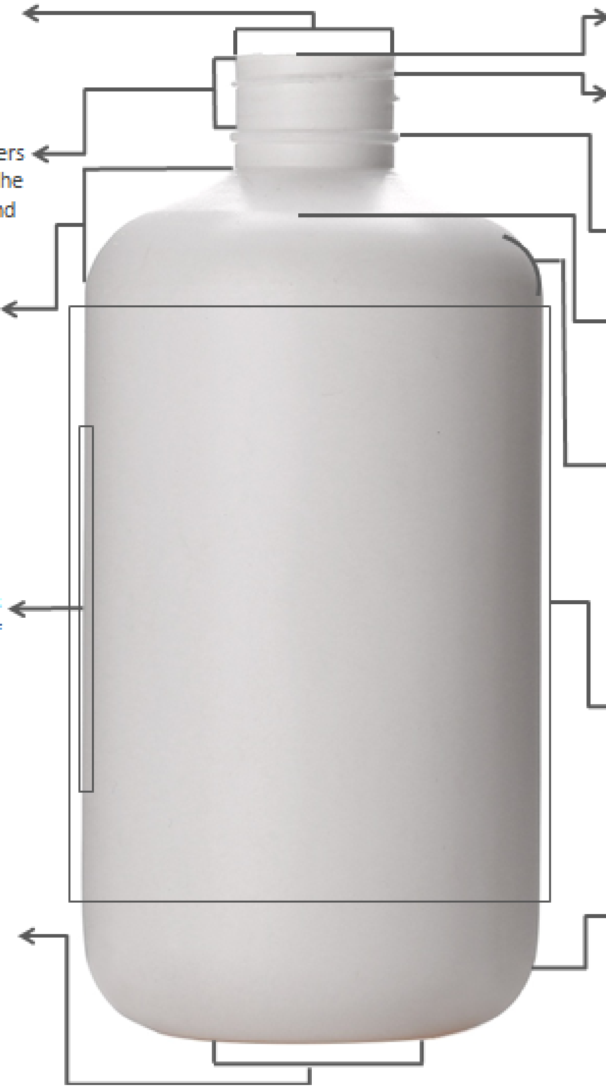


FIG. 4

PARTES


PLASTIC BOTTLE TERMINOLOGY
1 | neck
2 | finish
3 | shoulder
4 | label panel
5 | heel radius
6 | waist width
7 | mold parting line
8 | deco lug
ROUND BLOWN BOTTLE
OBLONG BLOWN BOTTLE
ROUND BLOWN BOTTLE WITH WAIST
height
shoulder width
height
depth
width
diameter
base width
1
2
3
4
5
6
7
8

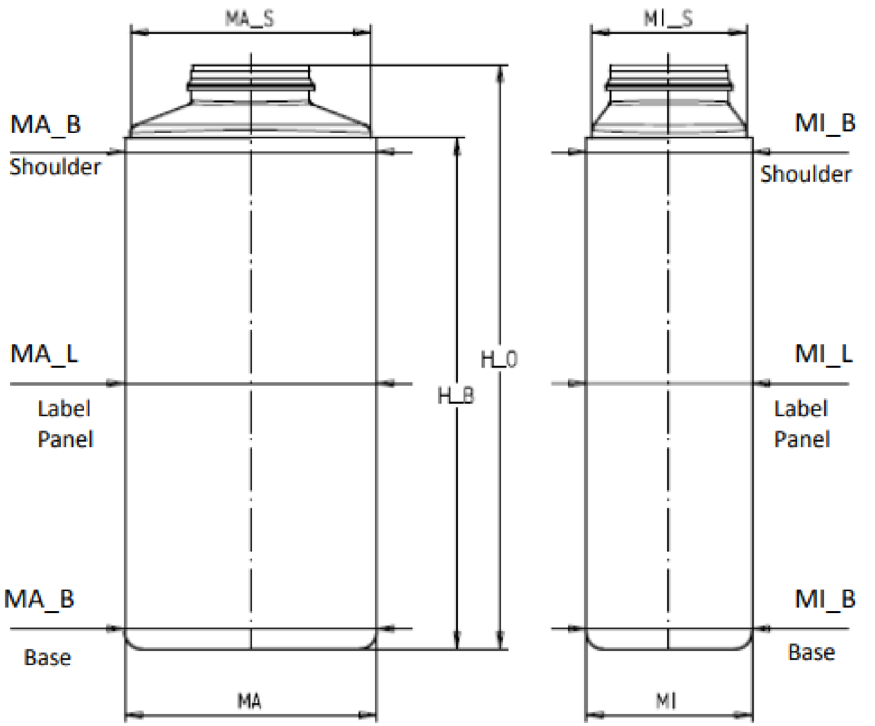
PARTES

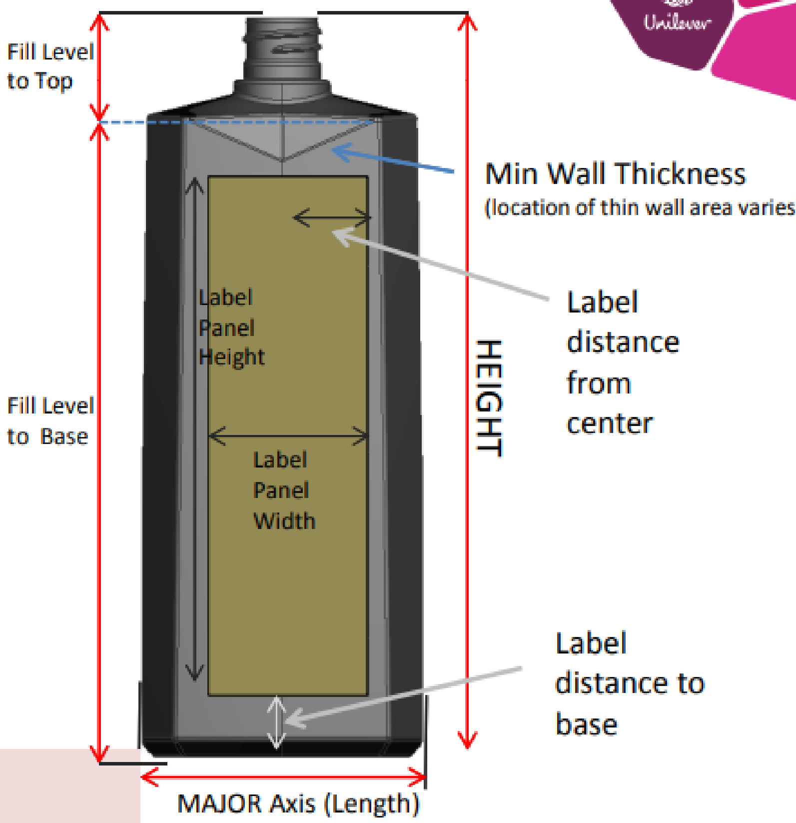


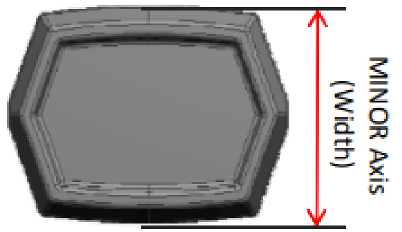
Mouth: The opening of plastic bottles. Generally, plastic jars has the wide mouth.
Neck Finish: The screw-threaded part of the bottles that holds the cap or closure in place. It is usually expressed as two reference numbers such as 24-410, the first number 24 refers to the overall diameter in millimeters, and the second number 410 refers to the thread size.
Shoulder: The area between the top of the body and bottom of the neck.
Wall: The thickness of the plastic containers measured at the side. It varies on the basis of the manufacturing process and original materials.
Seat: The indentations under the base that allow the filling or decorating equipment lines to align the bottles for optimum results.
Overflow capability: The max volume when a containers full filled to the very top.
Threads: The twisted spiral on neck finish to match the corresponding cap or closure. It is very important to the sealability of the plastic bottle.
Bead: The collar beneath the neck where the cap or closure rests.
Standard Capacity: The normal volume when plastic bottles filled with contents up to the shoulder area.
R Angle: The vector angle on shoulder which determines the shape of the shoulder. Such as cylinder plastic bottle, the R angle on shoulder is 90 degree.
Label Panel: The body part where labels or printings can be applied.
Base: The bottom part of the plastic bottle where recycling codes, material mark or other decorations can be applied. Plastic bottles can stand stably on the shelf with base.

DIMENSIONES

G-Bottle Plastic; Main Bottle Dims without Neck

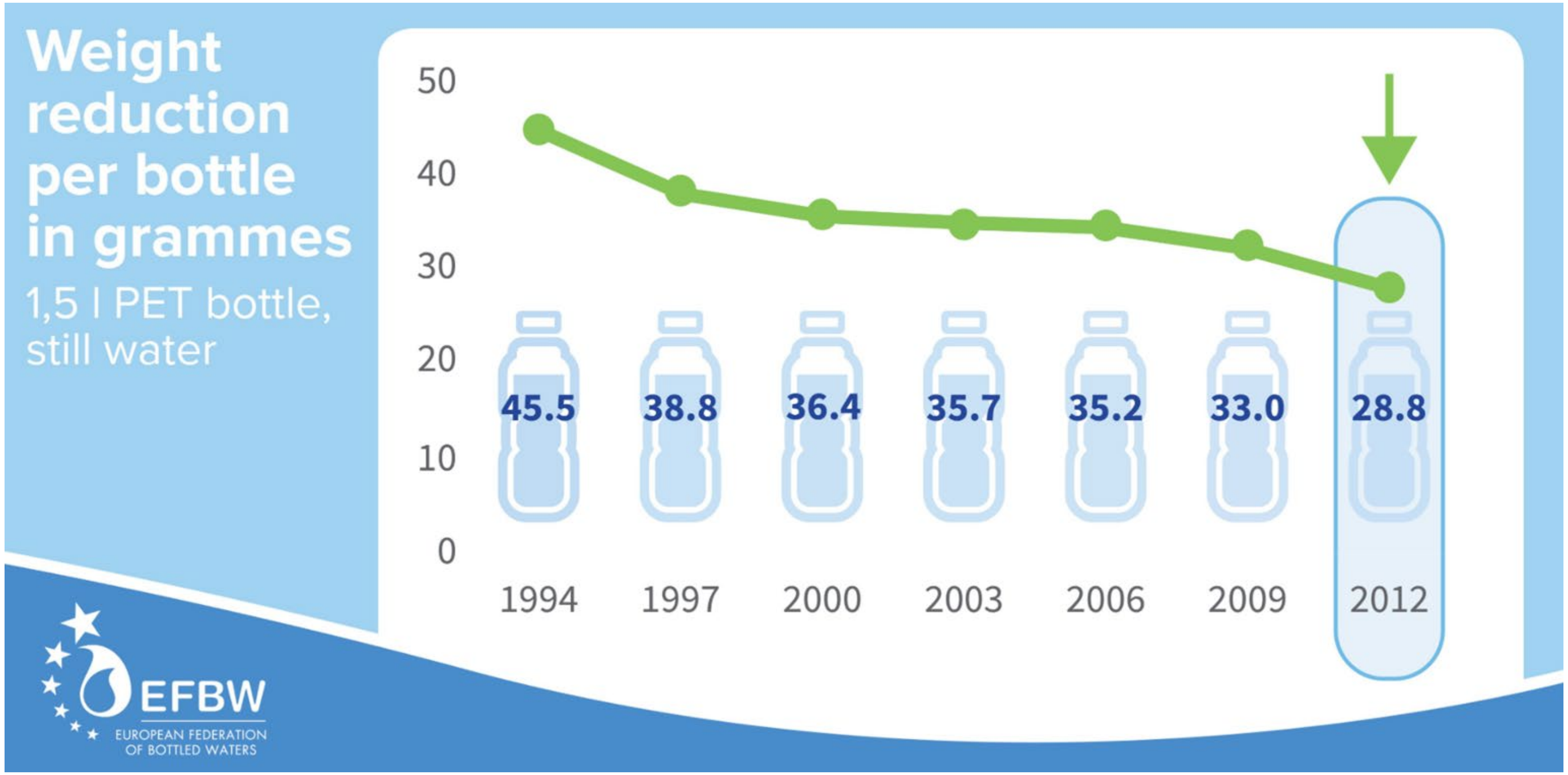






H_O Overall Height
H_B Body Height
MA_L Major Axis Label Panel (could be same as MA_B, depends on shape)
MA_B Major Axis Bottle (symmetrical bottles = same at base & shoulder)
MA_H Major Axis Housing (For bottle fit to SC requirement or a housing assembly/bracket. Not commonly specified.)
MI_L Minor Axis Label Panel (could be same as MI_B, depends on shape)
MI_B Minor Axis Bottle (symmetrical bottles = same at base and shoulder)
MI_H Minor Axis Housing (For bottle fit to SC requirement or a housing assembly/bracket. Not commonly specified.)
Diameter (Used for cylindrical bottles. Not shown)

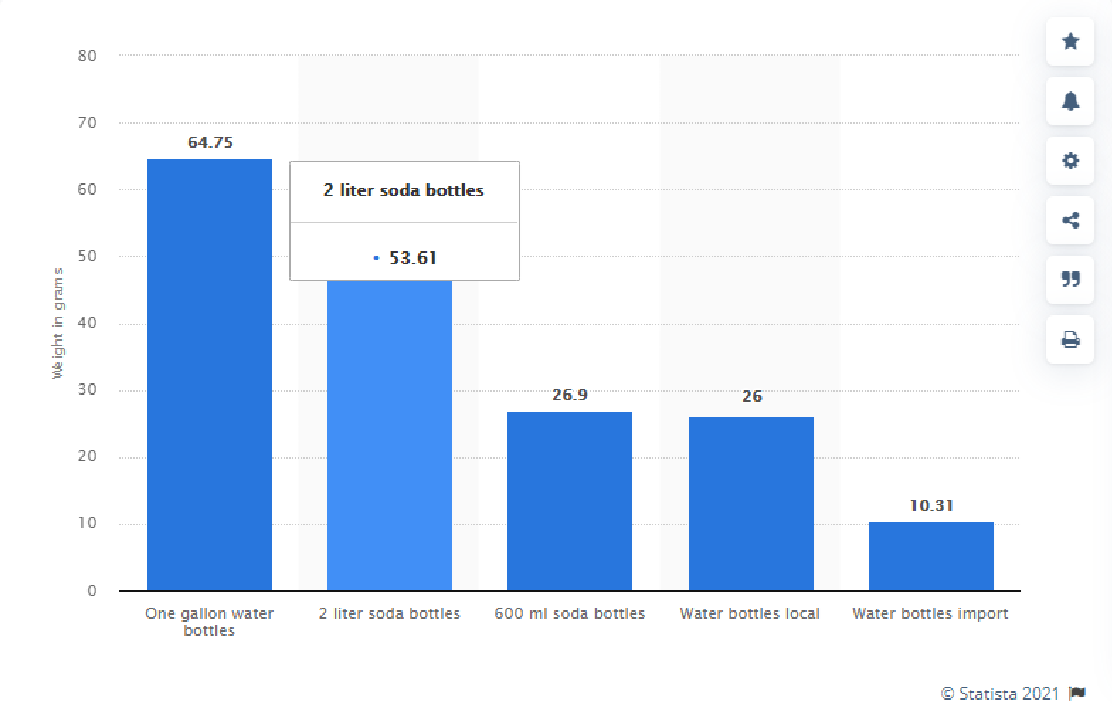
PESO



Weight reduction per bottle in grammes
1,5 l PET bottle, still water
50
40
30
20
10
0
45.5
38.8
36.4
35.7
35.2
33.0
28.8
1994
1997
2000
2003
2006
2009
2012
EFBW
EUROPEAN FEDERATION OF BOTTLED WATERS

PESO

Average weight of polyethylene terephthalate bottles as of 2014, by type (in grams)*



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Release date

June 2014

Region

United States

Survey time period

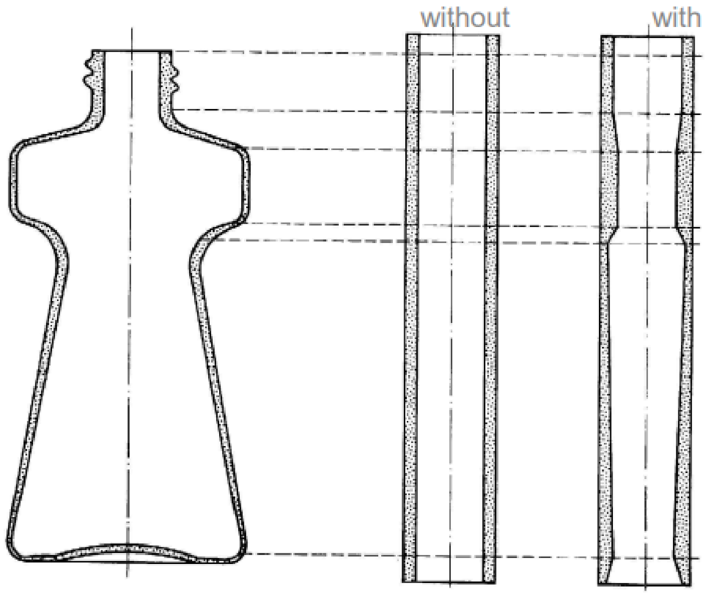
As of 2014

Supplementary notes

*Average weight of PET bottles without caps in American Samoa.

ESPESOR

Parison Programming Wall thickness change



ESPESOR

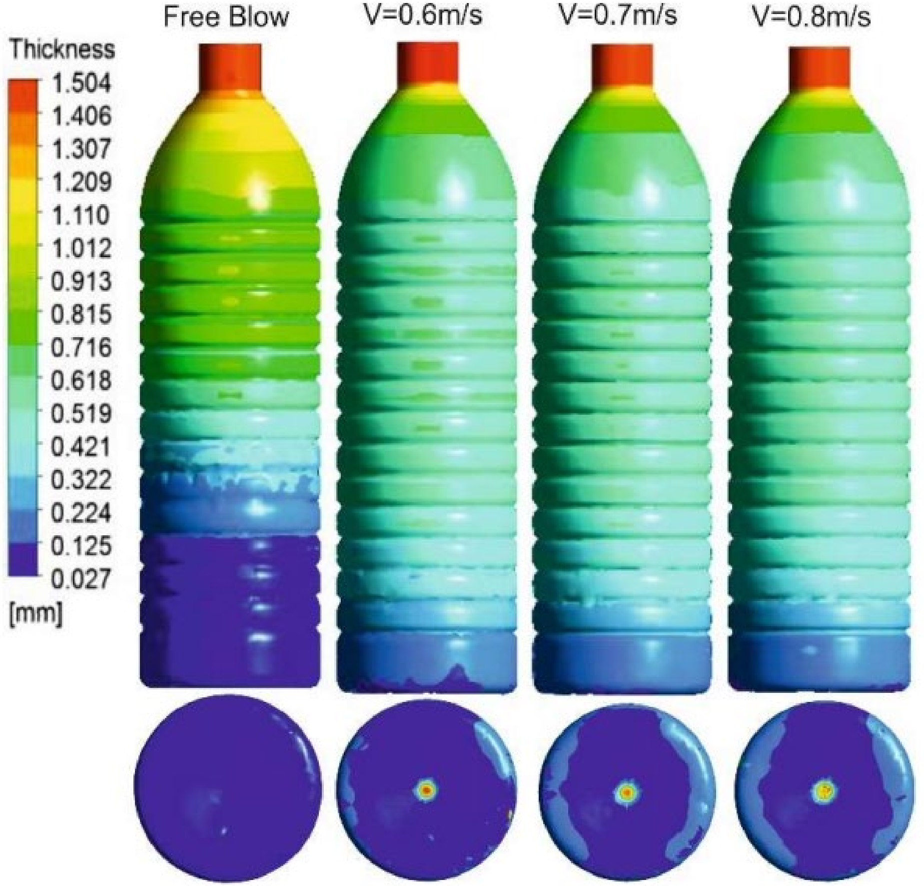
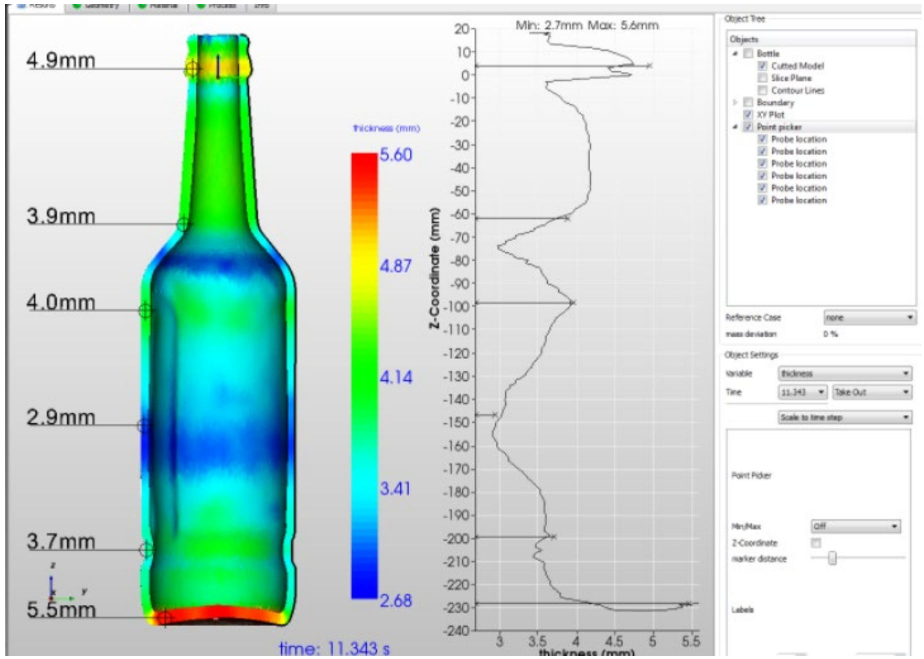


Fig. 3. Simulated final product with thickness contours for Cases 1-4.



RESINA

DAK Americas
an Alpek Polyester Business

Laser+®
CONTAINER PET RESIN

Laser+® 7000 (B92A)

Product Information

polyethylene terephthalate resin

General

Laser+® 7000 (B92A) polyethylene terephthalate (PET) resin is a copolymer formulated for conversion to PET bottles by conventional single or two-stage processing technology. This product is made using IntegRex® Technology.

Product Description

Bi-orientation of Laser+® 7000 (B92A) by injection/stretch blow molding provides optimal barrier and mechanical properties, including superior stress crack resistance. It performs exceptionally well in the manufacture of CSD bottles made from thick-wall preforms, where heat up rate and temperature profile through the wall are important. DAK Laser+® 7000 (B92A) is engineered to improve acetaldehyde (AA) performance without sacrificing intrinsic viscosity (IV), to meet increasing demand for CSD applications. Laser+® 7000 (B92A) offers superior heat absorption and processing control, even at higher blowing speeds. A slower crystallization rate enables high injection molding output.

Sales Specifications

Property	Value	Test Method
Intrinsic Viscosity	0.84 ± 0.02	DAK-QAR-SOP-0012
Color L* CIE	67 min	DAK-QAR-SOP-0011
Color b* CIE	-4.5 ± 1.4	
Acetaldehyde	2 ppm max	DAK-QAR-SOP-0010

Certification

Laser+® 7000 (B92A) is ideally suited for food packaging applications and is considered in compliance with the Food and Drug Administration (FDA) Food Contact Notification (FCN) 000635, and Health Canada Health Products and Food Branch (HPFB) file KS 06111304 for PET polymers.

Typical Properties

Property	Value	Test Method
Moisture Content[1]	0.25% max	DAK-QAR-SOP-0013
Fines[1], +24 Mesh	0.05% max	DAK-QAR-SOP-0014
Pellet Size, nominal	30 chips/g	DAK-QAR-SOP-0015
Crystallinity	>35%	DAK-QAR-SOP-0016
Spherical Shape	3.5 mm	DAK-QAR-SOP-0017
Melt Point, nominal	242°C	DAK-QAR-SOP-0016
Bulk Density	52 lb / ft^3	DAK-QAR-SOP-0018

[1] As packaged

These values represent the anticipated performance data for these polyester resins and intermediates; they are not intended to be used as design data. We believe this information is the best currently available on the subject. It is offered as a possible helpful suggestion in the experimentation you may care to undertake along these lines. It is subject to revision as additional knowledge and experience is gained. DAK Resins makes no guarantee of results and assumes no obligation or liability whatsoever in connection with this information. This publication is not a license to operate under, or intended to suggest infringement of, any existing patents.

CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DAK Medical Caution Statement".

RESINA

TABLE 1: POLYETHYLENE (PE) RESINS FOR BLOW MOLDED RIGID PACKAGING APPLICATIONS[1]

RESIN NAME	PRODUCT DESCRIPTION; MARKET APPLICATION(S)	MELT INDEX[2] (I_2), g/10 min	MELT FLOW RATE[3] (I_{21}), g/10 min	DENSITY[4], g/cc	TENSILE STRENGTH @ YIELD[5], psi	2% SECANT FLEXURAL MODULUS[6], psi	TENSILE IMPACT STRENGTH[7], ft.-lb./in.^{2}	ESCR[8], 122°F (50°C), F50, 100% IGEPAL, hrs.	FDA COMPLIANCE – U.S. FDA 21 CFR 177.1520 (c)[9]
UNIVAL™ HDPE COPOLYMER PRODUCTS									
UNIVAL™ DMDA-6200 NT 7 HDPE Resin	Household & Industrial Chemicals (HIC), Personal Care, Food Packaging	0.38	33	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDB-6200 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.38	33	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDD-6200 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.25	23	0.954	3,800	150,000	100	50	3.2a
UNIVAL™ DMDG-6200 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.40	41	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDA-6220 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.38	33	0.953	3,900	150,000	80	50	3.2a
UNIVAL™ DMDA-6320 NT 7 HDPE Resin	HIC, Personal Care, Food Packaging	0.46	39	0.953	3,900	150,000	80	40	3.2a
UNIVAL™ DMDA-6230 NT 7 HDPE Resin	HIC, Personal Care, Agricultural Chemicals (Ag Chem); High Environmental Stress Crack Resistance (ESCR)	0.25	25	0.949	3,400	130,000	100	180	3.2a
UNIVAL™ DMDD-6230 NT 7 HDPE Resin	HIC, Personal Care, Ag Chem; High ESCR	0.25	25	0.949	3,400	130,000	100	180	3.2a
UNIVAL™ DMDF-6230 NT HDPE Resin	HIC, Personal Care, Ag Chem; High ESCR	0.25	25	0.949	3,400	130,000	100	180	See Note[10]
XDMDB-6240 NT 7 Experimental HDPE Resin[11, 12]	HIC, Personal Care, Ag Chem; High ESCR	0.40	43	0.946	3,000	110,000	70	400	3.2a
UNIVAL™ DMDG-6240 NT 7 HDPE Resin	HIC, Personal Care, Ag Chem; High ESCR	0.40	43	0.946	3,400	118,000	70	400	3.2a
UNIVAL™ HDPE HOMOPOLYMER PRODUCTS									
UNIVAL™ DMDA-6400 NT 7 HDPE Resin	Water, Juice, Dairy	0.80	57	0.961	4,600	188,000	40	20	2.2
UNIVAL™ DMDH-6400 NT 7 HDPE Resin	Water, Juice, Dairy	0.80	57	0.961	4,600	188,000	40	20	2.2
CONTINUUM™ BIMODAL HDPE PRODUCTS									
XDMDA-6601 Experimental Bimodal HDPE Resin[11, 12]	Lightweighting; High ESCR; PCR Blends	0.30	27	0.954	3,200 -3,400	145,000 -155,000	170 - 230	>1,100	3.1a
CONTINUUM™ DMDD-6620 NT 7 Bimodal HDPE Resin	Lightweighting; High ESCR; PCR Blends	0.30	27	0.958	3,600	170,000	170	>1,100	3.1a
CONTINUUM™ DMDE-6620 NT 7 Bimodal HDPE Resin	Lightweighting; High ESCR, High Barrier	0.30	27	0.960	3,600	170,000	170	>1,100	3.1a

RESINA

PETROQUIMICA CUYO S.A.I.C.
Avenida Madero 942 - Piso 10° (C1106ACW)
Ciudad Autónoma de Buenos Aires, Argentina
Tel.: (54-11) 5167-2700

Technical Data Sheet

Random Copolymer 3240 H

MAIN USE: BLOW MOULDING/EXTRUSION

- Recommended for the manufacturing of blow-moulded containers for water, juice, oil and cosmetics
- Also suitable for extrusion of sheets for thermoforming

GENERAL PROPERETIES

- Excellent transparency and gloss
- High melt strength
- Good thermal strength which makes this grade apt for the hot-packed processes
- Good impact resistance at room temperature

PROPERTIES		METHOD	UNIT	VALUE
Melt Flow Index (230°C/2.16 kg)		ISO 1133	g/10 min	1,5
MECHANICAL PROPERTIES				
Flexural Modulus (1)		ISO 178	MPa	1100
Tensile strength at yield (2)		ISO 527-2	MPa	26
Elongation at yield (2)		ISO 527-2	%	12
Charpy notched Impact Strength (1)	@ 23°C	ISO 179	KJ/m²	10
	@ 0°C	ISO 179	KJ/m²	2
THERMAL PROPERTIES				
Heat Deflection Temperature HDT/A (1,80 MPa) (1)		ISO 75-2	°C	50
Heat Deflection Temperature HDT/B (0,45 MPa) (1)		ISO 75-2	°C	80

Polymer additives

There are many additives that can be included with the resins to improve aesthetics processing performance. Below are examples

COLOR

Masterbatch

- Liquid or solid concentrate of pigment encapsulated into a carrier resin
- Costs 10-20 times more than virgin; white cheapest up to gold most expensive
- Colours make components shrink different amounts
- Let down ratio (LDR %) displaces virgin resin = 97% virgin resin & 3% mb.

UV filter/absorber

- Liquid or solid additive which prevents the oxidisation of photosensitive products

Anti-static

- Liquid or sold additive which reduces or eliminates static build up, prevents static build up or lines and dust attraction

- Antioxidants

- Prevents thermo-oxidative degradation from occurring when processing plastics at high tem

COLOR

MASTERBATCH

What is it ? **A concentrate of pigment or dye carried by a polymer base.**

How much does it cost ? **Ten to 20 times the cost of the base resin. White is the cheapest, then yellow....with red and then pearlecent being the most expensive**.

How much is used in production (letdown ratio)? **1-5%**

APLICACIÓN


Jana
Pepsi
Coca-Cola
ZUBR
Hortex
POWERADE


Frittier- & Brat-Öl
DIJAMANT
Sonnen-blumenöl
APFELES
KRESSI
KRÄUTER
FELIX
TOMATEN KETCHUP
KETCHUP
FELIX
CURRY SAUCE
Drück mich!
Horlicks
Bourn Vita
Boost
Skittles

APLICACIÓN


kefir
Inza
Actimel
L.casei
Net:250 ml.


NIVEA
Soft Milk
GARNIER
FRUCTIS
Wahre Schätze
Alpecin
syoss
L'ORÉAL
AUSSIE
MIRACLE MOIST
Ultra DOUX
POND'S
Herbal Essences

APLICACIÓN


Lenor
OMO
Dash
Mr Muscle
409
rei
Comfort intense
Fresh Sky
finish
HARPIC
蓝月亮


LIQUI MOLY
5W-30
SPECIAL TEC
LIQUI MOLY
TOTAL
QUARTZ
7000 ENERGY
10W-40
Very high performances
SYNTHETIC BASED
5L
Shell
HELIX
HX7
5W-40
SERVO
4T
ZOOM
LIQUI MOLY
10W-40
Castrol
10W-50 4T
Shell
HELIX
HX6
10W-40

HERMETICIDAD

TORQUE

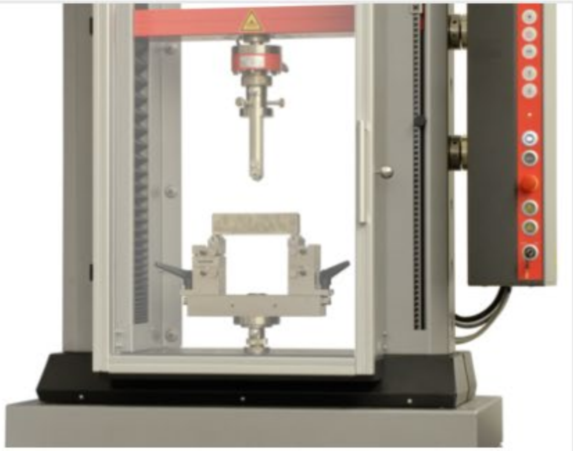
17. ANNEXES:

17.1. APPENDIX 1 : APPLICATION TORQUE GUIDELINES - ALWAYS USE THE MINIMUM APPLICATION TORQUE (THE FIRST NUMBER) FOR LEAK TESTS.

Closure Diameter (mm)	Torque (lb. ins.)	Torque (Nm)
13	5 - 8	0.6 - 0.9
14	6 - 8	0.7 - 0.9
15	6 - 9	0.7 - 1.0
18	7 - 11	0.8 - 1.2
20	8 - 12	0.9 - 1.4
22	9 - 13	1.0 - 1.5
24	9 - 15	1.0 - 1.7
28	10 - 18	1.1 - 2.0
30	11 - 19	1.2 - 2.1
31	11 - 20	1.2 - 2.3
33	12 - 21	1.4 - 2.4
38	15 - 25	1.7 - 2.8
40	16 - 26	1.8 - 2.8
43	17 - 27	1.9 - 3.1
48	19 - 30	2.1 - 3.4
51	20 - 33	2.3 - 3.7
53	21 - 36	2.4 - 4.1
58	23 - 40	2.6 - 4.5
60	24 - 41	2.7 - 4.6
63	25 - 43	2.8 - 4.9
66	26 - 46	2.9 - 5.2
67	27 – 48	3.0 - 5.4
70	28 - 50	3.2 - 5.6
77	31 - 55	3.5 - 6.2
83	33 - 59	3.7 - 6.7
89	36 - 64	4.1 - 7.2
100	40 - 71	4.5 - 8.0
120	48 - 86	5.4 - 9.7

COMPRESIÓN

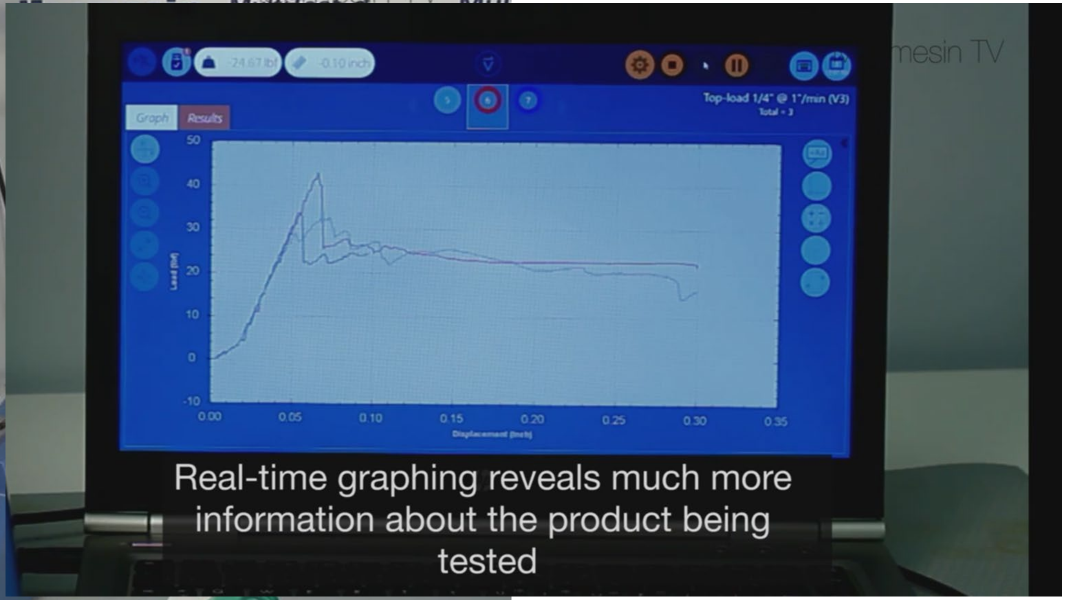
The right solution for any test test requirement



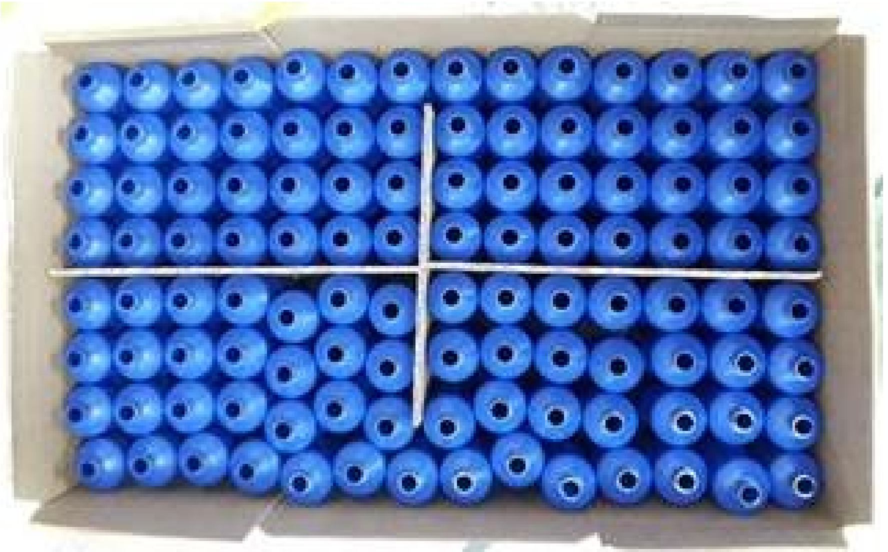
Flexure test kit for sandstone testing

Compression test on springs

Compression test on packaging



FORMA DE
ENTREGA



Packaging primario
Rígidos - TAPAS

TAPAS: FLIP TOP

flip-top caps with neck fish 24-410
Model Number: YL-A24410-101

flip-top caps with neck finish 20-410
Model Number: YL-A20410-102

20-410 flip-top caps
Model Number: YL-A20410-112

24-410 flip-top caps
Model Number: YL-A24410-113

flip-top caps with neck fish 18-410
Model Number: YL-A18410-114

flip-top caps (20mm-410)
Model Number: YL-A20410-118

(24mm-410)flip-top caps
Model Number: YL-A24410-119A

(24-410)flip-top caps
Model Number: YL-A24410-119B

(20-410)flip-top caps
Model Number: YL-A20410-126

TAPAS:
FLIP TOP

400 (continuous thread) A 400 neck finish consists of a single thread turn.
410 (continuous thread) A 410 neck finish consists of one and a half turns.
415 (continuous thread) A 415 neck finish consists of two thread turns, but the threads are thinner and neck is typically taller.
425 (continuous thread) A 425 neck finish consists of two thread turns, but is most commonly found on smaller capacity containers such as vials.
485 (continous thread) A 485 neck finish consist of one thread turn, but most commonly found on paragon glass jars. The finish can also take a 400 cap, but is used with spice caps.
430 (continuous thread) A 430 neck finish consists of one or two thread turns. The threads are also deeper than the standard 400 and 415 neck finish. The unique shape of the neck is commonly known as a buttress and is designed to help the user pour product with better accuracy.
DBJ (continuous thread) A DBJ neck finish features a ring beneath the threads that catches on to a detachable ring of a DBJ cap. When the end user unscrews the cap from the container for the first time, the ring will break off from the cap, making it tamper evident.
470 (continuous thread) A 470 neck finish consists of one thread turn and is commonly found on glass mayo jars. The threads of a 470 neck finish are deeper than a 400 finish.
2030 (lug) A 2030 neck finish consists of a single half turn twist. Continuous thread closures will not fit on lug finished closures. The 2030 are most commonly found on glass mayo or mason jars and are used for preserving food.

TAPAS:
INNER TOP

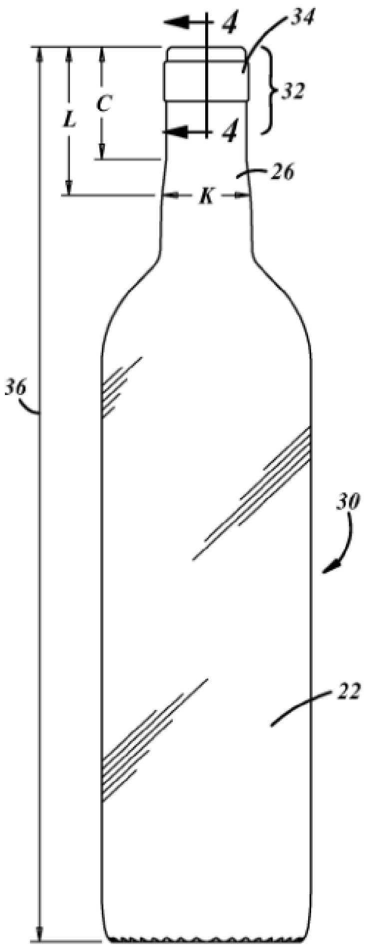


FIG. 3

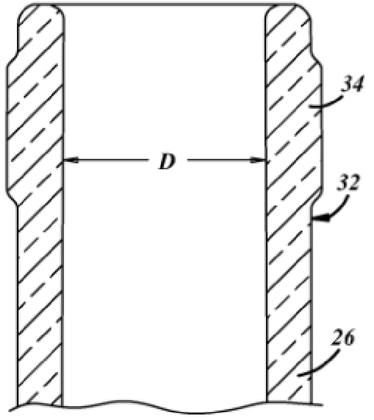


FIG. 4

TAPAS:

CIEGAS O UNIVERSAL

unversal caps(12-415)
Model Number: YL-D12415-137

unversal caps(15-415)
Model Number: YL-D15415-132A1

(15-415)unversal caps
Model Number: YL-D15415-132A2

unversal caps(15mm)
Model Number: YL-D15415-132A

15mm universal caps
Model Number: YL-D15415-132B1

universal caps(neck finish 15-415)
Model Number: YL-D15415-132B2

TAPAS:
DISC TOP

disc-top caps(24-410)
Model Number: YL-F24410-111

disc- top caps(20-410)
Model Number: YL-F20410-128

disc- top caps(24-415)
Model Number: YL-F24415-110

disc- top caps(28-410)
Model Number: YL-F28410-134

TAPAS:

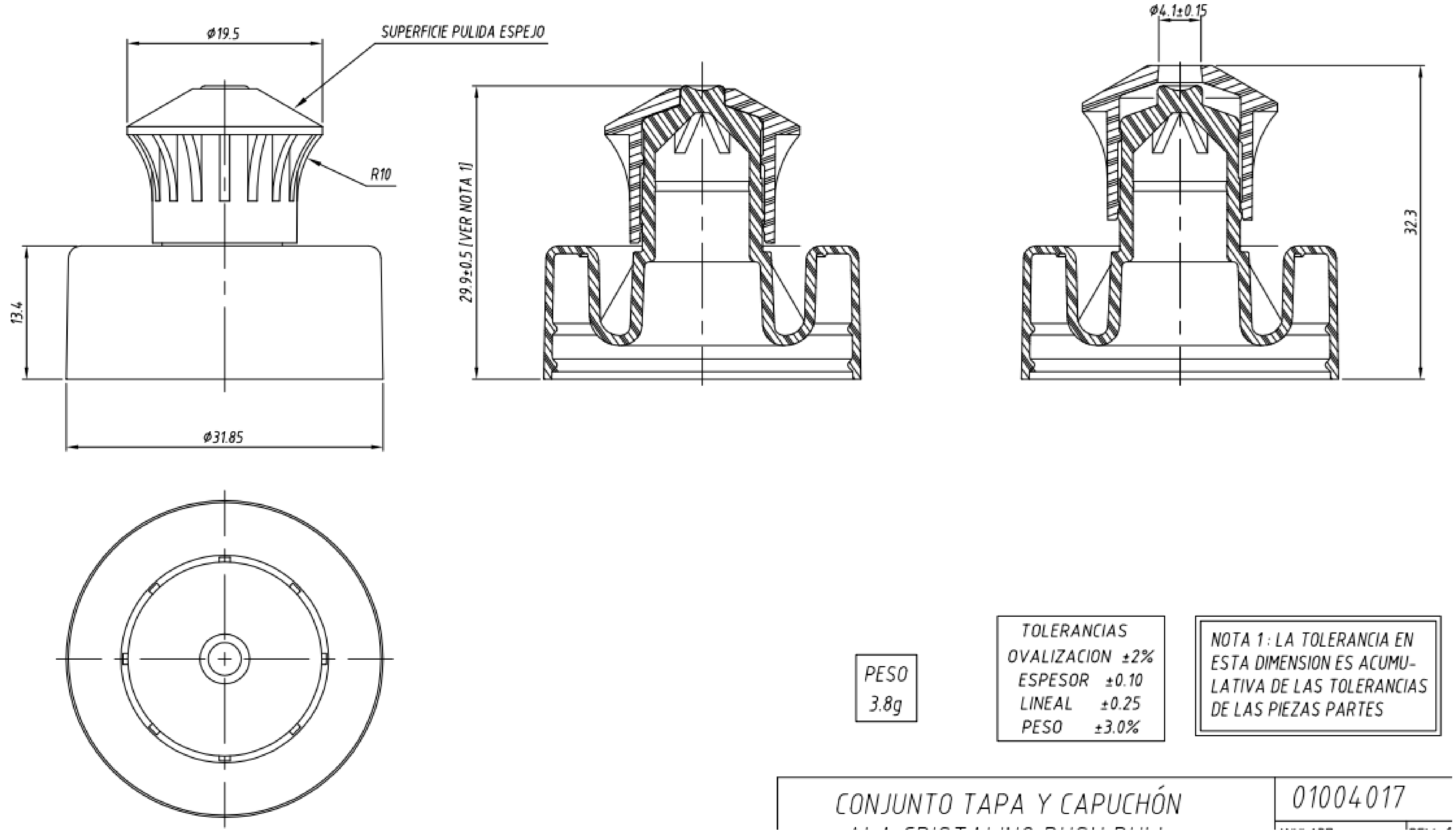
FLIP OUT CAPS

flip spout caps 24-410
Model Number: YL-H24410-143

flip spout caps 28-410
Model Number: YL-H28410-158

TAPAS:
PUSH PULL

TAPAS:
PUSH PULL



TAPAS: CHILDPROOF

https://www.youtube.com/watch?v=EG8XTxus-Tw

TAPAS:

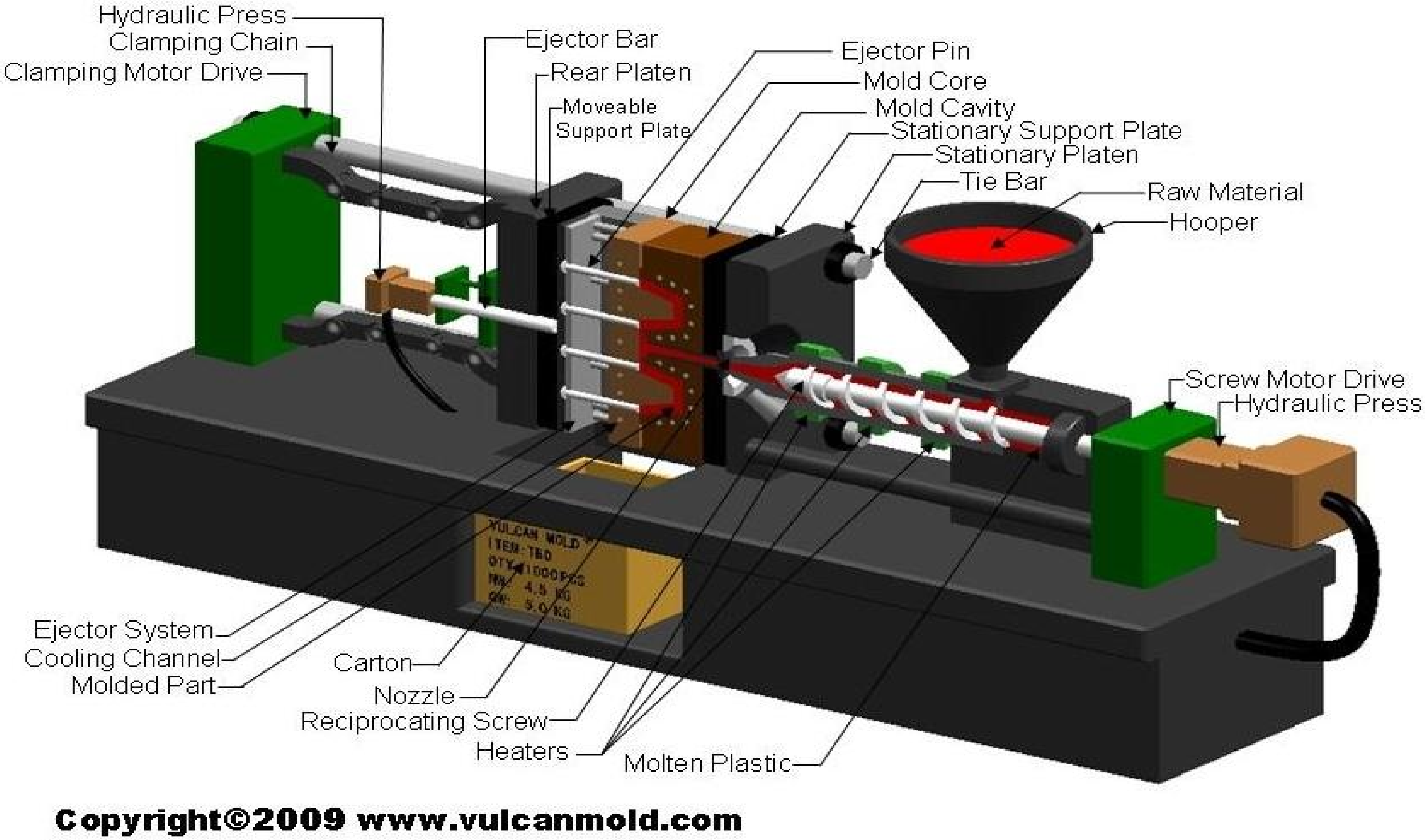
PRECINTO DE SEGURIDAD

TAPAS:

PRECINTO DE SEGURIDAD

Intro. Injection Moulding

- What a modern machine looks like (look inside):

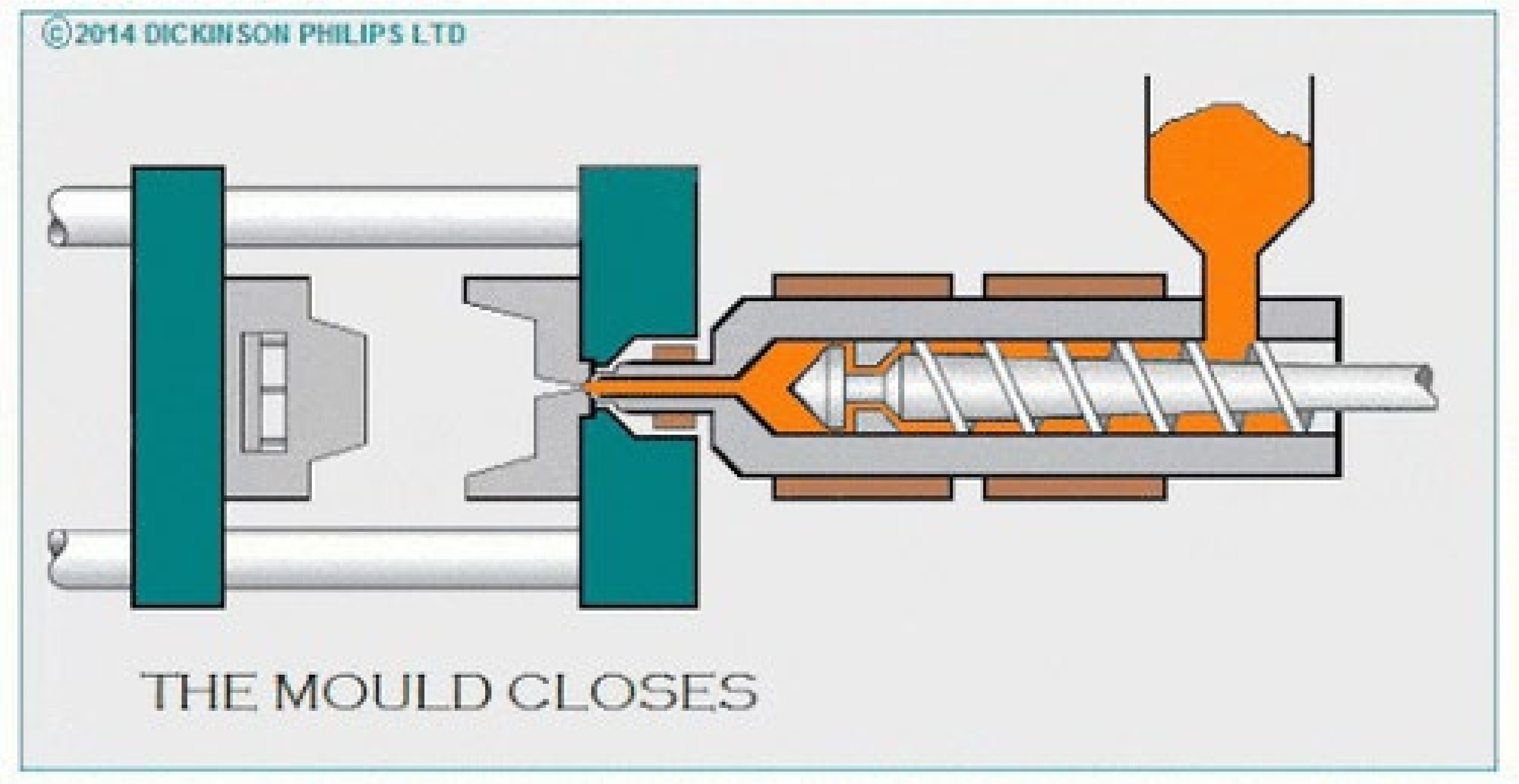


TAPAS:

PROCESO DE FABRICACIO
N

TAPAS:

PROCESO DE FABRICACION



TAPAS:

PROCESO DE FABRICACION

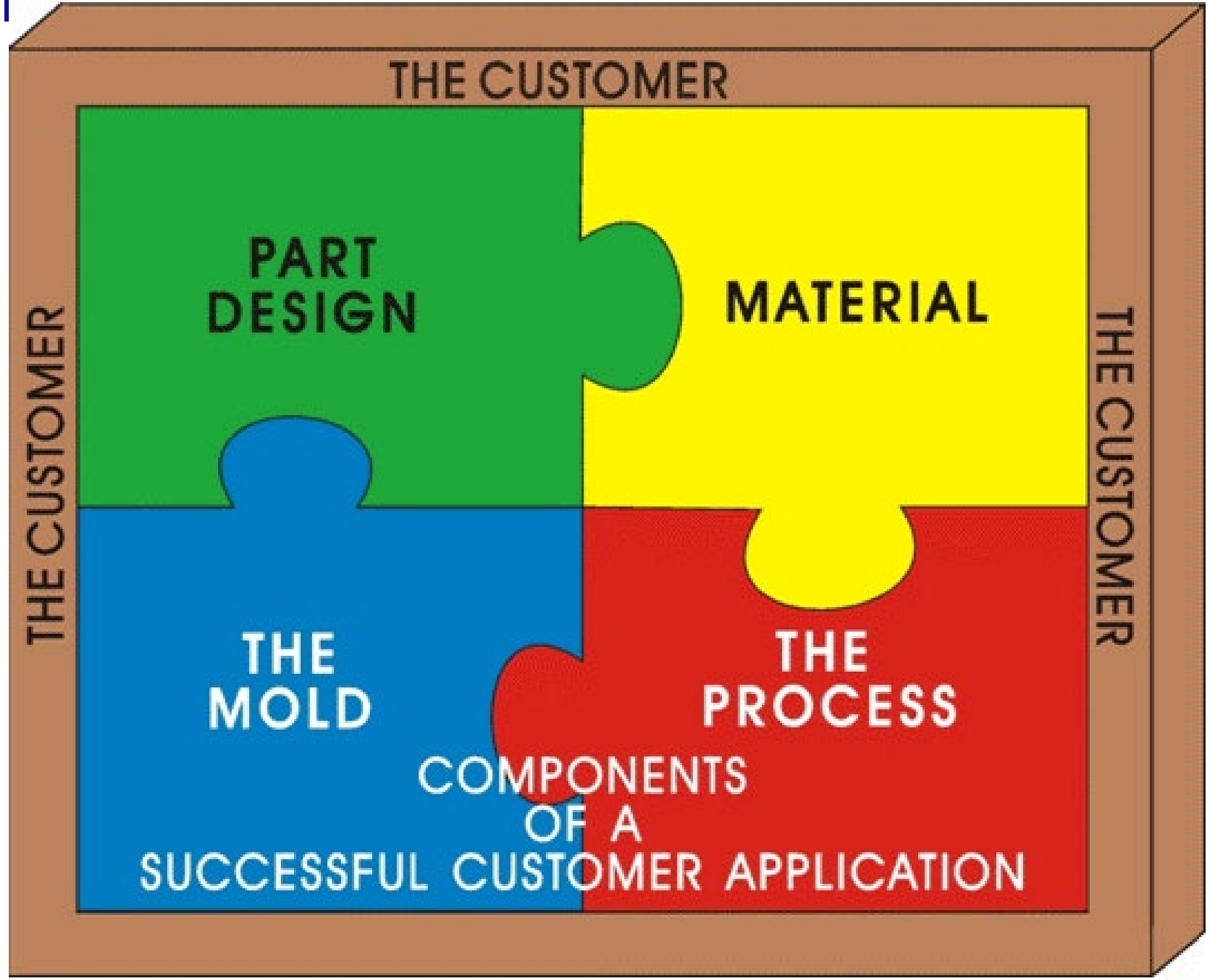
Technology Comparison Summary

	Extrusion Blow Moulding	Injection Moulding	Injection Blow Moulding	Injection Stretch Blow Moulding	Thermo forming
Process output volume	Medium	Medium-High	Medium	High	Medium - High
Accuracy of Component dimensions	Medium	High	High	High	Low
Mould cost	Medium	High	High	High	Low
Machine cost	High	Medium	High	High	Low - Medium

TAPAS:

PROCESO DE FABRICACIO N

Intro. of scientific approach to injection moulding

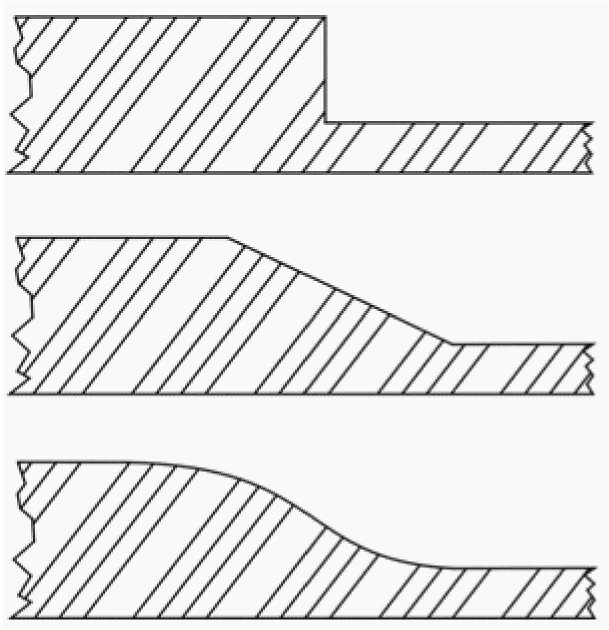


TAPAS:

PROCESO DE FABRICACIO N

Part Design

- Design for Manufacturability
  - Draft angles
  - Thin to Thick
  - Non-Uniform Walls
  - Thin wall or high L/T
  - Sharp Corners
  - Ribs
  - Weld Lines
  - Gas Traps
  - Venting
  - Dimensional Tolerance

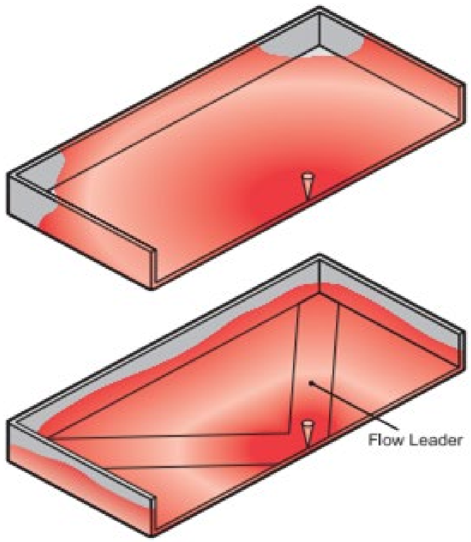


TAPAS:

PROCESO DE FABRICACIO N

Flow Leaders

Figure 2- 6

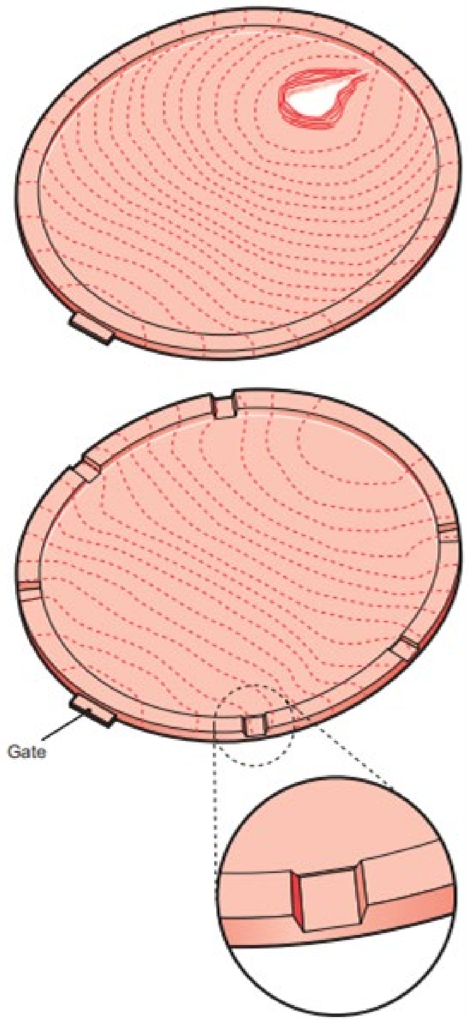


Corners typically fill late in box-shaped parts. Adding flow leaders balances flow to the part perimeter.

Flow leader and restrictor placement were traditionally determined by trial and error after the mold was sampled. Today, computerized flow simulation enables designers to calculate the correct size and placement before mold construction.

Flow Restrictors

Figure 2- 7



Flow restrictors can change the filling pattern to correct problems such as gas traps.

TAPAS:

PROCESO DE FABRICACION

RIBS

Ribs provide a means to economically augment stiffness and strength in molded parts without increasing overall wall thickness. Other uses for ribs include:

- Locating and captivating components of an assembly;
- Providing alignment in mating parts; and
- Acting as stops or guides for mechanisms.

This section deals with general guidelines for ribs and part design; structural considerations are covered in Chapter 3.

Rib Design

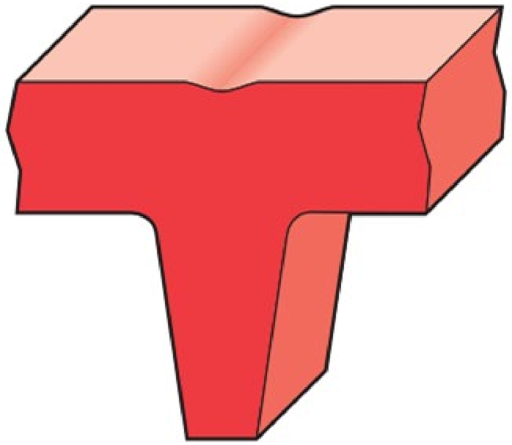
Proper **rib design** involves five main issues: thickness, height, location, quantity, and moldability. Consider these issues carefully when designing ribs.

Rib Thickness

Many factors go into determining the appropriate **rib thickness.** Thick ribs often cause sink and cosmetic problems on the opposite surface of the wall to which they are attached (see figure 2-8). The material, rib thickness, surface texture, color, proximity to a gate, and a variety of processing conditions determine the severity of sink. Table 2-1 gives common guidelines for rib thickness for a variety of materials. These guidelines are based upon subjective observations under common conditions and pertain to the thickness at the base of the rib. Highly glossy, critical surfaces may require thinner ribs. Placing ribs opposite character marks or steps can hide rib read-through (see figure 2-9). Thin-walled parts– those with walls that are less than 1.5 mm – can often tolerate ribs that are thicker than the percentages in these guidelines. On parts with wall thicknesses that are 1.0 mm or less, the rib thickness should be equal to the wall thickness. Rib thickness also directly affects moldability. Very thin ribs can be difficult to fill. Because of **flow hesitation,** thin ribs near the gate can sometimes be more difficult to fill than those further away. Flow entering the thin ribs hesitates and freezes while the thicker wall sections fill.

Sink

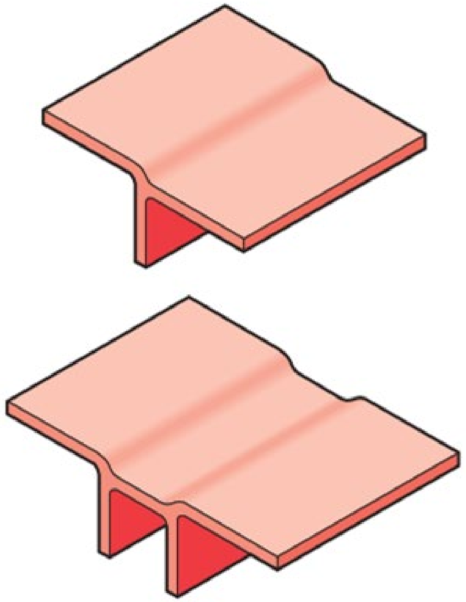
Figure 2- 8



Sink opposite thick rib.

Offset Rib

Figure 2- 9



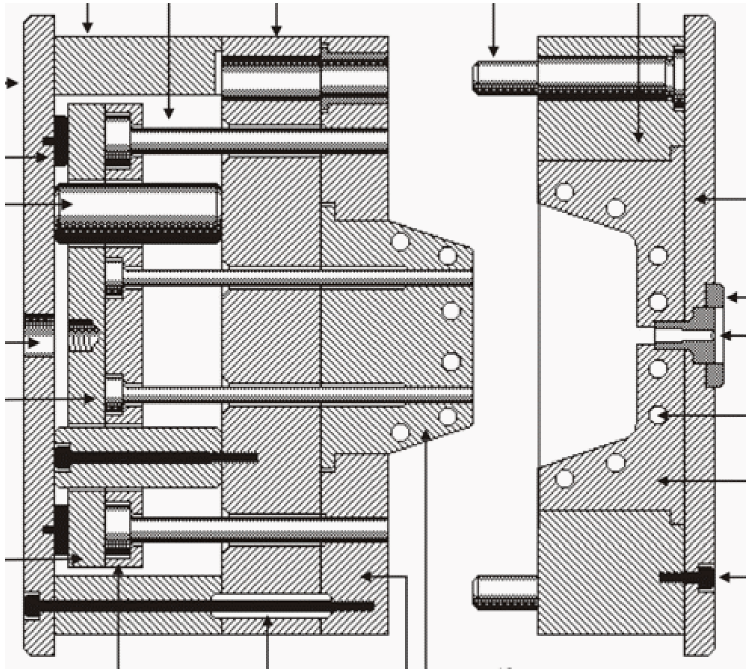
Offset rib to reduce read-through and sink.

TAPAS:

PROCESO DE FABRICACIO N

Mold Design

- Mold
  - Hot Runner design
  - Runner balance
  - Gating
  - Short shots
  - Shut offs
  - Slides
  - Cooling
  - Special Programs required
  - Sprue/runner puller
  - Cold slug well

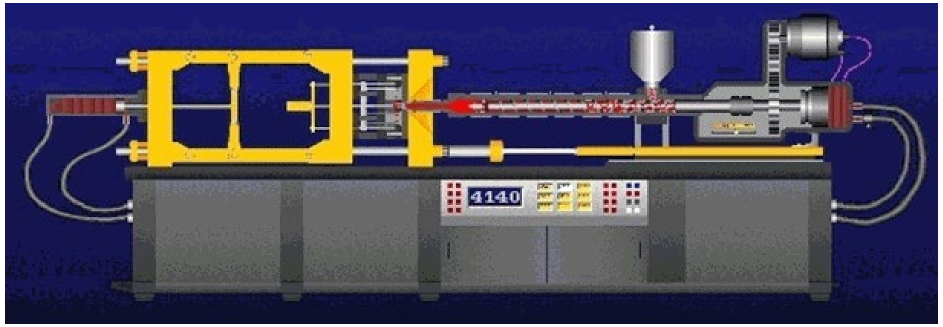


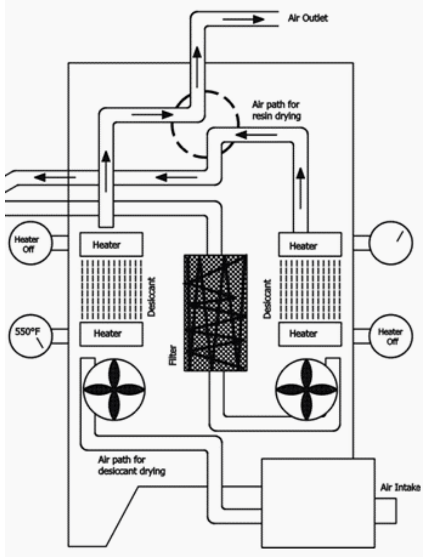
TAPAS:

PROCESO DE FABRICACIO N

Equipment (process)

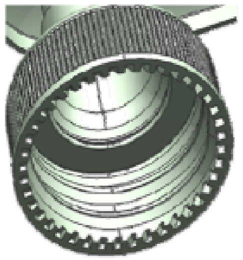
- Equipment
  - Tonnage
  - Shot size
  - Injection pressure
  - Screw design
  - Check ring
  - Flow rate
  - Nozzle contact force
  - Ejector force
  - Hot runners
  - Cooling systems
  - Material drying and handling

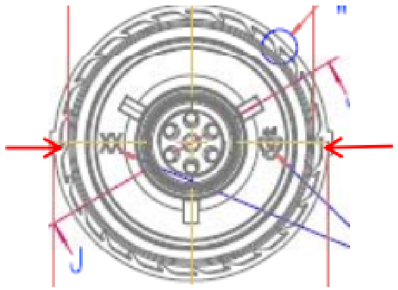


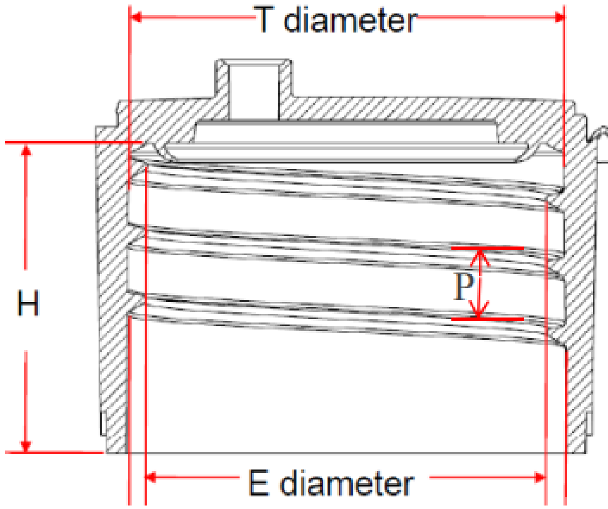


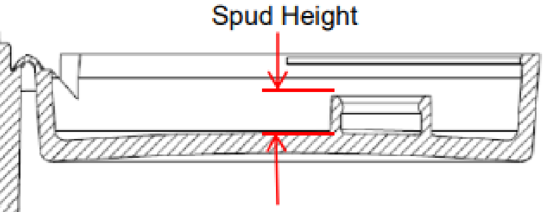
TAPAS: FINISH

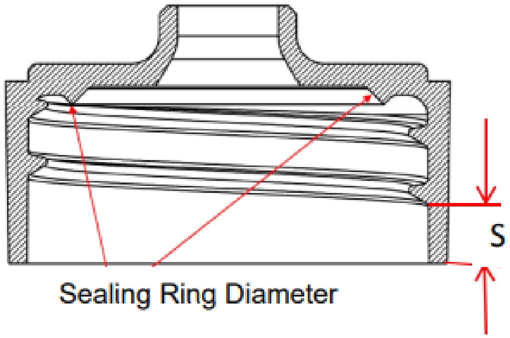
G-Closure Plastic; Technology Type = Threaded

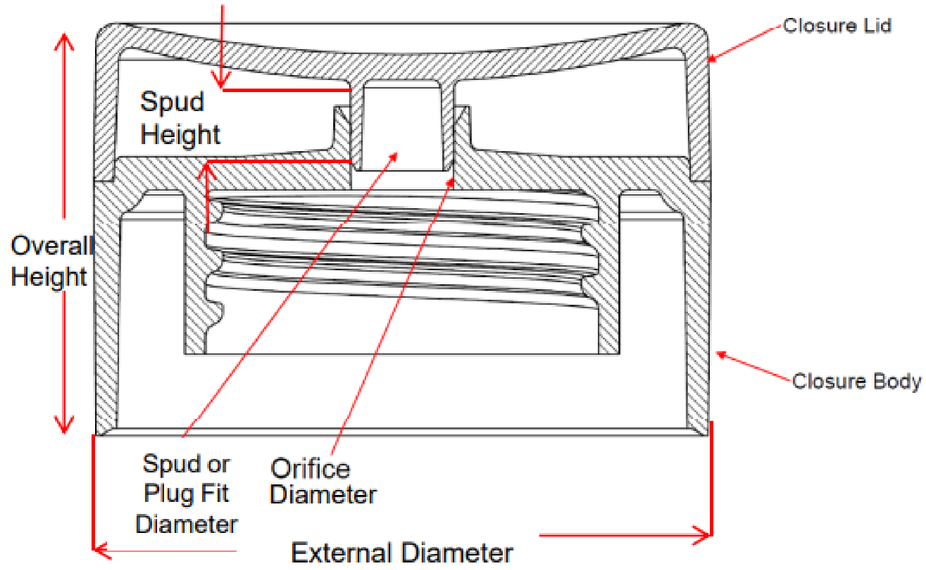










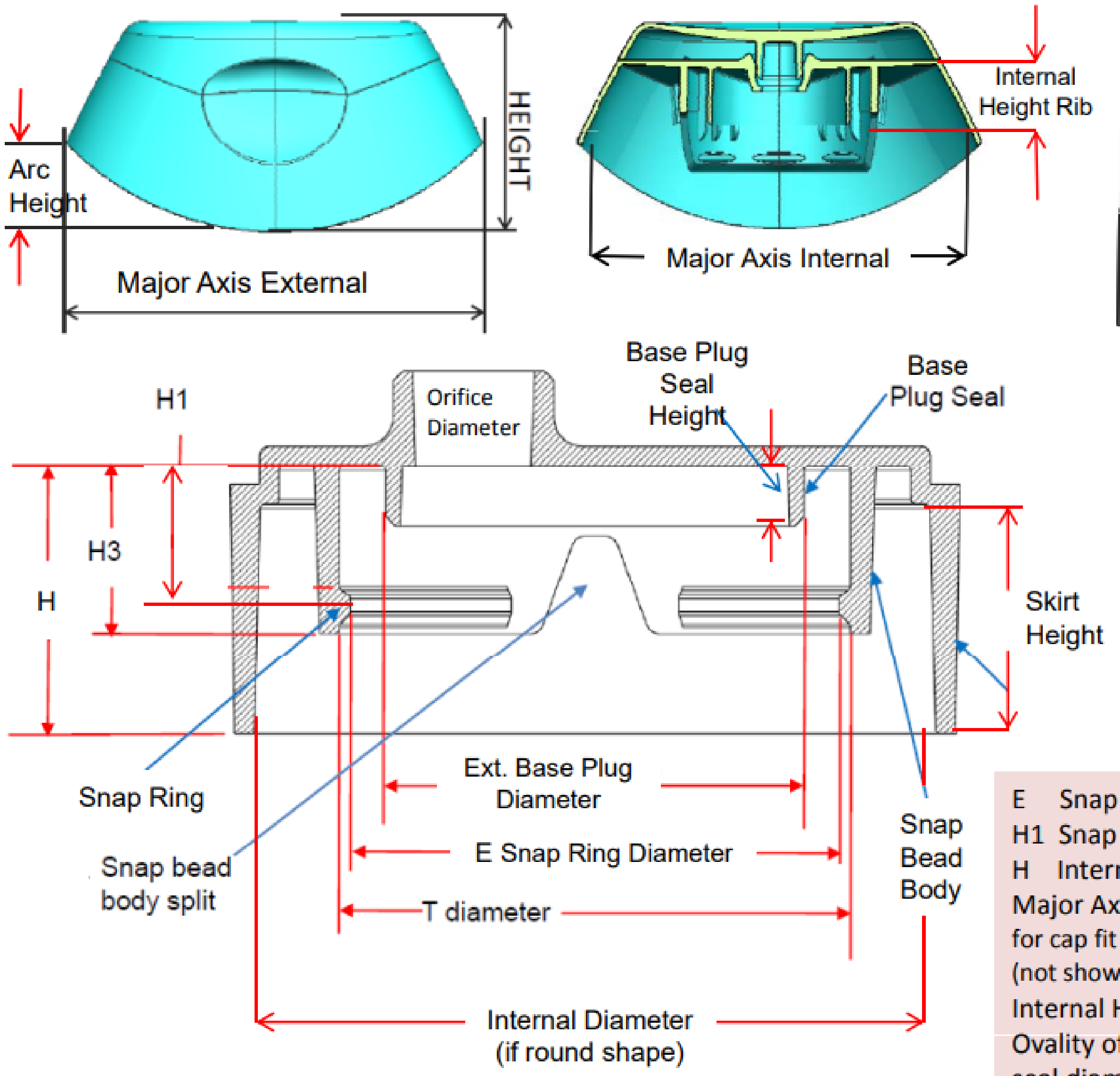


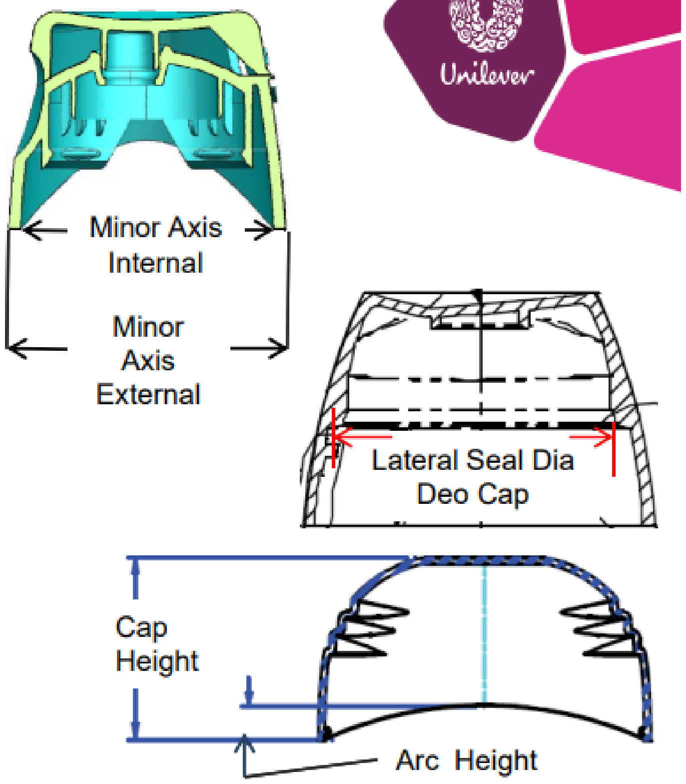
T	Root of Thread
E	Crest of Thread
H	Internal Height
S	Start of Thread (vertical dim thread bottom to base of cap)
P	Thread Pitch (vertical ht. distance between threads)
RD	Ratchet Dia for tamper evident/non-removable threaded caps

See Last Slide for some Alternative example views

TAPAS:
FINISH

G-Closure Plastic, Technology Type = Snap-On



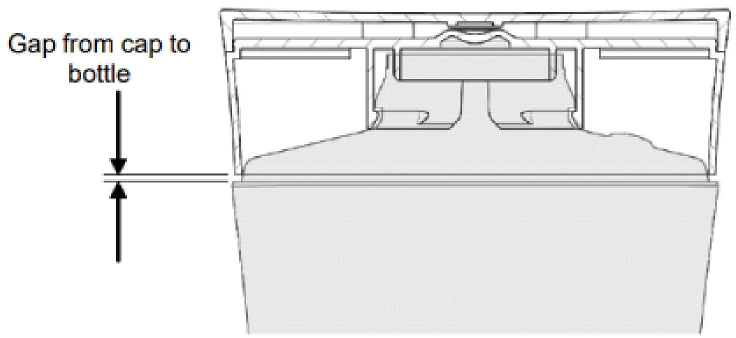


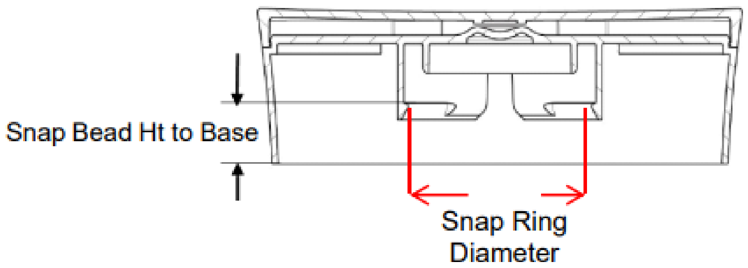
See Last Slide for some
Alternative example views

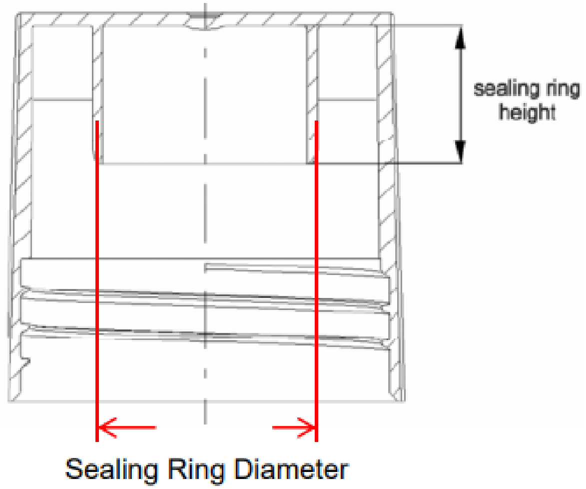
E Snap Ring Diameter
H1 Snap Ring Height (often from top or also from bottom of cap)
H Internal Height
Major Axis Housing & Minor Axis Housing:
for cap fit to SC requirement or to a housing assembly/bracket (not shown & seldom used).
Internal Height Rib: Varies by cap design for ht. & location
Ovality of Plug: allowed amount of ovality to Ext Base Plug seal diameter (not shown).
Ext Base Plug Diameter – plug seal of closure to bottle opening
Ext Base Plug Length – for non round seal (not common/not shown)
Ext Base Plug Width – for non round seal (not common/not shown)

G-Closure Plastic, Technology Type = Snap-On & Threaded

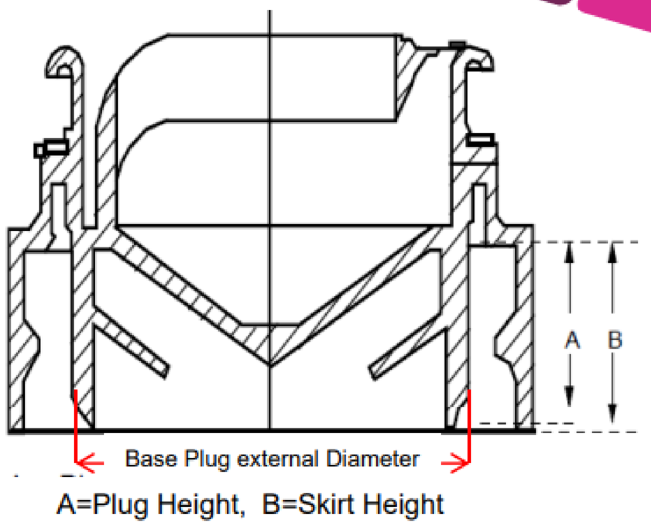
TAPAS: FINISH

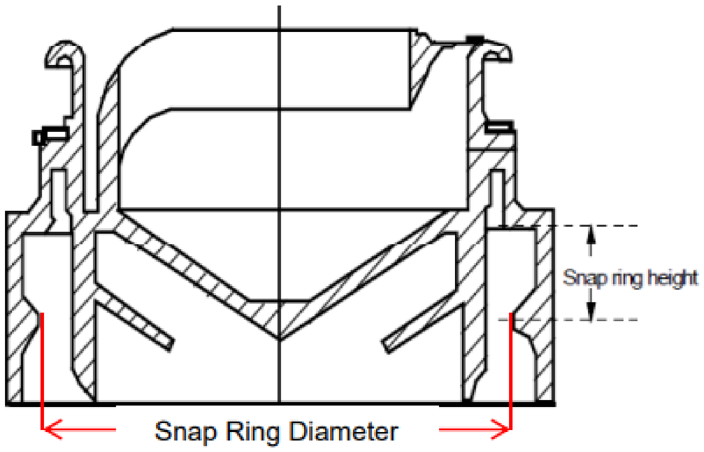






Some additional examples





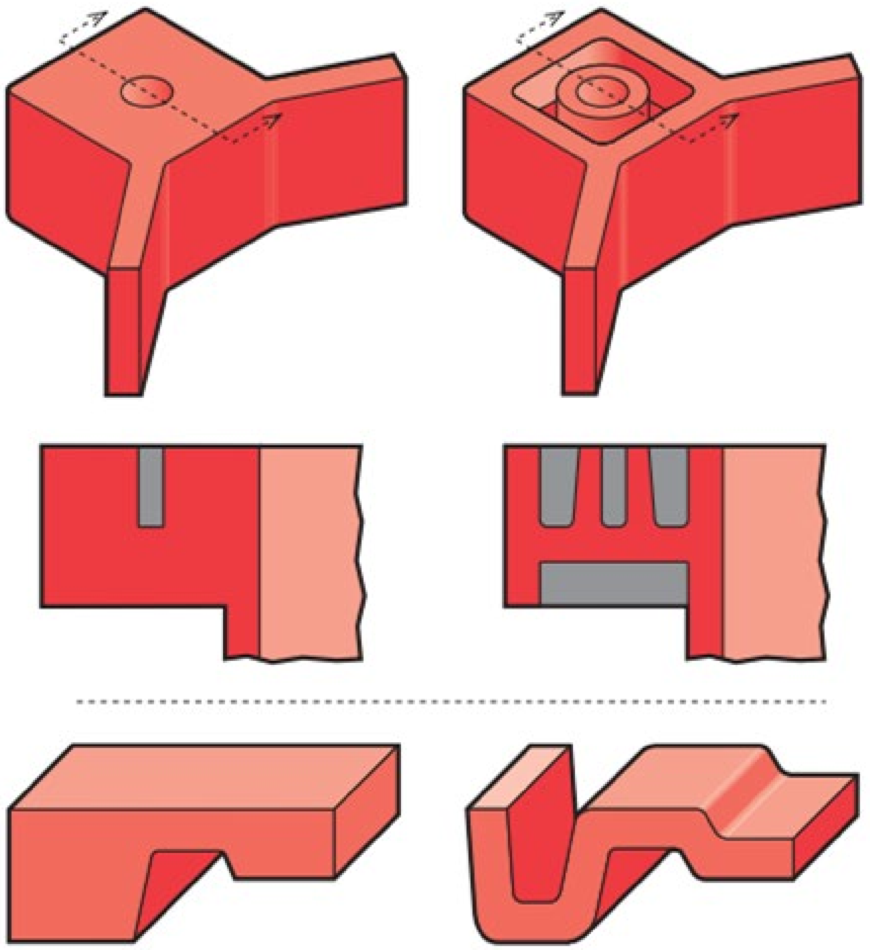
NOTE: Plug Fit Diameter and Ext. Base Plug Diameter are sometimes used interchangeably as the seal of cap to bottle opening.
Alternatively, plug fit diameter can be used if the cap has a plug or spud to seal a dispensing orifice opening.

TAPAS:
PESO

Chapter 2

GENERAL DESIGN

Coring **Figure 2- 3**



Core out thick sections as shown on right to maintain a more uniform wall thickness.

Many designs, especially those converted from cast metal to plastic, have thick sections that could cause sinks or voids. When adapting these designs to plastic parts, consider the following:

- Core or redesign thick areas to create a more uniform wall thickness (see figure 2-3);
- Make the outside radius one wall-thickness larger than the inside radius to maintain constant wall thickness through corners (see figure 2-4); and
- Round or taper thickness transitions to minimize read-through and possible blush or gloss differences (see figure 2-5). Blending also reduces the molded-in stresses and stress concentration associated with abrupt changes in thickness.

In some cases, thickness-dependent properties such as flame retardancy, electrical resistance, and sound deadening determine the minimum required thickness. If your part requires these properties, be sure the material provides the needed performance at the thicknesses chosen. UL flammability ratings, for example, are listed with the minimum wall thickness for which the rating applies.

TAPAS:
ESPESOR

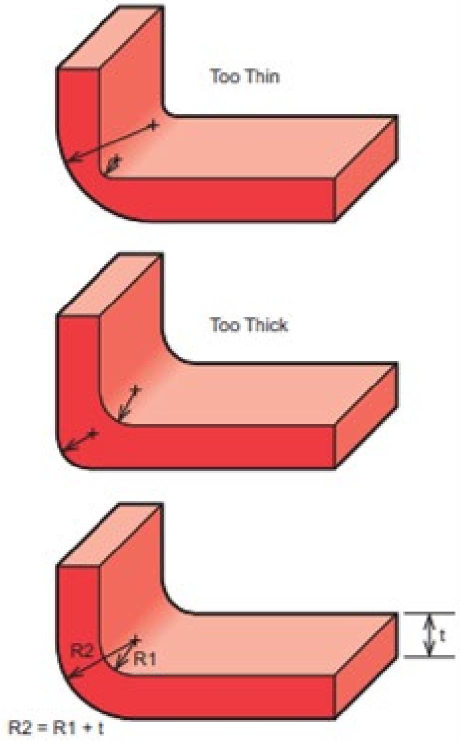
should extend from the gate without restrictions.

To avoid possible warpage and shrinkage problems, limit the added thickness to no more than 25% of the nominal wall for low-shrinkage, amorphous or filled materials and to 15% for unfilled crystalline resins. Carefully transition the flow leader into the wall to minimize read-through and gloss differences on the other side of the wall.

entire channel profile to effectively redirect flow;

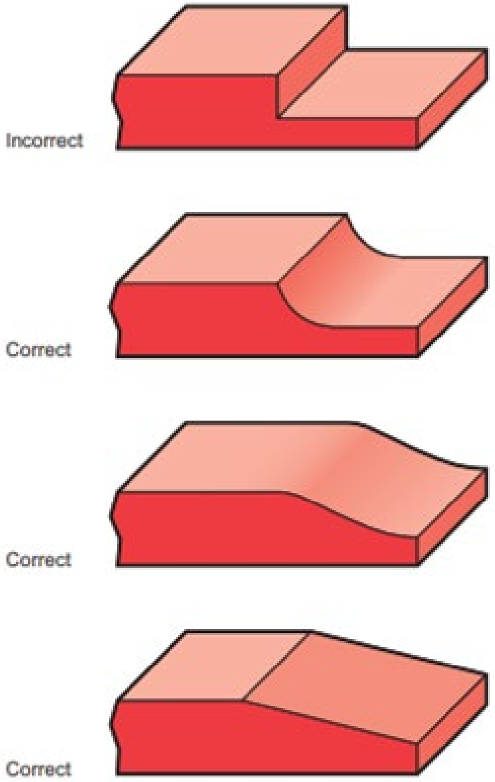
- Reduce the thickness by no more than 33% in high-shrinkage resins or 50% for low-shrinkage materials; and
- Lengthen the restrictor to decrease flow.

Corner Design **Figure 2- 4**



Internal and external corner radii should originate from the same point.

Thickness Transitions **Figure 2- 5**



Blend transitions to minimize read-through.

TAPAS:
RESINA

PETROQUIMICA CUYO S.A.I.C.
Avenida Madero 942 - Piso 10° (C1106ACW)
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Tel.: (54-11) 5167-2700

Technical Data Sheet

Impact Copolymer 2240 P

MAIN USE: INJECTION MOULDING

- Recommended for injection moulding of articles which require high stiffness and good impact resistance at room temperature (such as housewares, garden furniture, crates and containers)

GENERAL PROPERETIES

- High stiffness, similar to PP homopolymers but better impact resistance
- Good flowability
- Good surface gloss

PROPERTIES		METHOD	UNIT	VALUE
Melt Flow Index (230°C/2.16 kg)		ISO 1133	g/10 min	15
MECHANICAL PROPERTIES				
Flexural Modulus (1)		ISO 178	MPa	1500
Tensile strength at yield (2)		ISO 527-2	MPa	31
Elongation at yield (2)		ISO 527-2	%	6
Charpy notched Impact Strength (1)	@ 23°C	ISO 179	KJ/m^2	7
	@ 0°C	ISO 179	KJ/m^2	3
	@ -30°C	ISO 179	KJ/m^2	2
THERMAL PROPERTIES				
Heat Deflection Temperature HDT/A (1,80 MPa) (1)		ISO 75-2	°C	55
Heat Deflection Temperature HDT/B (0,45 MPa) (1)		ISO 75-2	°C	95

TAPAS:

RESINA

Petrocuyo

PETROQUIMICA CUYO S.A.I.C.
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Ciudad Autónoma de Buenos Aires, Argentina
Tel.: (54-11) 5167-2700

Hoja Técnica

Copolímero de Impacto 2630 PC

USO PRINCIPAL: INYECCIÓN

- Indicado para la fabricación de piezas técnicamente complicadas y con altos requerimientos de impacto
- Fabricación de cajones, baldes, baterías, con buena capacidad de desmolde

PROPIEDADES GENERALES

- Muy buena resistencia al impacto a bajas temperaturas
- Baja distorsión post-moldeo
- Contiene agente desmoldante

PROPIEDADES FÍSICAS	MÉTODO	UNIDAD	VALOR
Índice de fluencia (230°C/2.16 kg)	ISO 1133	g/10 min	15
PROPIEDADES MECÁNICAS			
Módulo de elasticidad en Flexión (1)	ISO 178	MPa	1050
Esfuerzo de tracción en la fluencia (2)	ISO 527-2	MPa	23
Elongación en la fluencia (2)	ISO 527-2	%	8
Resistencia al impacto Charpy c/e (1) a 23°C	ISO 179	KJ/m^2	13
a 0°C	ISO 179	KJ/m^2	8
a -30°C	ISO 179	KJ/m^2	4
PROPIEDADES TÉRMICAS			
Temperatura de deflexión HDT/A (1,80 MPa) (1)	ISO 75-2	°C	50
Temperatura de deflexión HDT/B (0,45 MPa) (1)	ISO 75-2	°C	82

NOTAS:

TAPAS: DROP TEST

1) DESARROLLO DEL ENSAYO DROP TEST (Método UMA 1341)

1. Llenar las botellas con el producto y tapar (tapa snap on),
2. Colocar muestras en máquina drop test para hacer caída a 1 m del piso.
3. Dejar caer y Verificar que no haya rastro de roturas y/o perdidas en ningún lado de la tapa.

RESULTADOS / OBSERVACIONES.

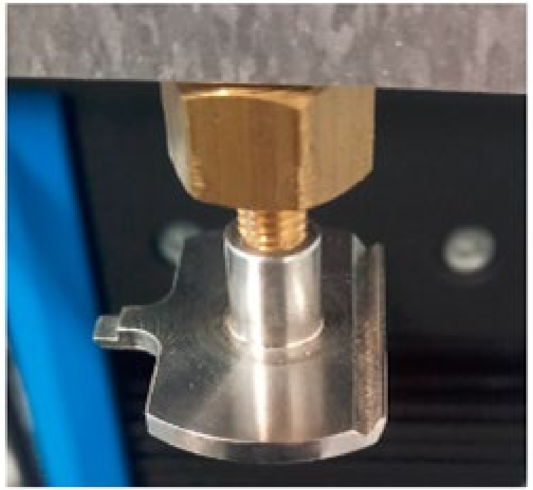
Máquina Drop test con muestra tapa PCR

Ninguna de las muestras tresteadas presentaron roturas ni fallas y funcionalmente estan correctas.

TAPAS:

FUERZA DE APERTURA

* Speed: 33 mm/min
* Metal device should touch the wall of the cap (standardization of the test)
* Apply the cap until the stopper on the PET neck finich



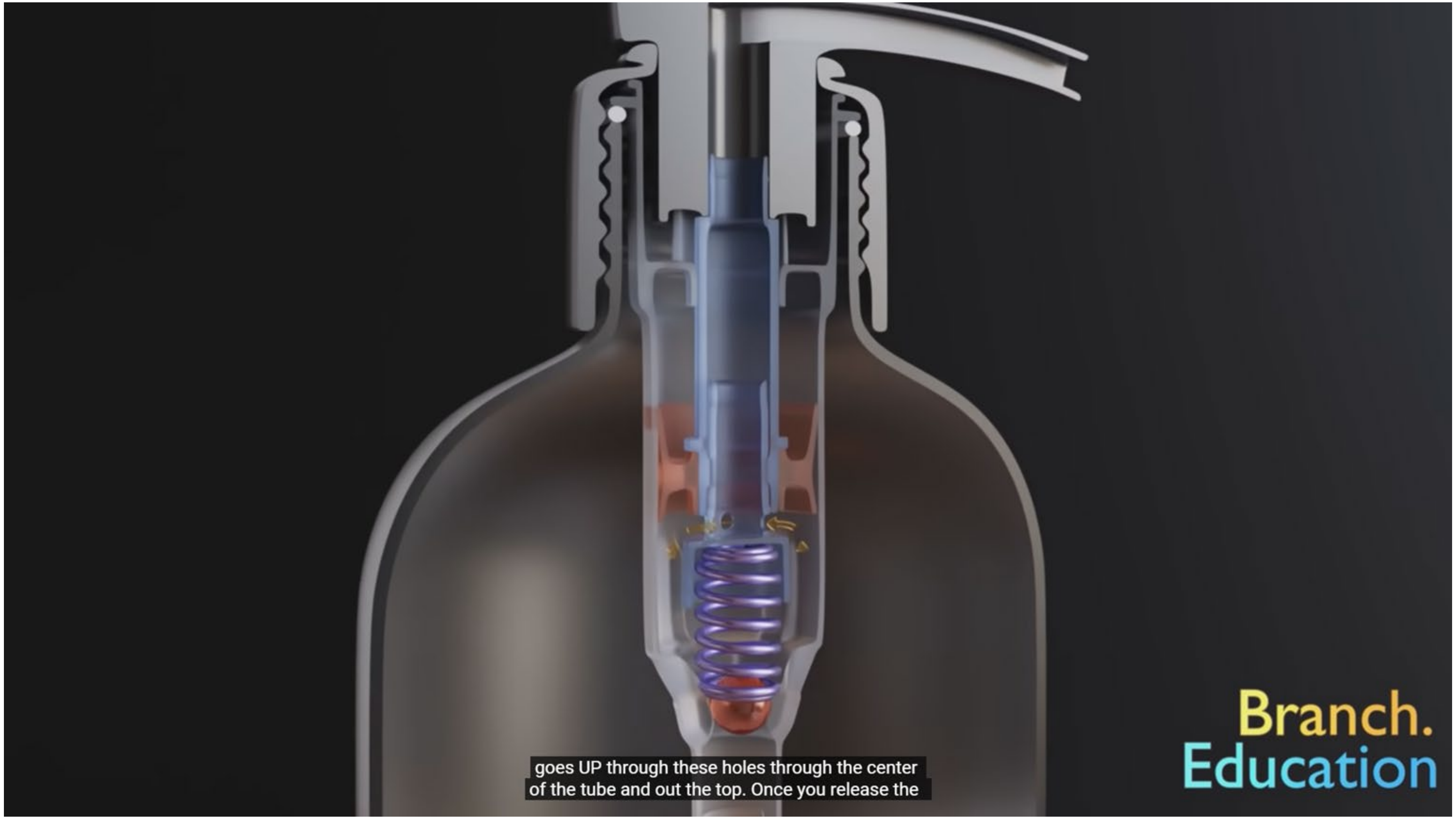
TAPAS:

CAPPING FORCE

TAPAS:
PUMPS

TAPAS:
PUMPS

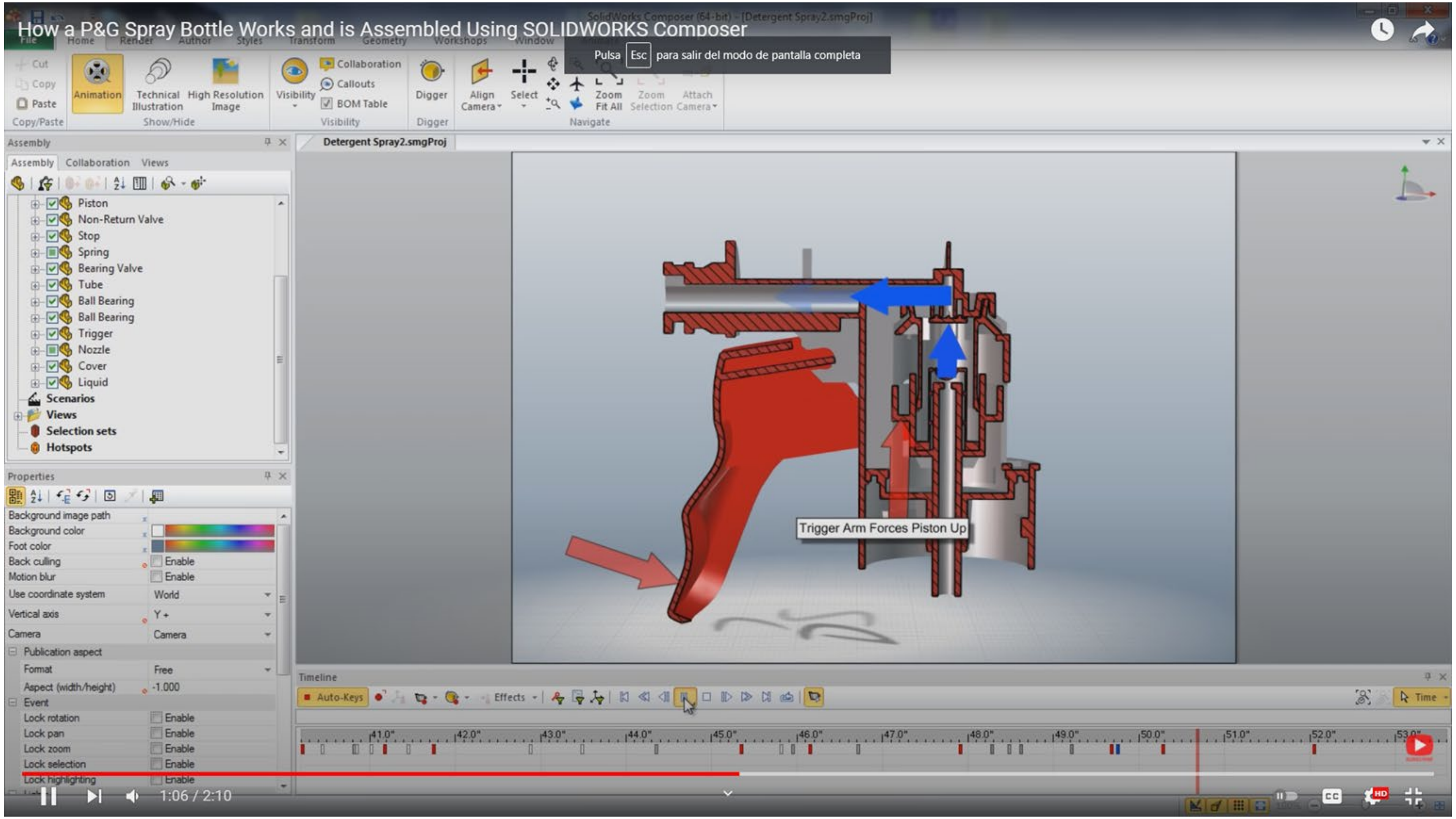
TAPAS: PUMPS



https://www.youtube.com/watch?v=9kzC4CpPxSQ

TAPAS:
TRIGGERS

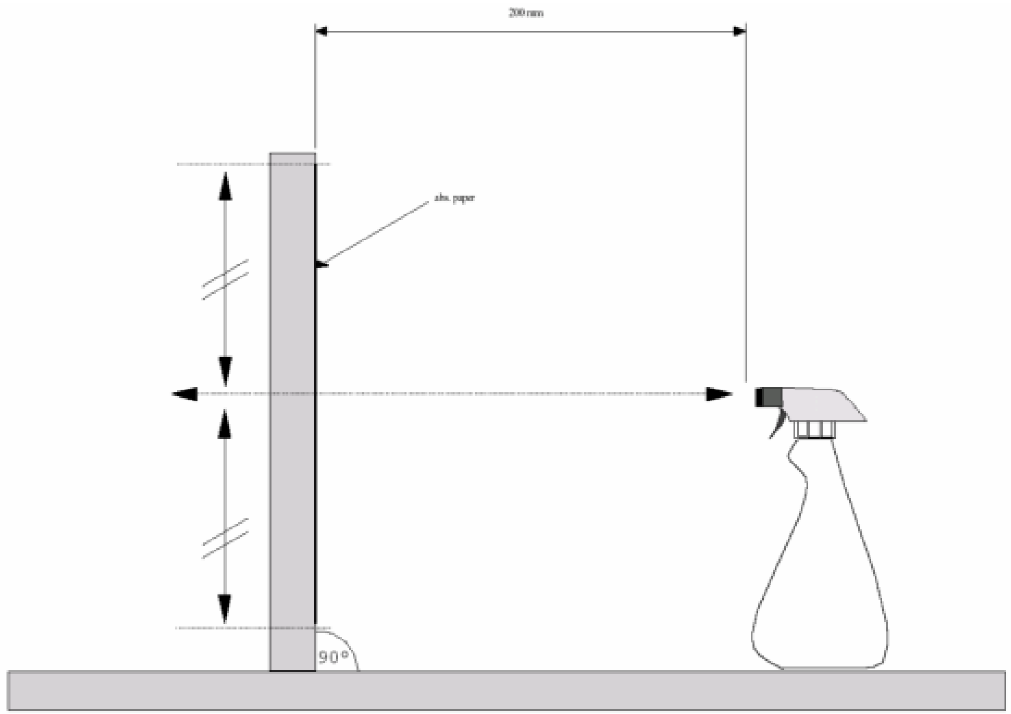
TAPAS: TRIGGERS



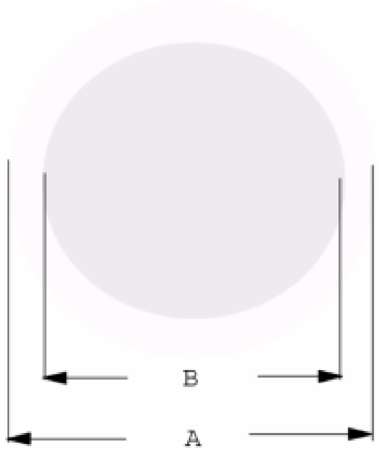
https://www.youtube.com/watch?v=bUuSKxs0Oz8

TAPAS:

SPRAY PATTERN



17.2. Example spray area

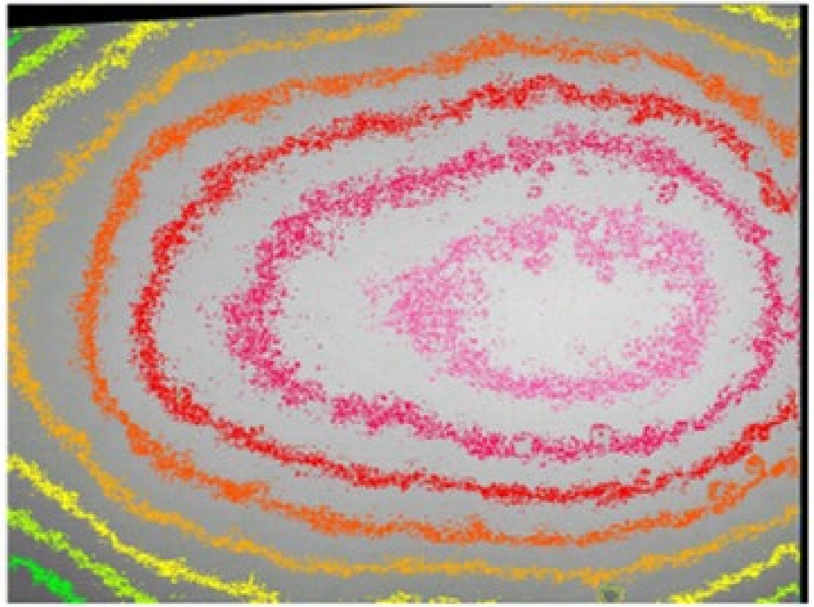


Maximum dimension of the spray pattern = length and width of area A
The dimension of spray pattern where the density of product distribution is homogenous = length and width area B

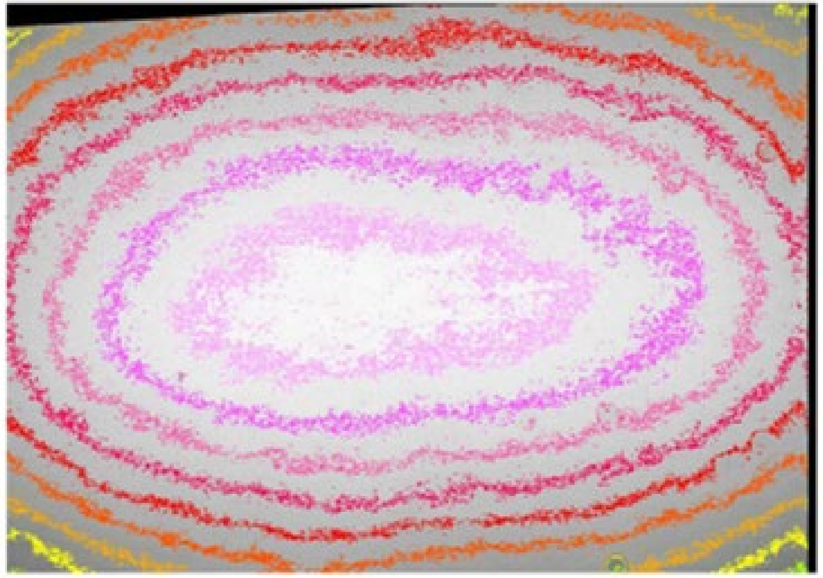
TAPAS:

SPRAY PATTERN

Bad Pattern:

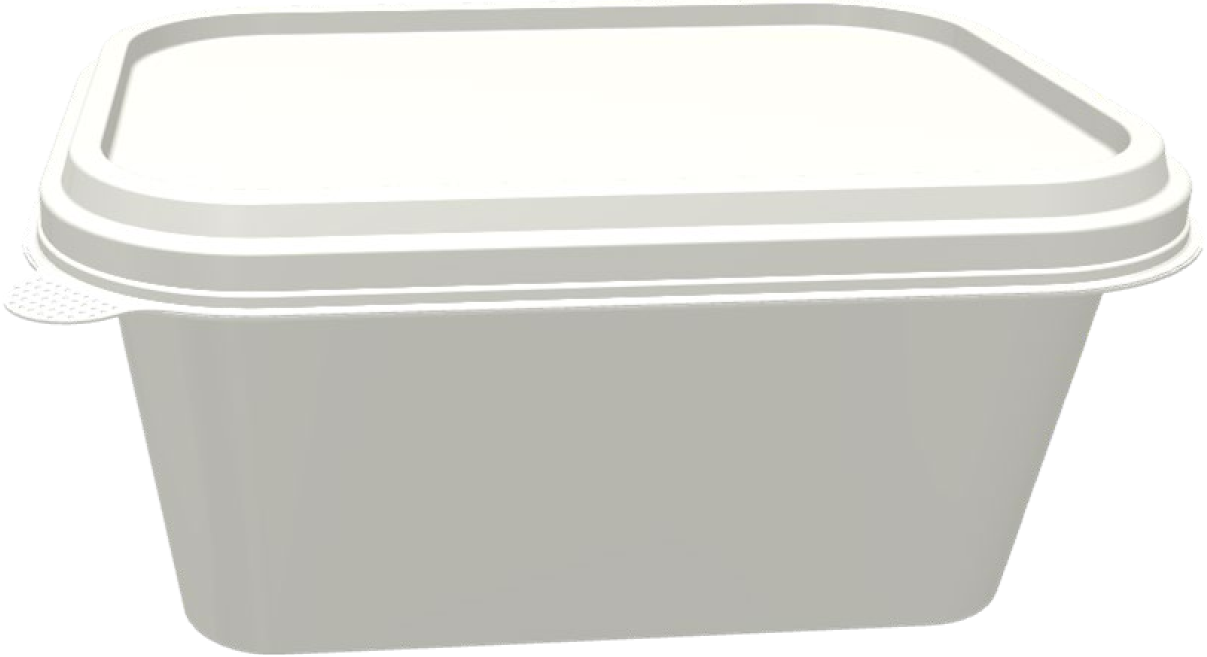


Good Pattern:



Packaging primario Rígidos – FRASCOS/POTES

POTES:
HDPE/PS



POTES:

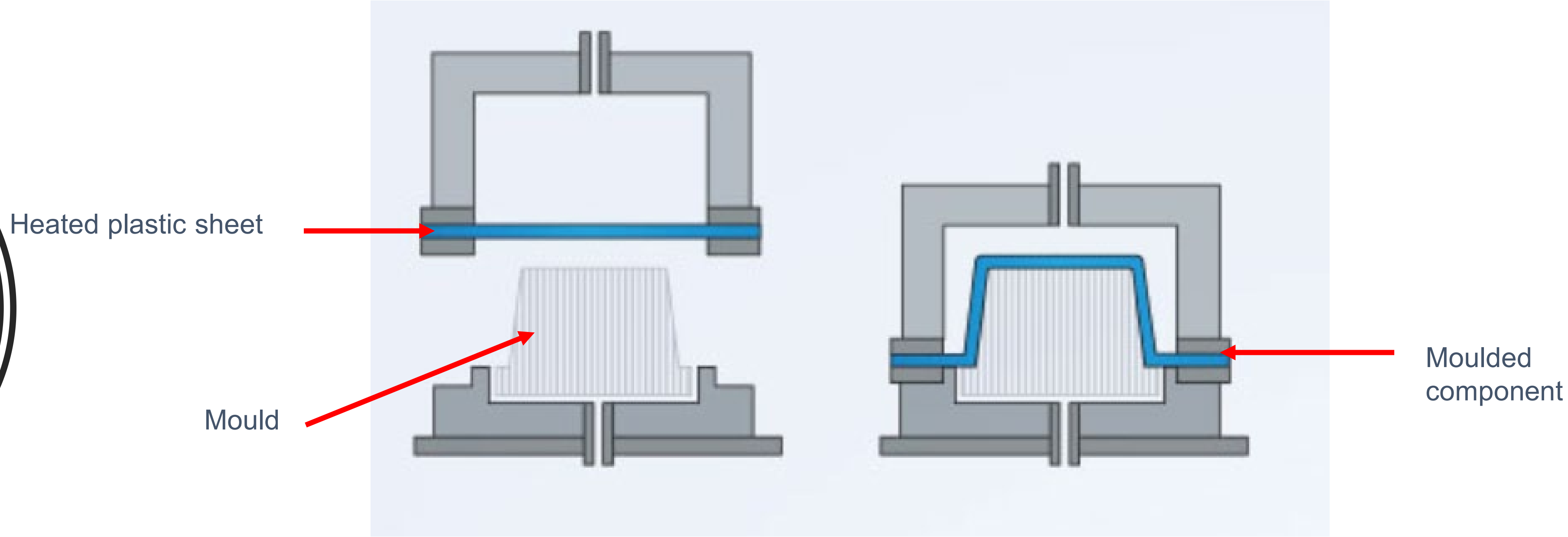
HDPE/PS

POTES:

PROCESO DE FABRICACIO N

What is Thermoforming

Thermoforming is a manufacturing process where a plastic sheet of even thickness (which can be mono material a coextrusion or a laminate) is heated to a pliable forming temperature and drawn over, or into a mould to form a rigid or semi-rigid shape. The excess material is trimmed off to create a finished article.

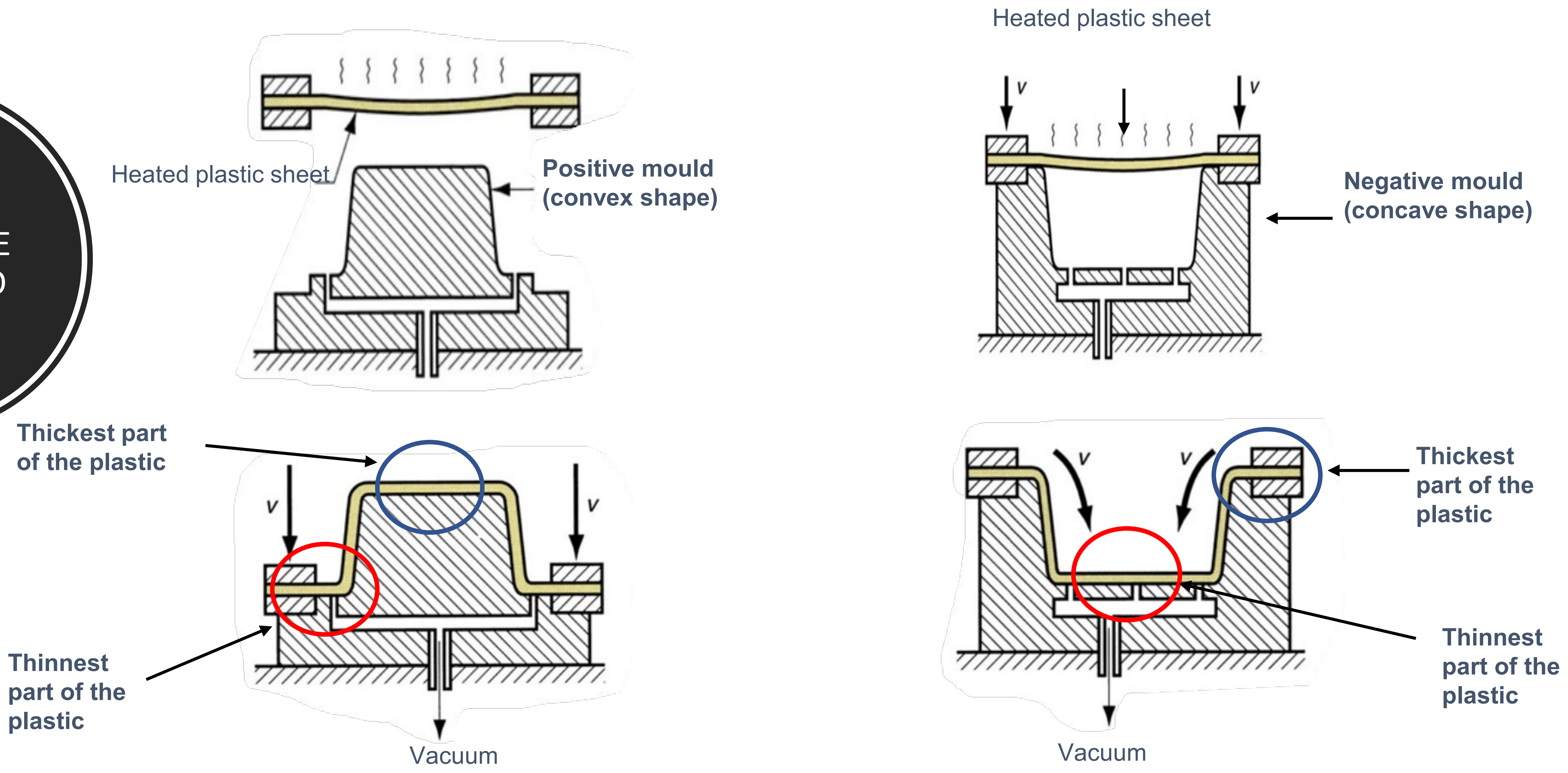


There are three different and/or combination of forces that can be applied, which will be explained later in this deck:

- By using vacuum to pull the material against the mould
- By positive air pressure to push the sheet against the mould
- By plug assisted.

Thermoforming moulds

In Thermoforming you can use positive (humped/convex surface) or negative (concave) moulds (sometimes termed as male and female moulds).



POTES:

PROCESO DE FABRICACIO N

Thermoforming moulds

The difference between positive and negative may seem unimportant but there are slight differences

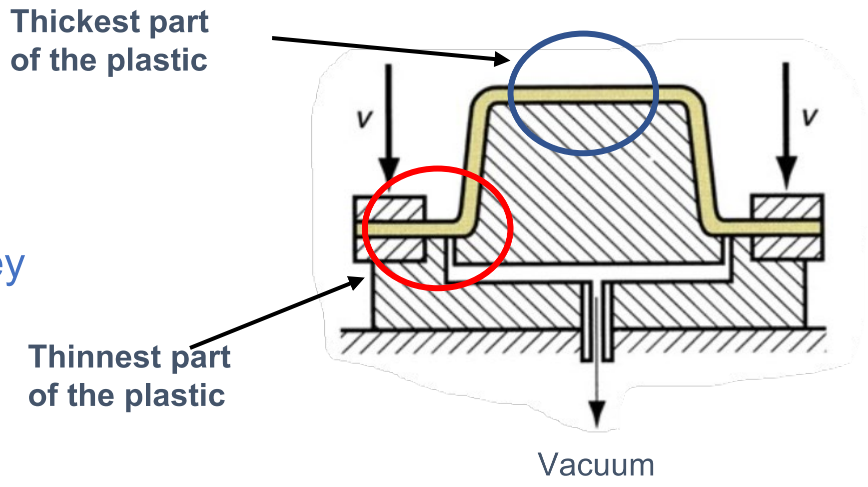
- Surface detailing on only the interior/exterior of the finished component, dependant on negative or positive mould – this maybe important

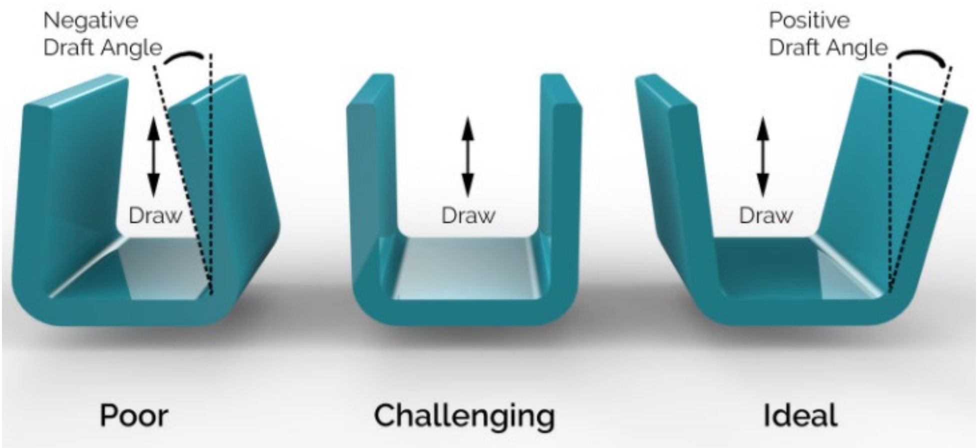
  - Thinning of the component walls can be an issue, dependant on the mould contour.

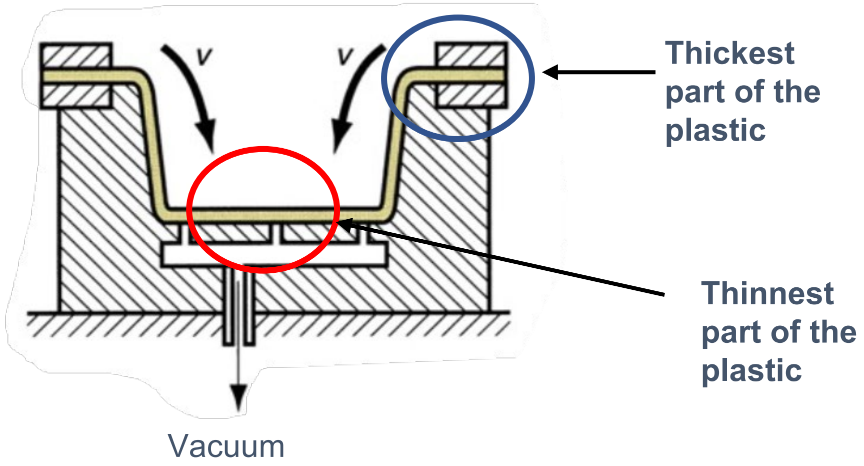
  - Draft angles are slight tapers which are applied to the outer edges and angles within the mould. They aid both material distribution and ejecting the part from the mould

POTES:

PROCESO DE FABRICACIO N







Components and material

POTES:

PROCESO DE FABRICACIO N

Typical components produced via compression moulding include bottle closures mainly for the beverage market and thin walled tubs for ice cream and spreads.

The materials that is typically used for compression moulding is Polypropylene

- **Relatively easy material to compression mould. It has good chemical and heat resistance properties. It also has a low shrinkage rate of typically 1%.**

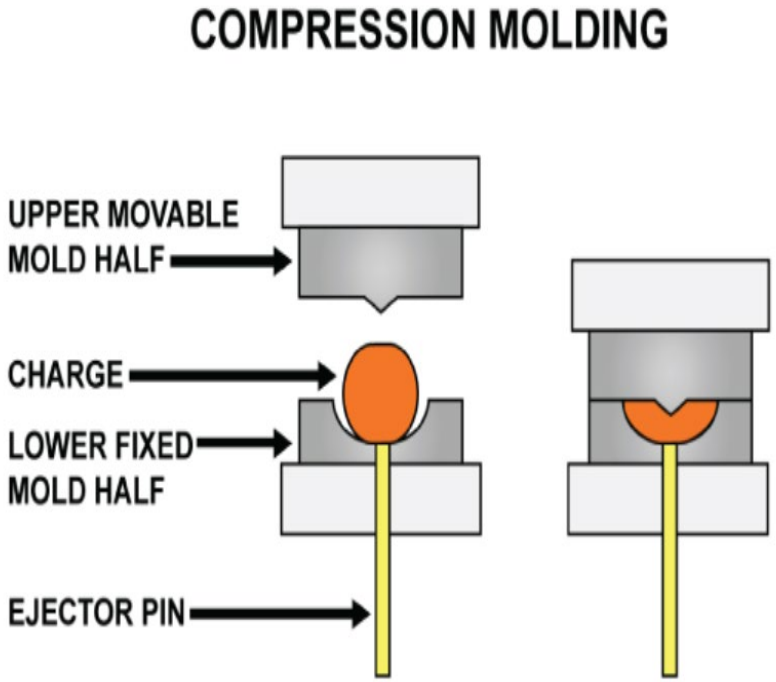
The basics

POTES:

PROCESO DE FABRICACION

A method for both thermoplastic and thermoset materials. Heated resin (called a charge) is placed between two halves of a mould to be formed by pressure. This cycle hardens the material and it can then be ejected from the mould. This process is somewhat similar to making waffles on a waffle press.

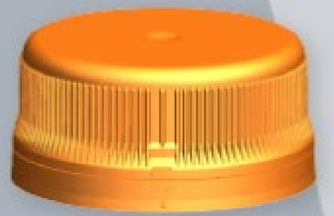
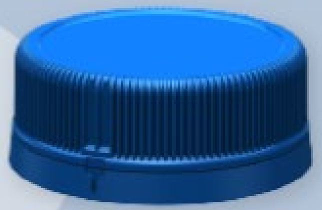
Raw material is usually in the form of pellets, putty-like mass or preform.



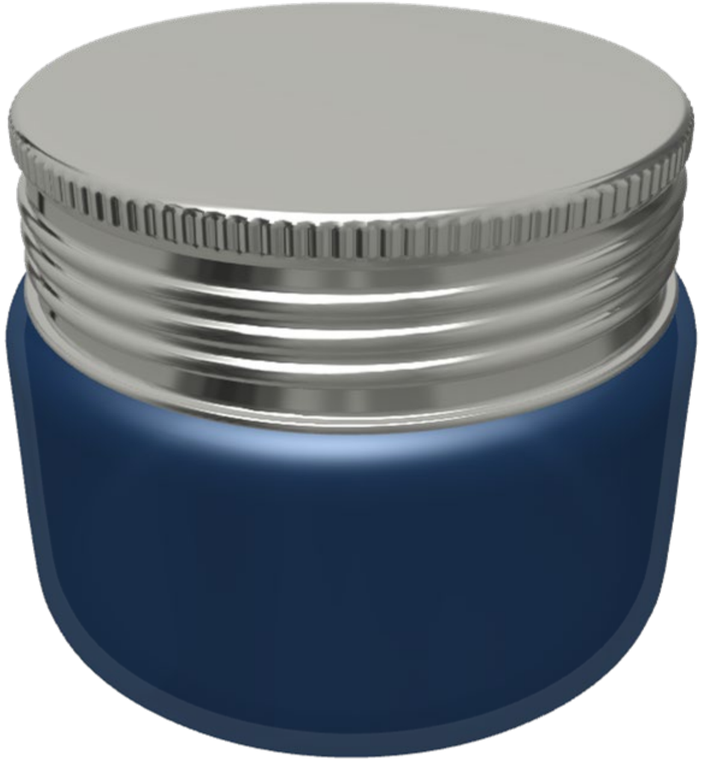
Advantages and disadvantages moulding

POTES:

PROCESO DE FABRICACIO
N

INJECTION		COMPRESSION	
			
Ideal for complex designs, multiple size runs, and offers flexibility in color and material.		Ideal for high volume production. Less post-printing challenges, energy-efficient, and minimal material waste.	
PROS	**CONS**	**PROS**	**CONS**
Can mold more complex shape	Longer color changes	No gate mark = less post-printing challenges	Size dependent/ longer changeover
Multi-vendor for equipment	Large space footprint	Low-tool maintenance cost	Equipment vendor limited
Multiple material choices	Gates present can cause post-printing challenges	Low-energy costs	Difficult for complex part geometrics
Independent cavity control	N/A	Less waste	Tamper evidence usually requires secondary operations
Can easily change sizes			

FRASCOS:
METAL/VIDRIO



FRASCOS:
METAL/VIDRIO

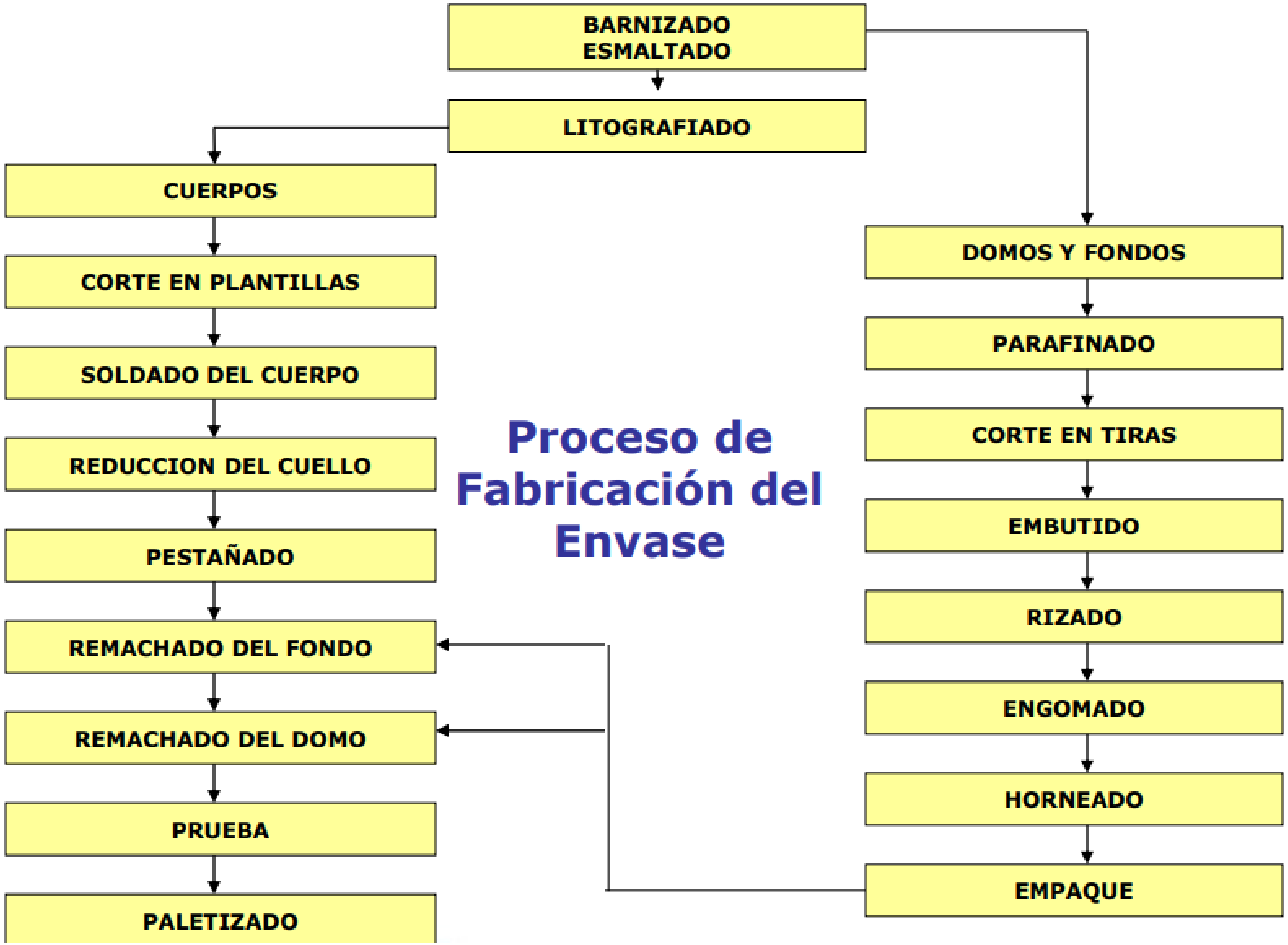
https://www.youtube.com/watch?v=RnHxqIsHVKk

Packaging primario
Rígidos – LATAS

LATAS:
ALUMINIO

LATAS:
HOJALATA

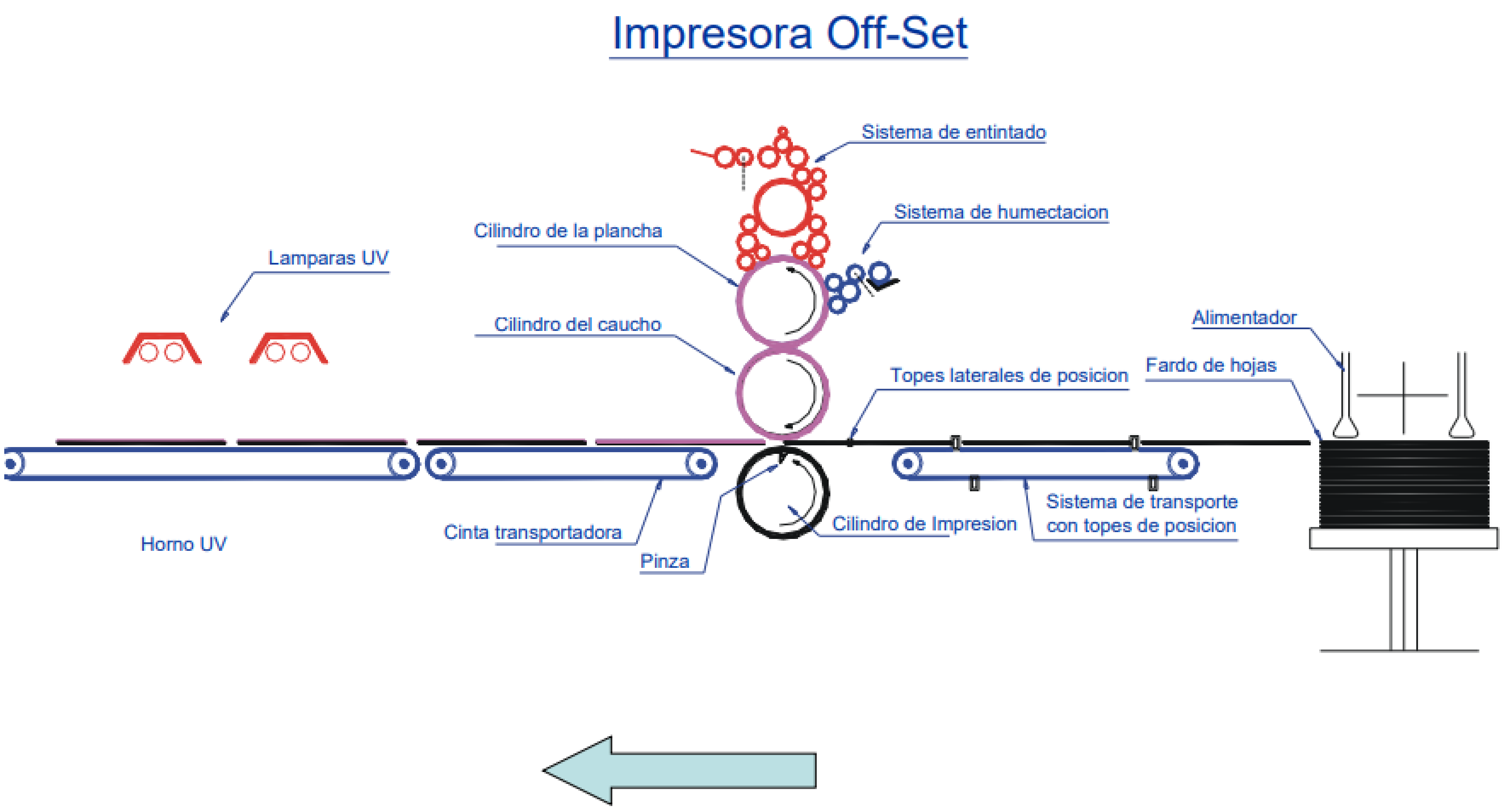
LATAS: HOJALATA



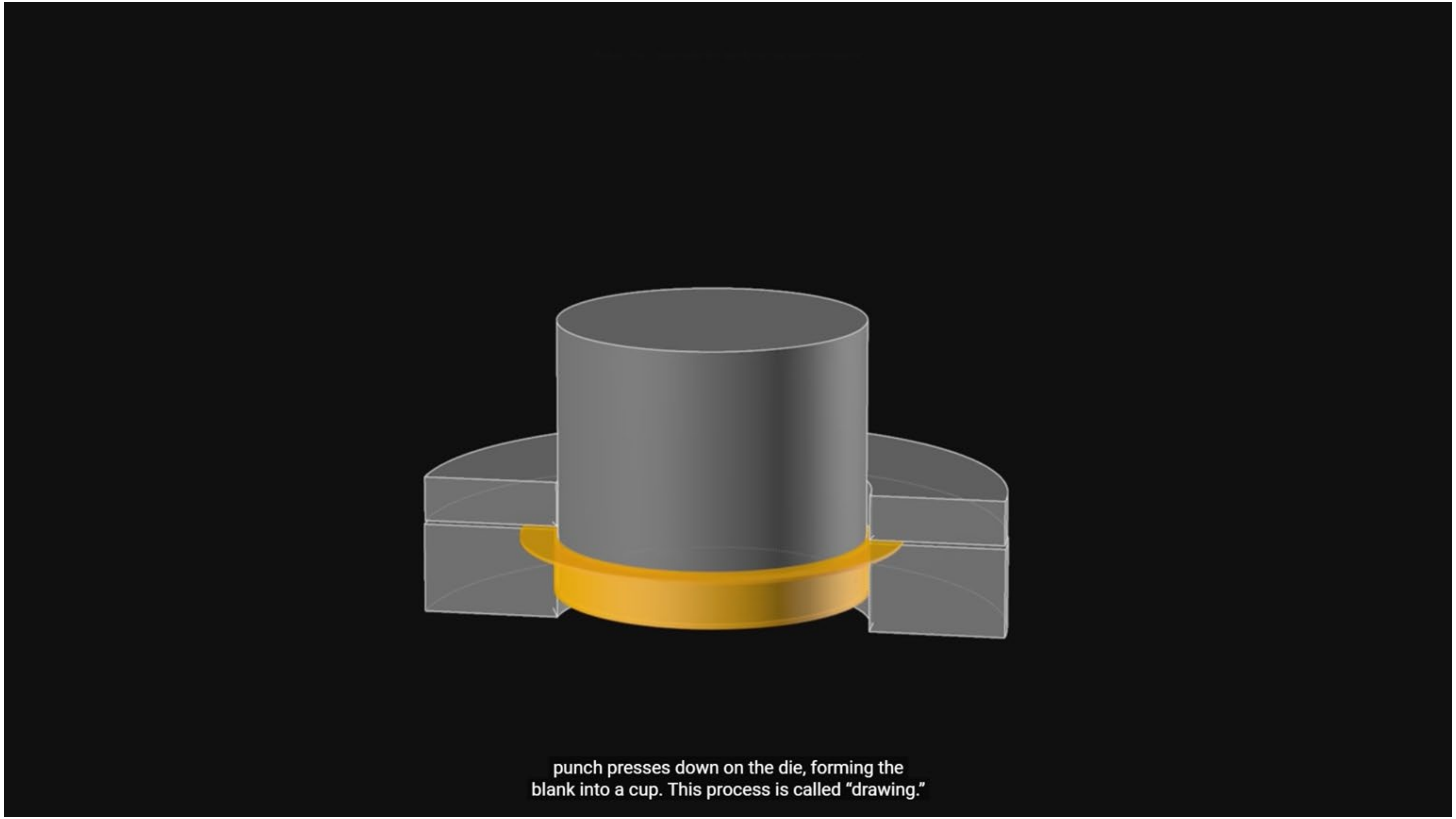
LATAS:
HOJALATA

https://www.youtube.com/watch?v=cCcfOVNWiHw

LATAS: HOJALATA



LATAS: ALUMINIO



https://www.youtube.com/watch?v=hUhisi2FBuw

LATAS: FORMAS

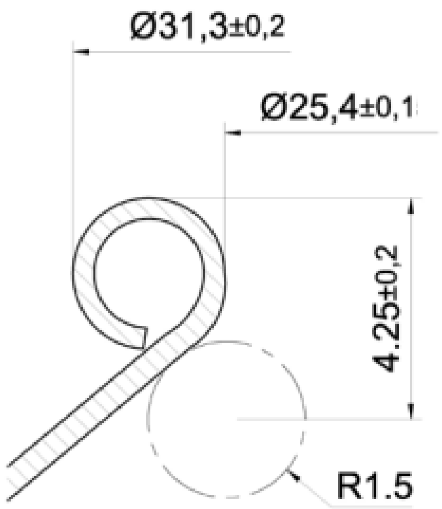


Figura 3- Detalle del rulo para envases de diámetro de 25,4

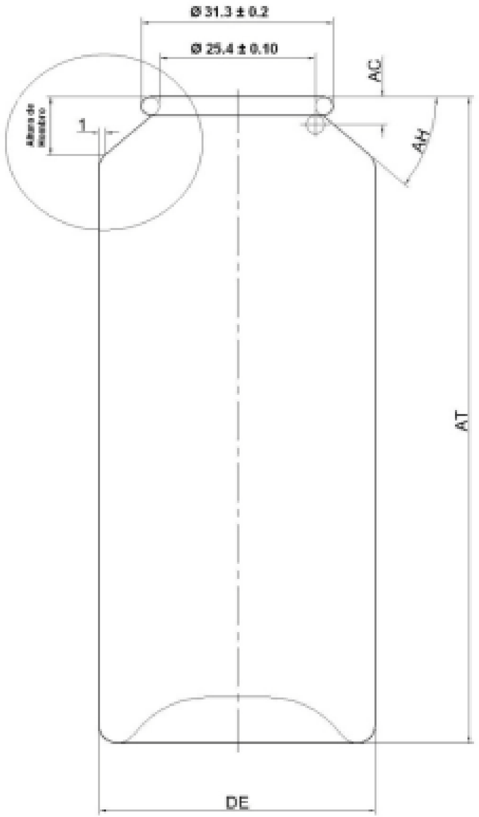
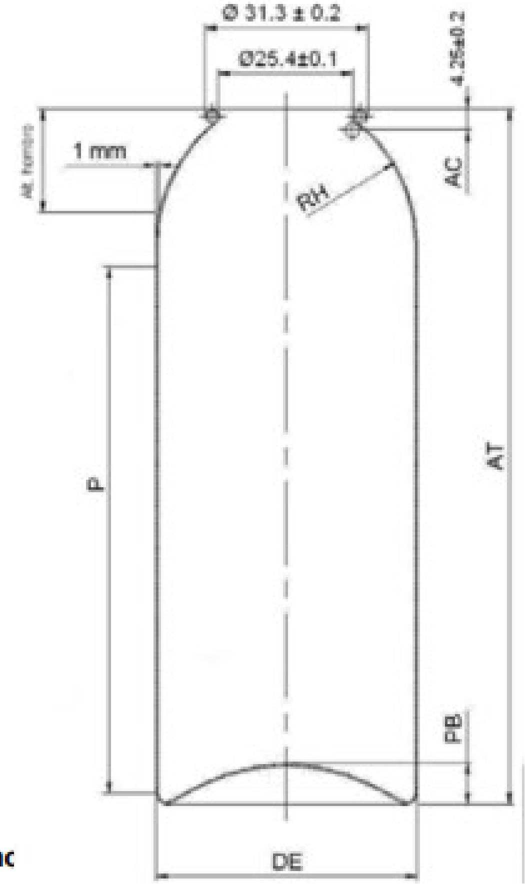
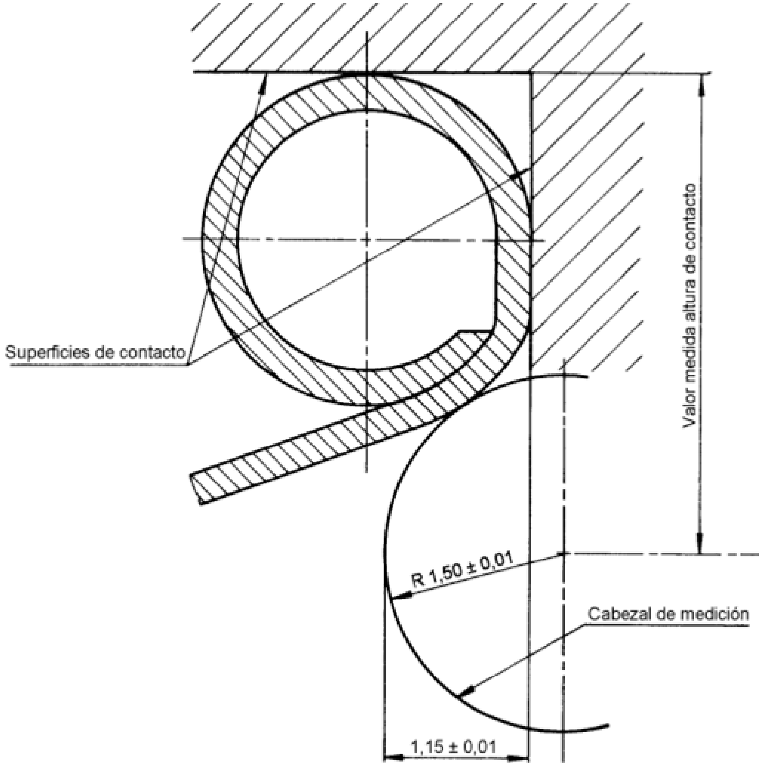


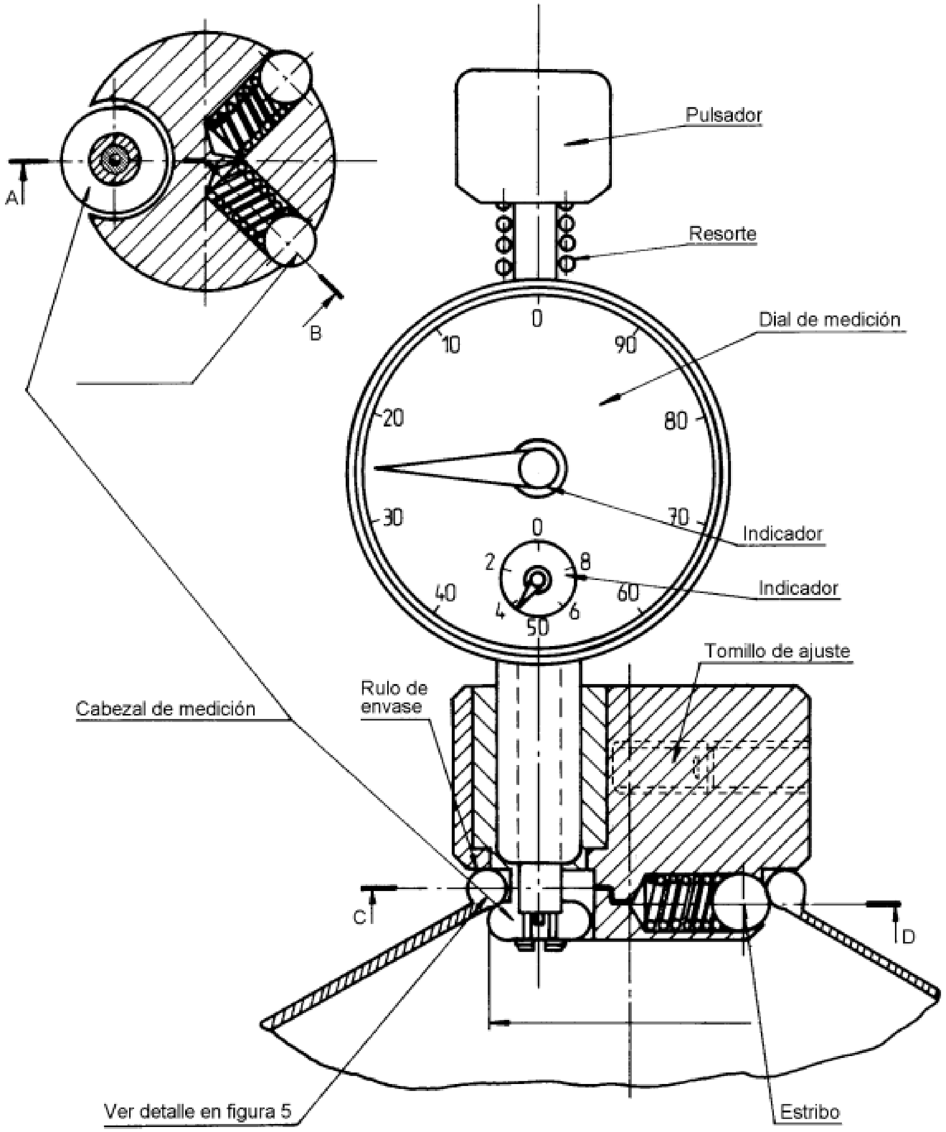
Figura 4 - Envase de hombro planc



LATAS: BOXAL

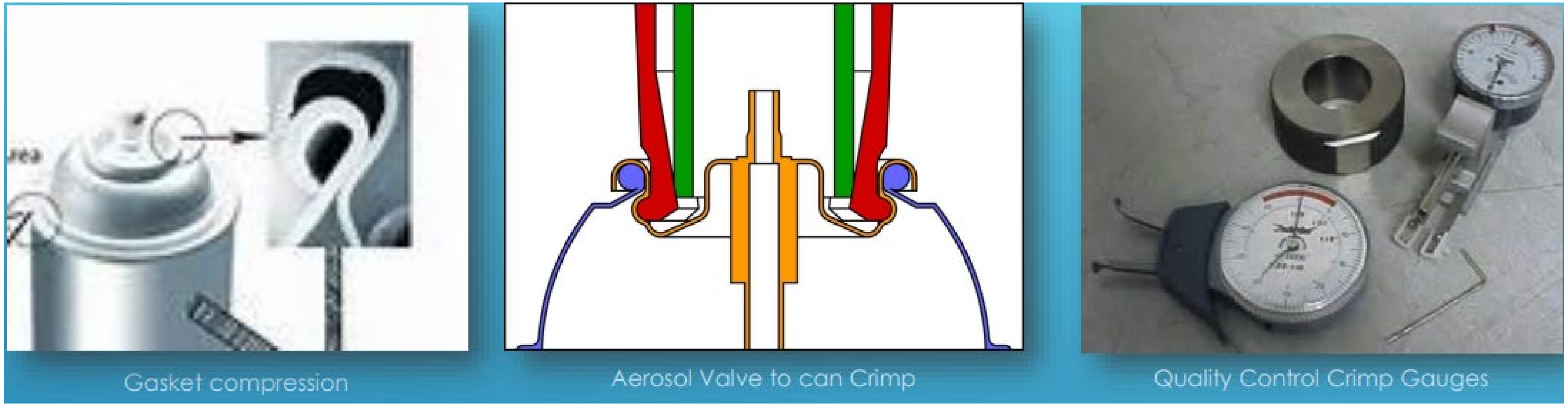


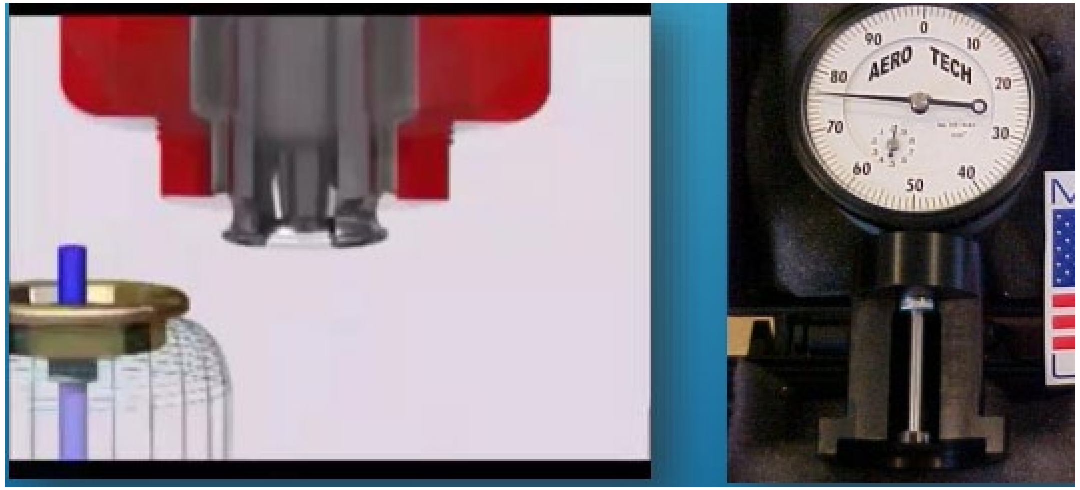
Superficies de contacto
Valor medida altura de contacto
R 1,50 ± 0,01
Cabezal de medición
1,15 ± 0,01



A
B
Pulsador
Resorte
Dial de medición
0
10
90
20
80
30
70
Indicador
0
2
8
4
6
40
50
60
Indicador
Tornillo de ajuste
Rulo de envase
Cabezal de medición
C
D
Ver detalle en figura 5
Estribo

LATAS: CRIMPADO





LATAS: CRIMPADO

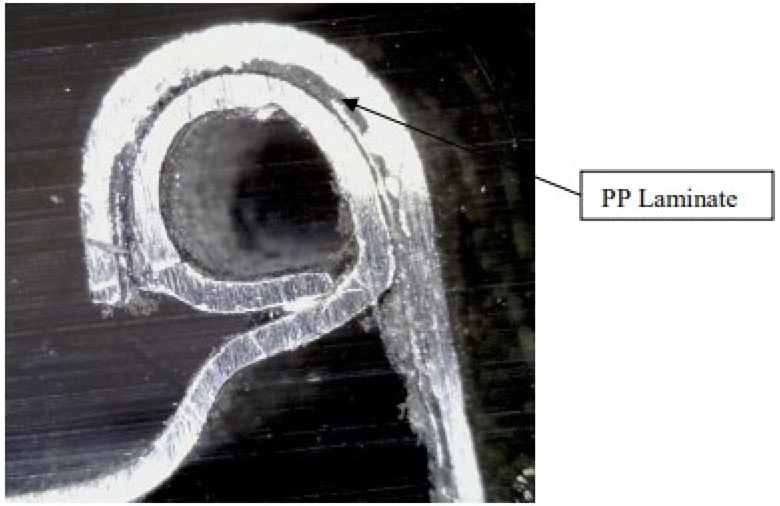


Figure 14 – Cross Section of Laminate Mounting Cup before Crimping

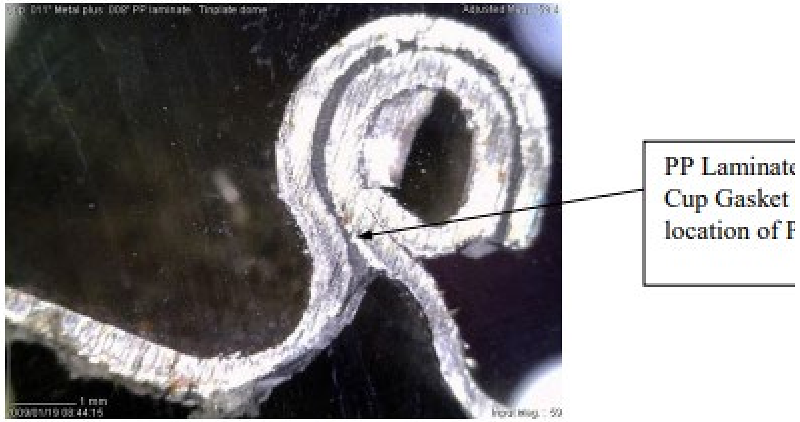


Figure 15 – Cross Section of Laminate Mounting Cup Crimped on to a Tinplate Can

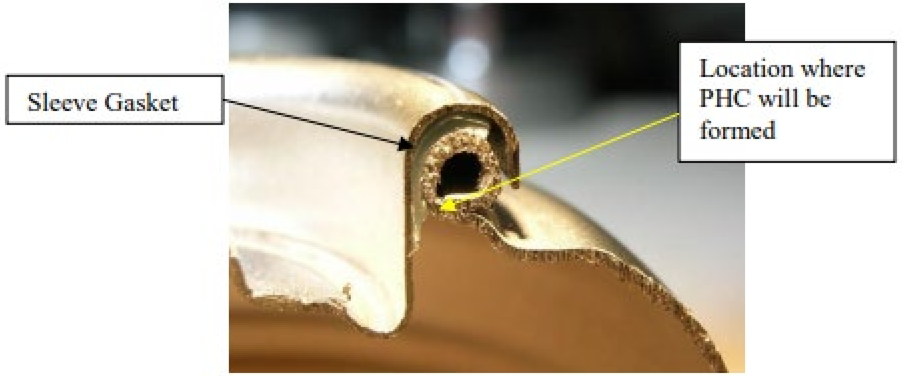


Figure 16 – Sleeve Gasket prior to Crimping

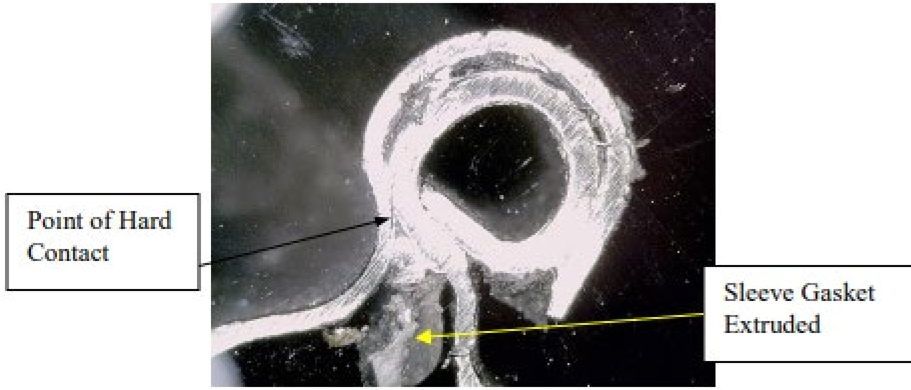


Figure 17– Sleeve Gasket after Crimping

LATAS:

RESISTENCIA LA PRESION

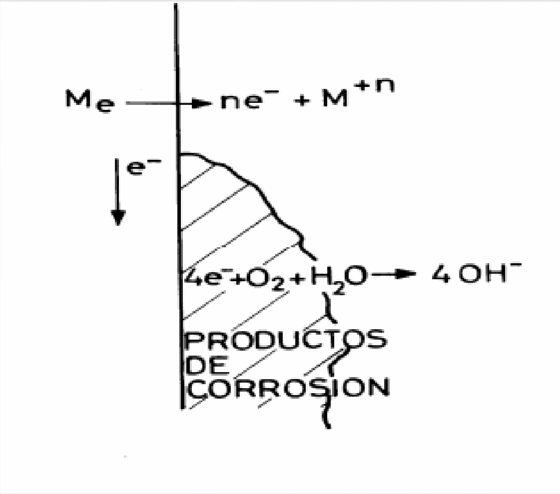
REGULACION USA DOT			
LA SIGUIENTE TABLA NOS MUESTRA LA CLASIFICACION DEL DEPARTAMENTO DE TRANSPORTE DE ESTADOS UNIDOS PARA AEROSOLES			
CLASE	PRESION DE FORMULACION A 55 ºc (BARS)	PRESION MINIMA DE DESFORMACION (BARS)	PRESION MINIMA DE EXPLOSION (BARS)
"Non Spec"	9,66	>9.66	14,49
"DOT 2P"	11,04	>11.04	9,45
"DOT 2Q"	12,42	>12.42	18,63

REGULACION EUROPEA			
LA SIGUIENTE TABLA NOS MUESTRA LA CLASIFICACION EUROPEA DESCRIPTA EN LAS DIRECTIVAS 75/324/EEC. PRESION DE FORMULACION A 50ºC C = P PRIMERA DESFORMACION(REVERSION) NO MENOR A P x 1.5 EXPLOSION NO MENOR A P x 1.8			
DESIGNACION	PRESION DE FORMULACION A 50 DEG C (BARS)	PRESION MINIMA DE REVERSION (BARS)	PRESION MINIMA DE EXPLOSION (BARS)
"12 Bar"	8	12	14,4
"15 Bar"	10	15	18
"18 Bar"	12	18	21,6

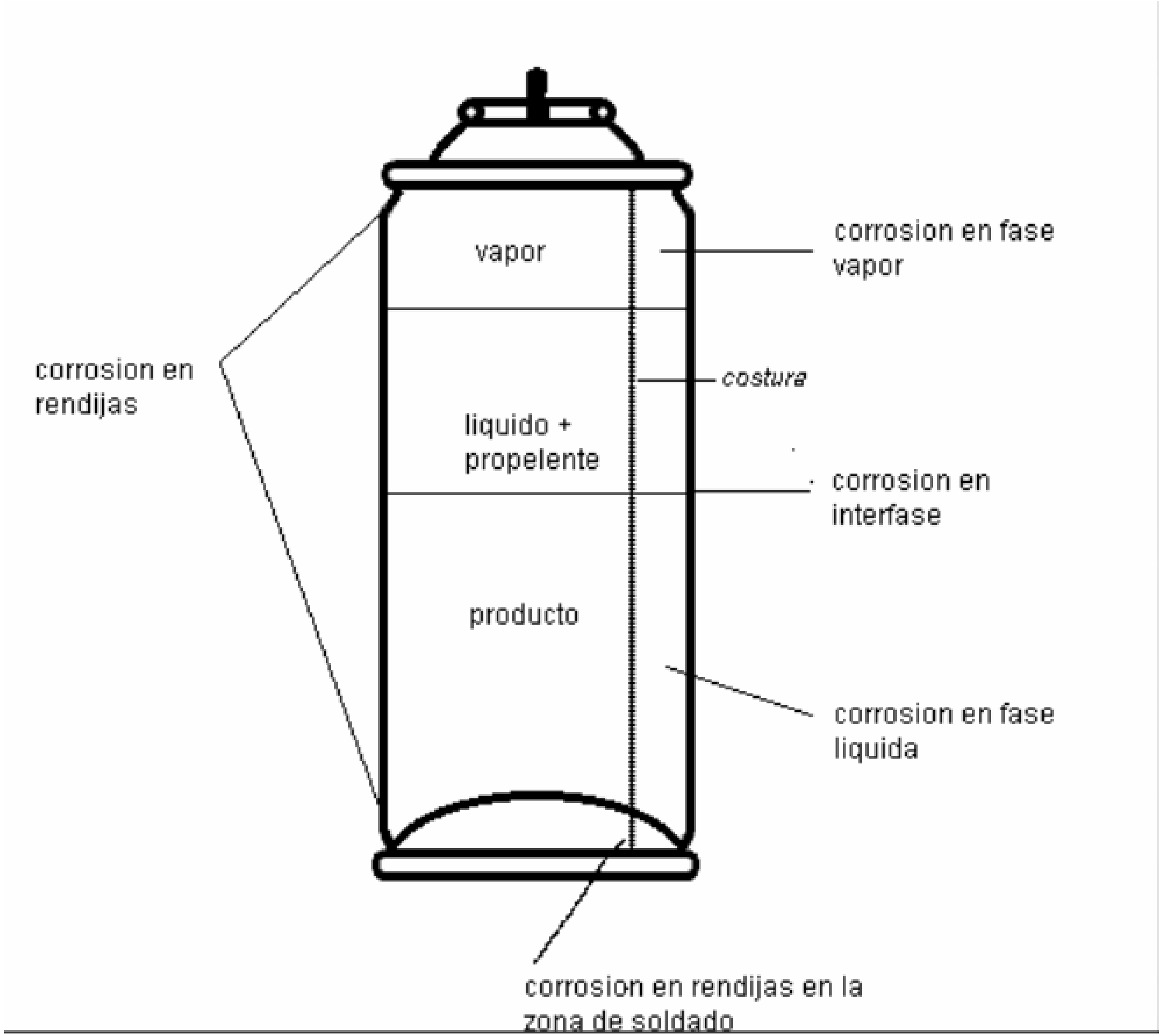
LATAS:
CORROSION

CORROSION ELECTROQUÍMICA

- Es necesario la presencia de un electrolito
- Se forman dos zonas distintas en el metal, una donde se disuelve (oxida) "anódica", y otra que permanece sin alteración "catódica"
- Se forma una pila entre ambas zonas
- En la zona anódica el metal se disuelve, liberando electrones que migran a través del metal a la zona catódica, donde son consumidos por alguna sustancia del medio



LATAS: CORROSION



Packaging primario Rígidos – POMOS

POMOS:
LDPE/HDPE

POMOS:
LDPE/HDPE

POMOS:
LDPE/HDPE

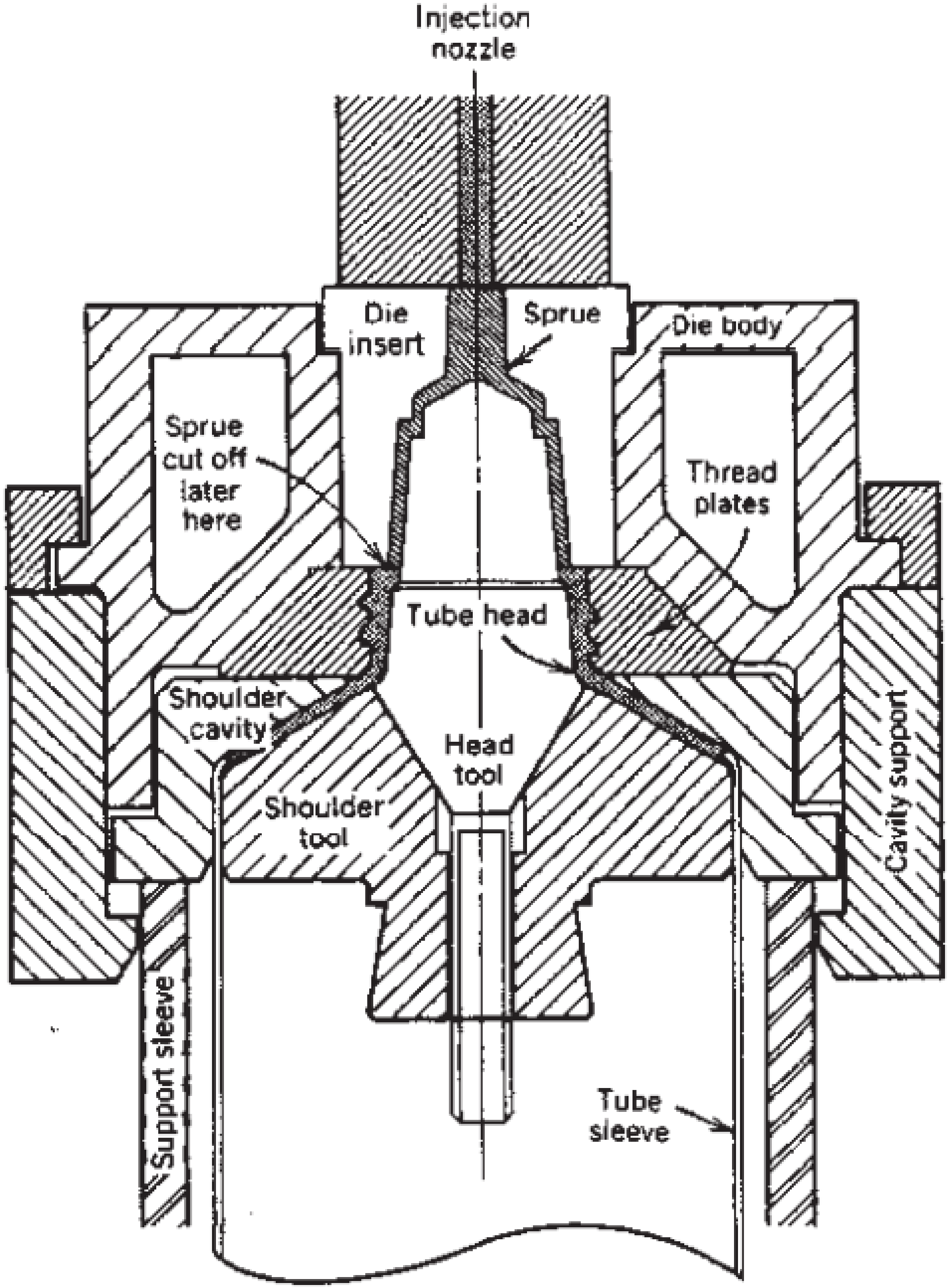
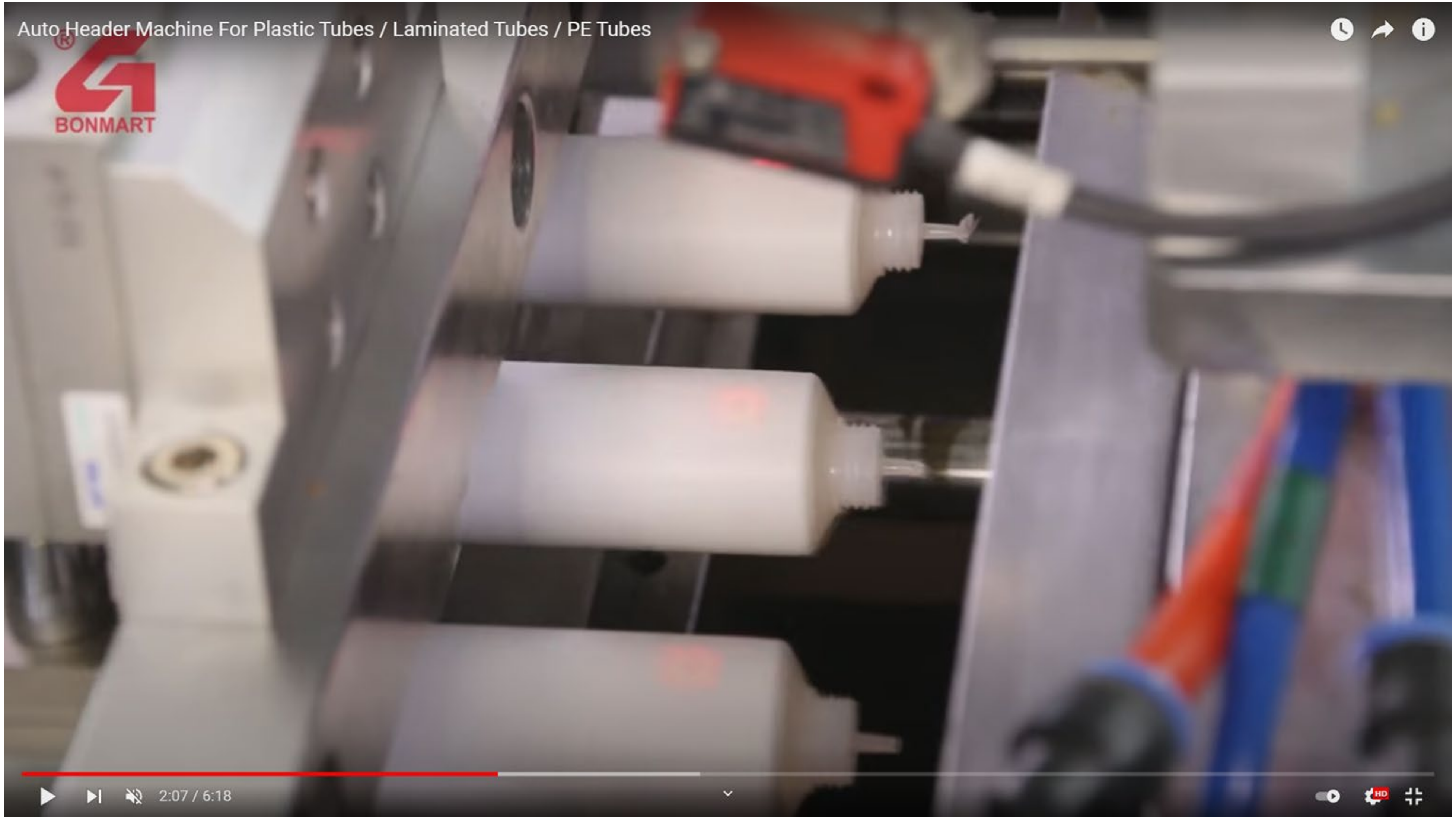


Figure 2. Strahm heading method.

POMOS: HDPE/LDPE



https://www.youtube.com/watch?v=cFApGkIOUZY

GRACIAS!!!!

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