TECHNICAL MANUAL

FOR

VISCOSE CLOSURES

TRADE NAMES: *VISKRINGS AND CELONS*

TABLE OF CONTENTS

1. GENERAL SPECIFICATION

1.1. VISCOSE SPECIFICATION

Viskrings are secondary seals applied over primary closures to improve security, prevent counterfeiting and provide decoration.

They are used in many industries, but mostly in food, drink, chemicals, pharmaceuticals and cosmetics.

1.2. APPLICATION METHOD

Viskrings are sold wet and are applied to the container in that condition. Drying is by natural or forced evaporation which shrinks the tubing to the shape of the container.

1.3. SIZE

Viskrings can be used to fit over bottles, etc., with diameters from 12 to 119mm.

(See pages 13-16 for help with sizing Viskrings/Celons).

1.4. COLOUR

Viskrings are available in many colours, but the majority are sold either transparent or white. They are also available with different colour panels or vertical stripes.

A special range of Viskrings exists with a transparent overlay which gives a high gloss finish to the product.

Gold and Silver finishes are also available.

In general terms, Viskrings can be made to match the colour requirement of the customer. To date, over 400 separate colours and finishes have been supplied.

1.5. PHYSICAL PROPERTIES

1.5.1. STRENGTH

The rings have to have sufficient strength so that they can withstand the force required during application. Experience has shown that a transverse tensile strength across the crease (the weakest part of the ring) should be greater than 40 kg/cm^2. The average value for Viskrings is 45-60 kg/cm^2.

1.5.2. GAUGE AND CROSS-SECTION

The gauge of Viskrings is 550 micron ± 50 micron (double thickness). Products for North America are 600 micron ± 50 micron.

1.5.3. SHRINKAGE ON DRYING

The closure over which the Viskring is fitted is rarely even, therefore, a certain shrinkage is necessary to allow the ring to fit uniformly. Viskrings have a total transverse shrinkage of between 35-43%, i.e. it can shrink to two-thirds of its original size. The longitudinal shrinkage is between 8-12%. NOTE: Maximum desirable shrinkage to avoid problems of splitting or wrinkling is 20% (see pages 13-16).

1.6. SHELF LIFE

In view of the long life requirements for storage of bottles, Viskrings have a minimum life in use of one year from application to the customer's product.

This has been simulated in the laboratory by a shelf-life test which takes mounted Viskrings through humidity cycles on a regular basis.

1.7. PRESERVATION

Cellulose is a natural product subject to bacterial and fungal degradation when wet and must be protected from attack.

Viskrings are normally sold in the wet state and are always applied in this condition. They must be treated with a preservative to offer protection both during processing and for storage prior to application. The preservatives chosen are harmless to humans at the concentration used and do not interfere with the manufacturing processes involved. The preservatives used are "P.C.M.C." and "Hibitane". In addition to the biocides a plasticiser is added to protect the cellulose during the drying process and to avoid splitting of the band. The material safety data sheet for the softening and preservative solution is available on request.

The preservative solution used is called “CH solution”. The composition is:

P.C.M.C.	0.08 – 0.13 %
Hibitane:	0.04 – 0.1 %
Polyethylene glycol 200:	6.0 – 8.0 %
Water	> 91.8 %

A concentrated preservative solution is available for distributors of viskrings only.

1.8. DRYING RATE

Viskrings are applied to containers in the wet state, normally by hand. For most applications, the Viskrings are allowed to dry naturally. Shrinking usually starts within 10-15 minutes of application and within one hour most Viskrings will shrink to their final dimensions on the container even though their moisture content is still higher than the surrounding atmosphere. For this reason it is advised not to pack the sealed container immediately after shrinkage.

The drying time depends upon the atmospheric conditions within the drying environment. A temperature of 20 – 30°C and a low relative humidity is ideal for quick drying times. Do not apply localised heat or air flow to a Visking as this will create an uneven shrinkage rate within the Viskring causing weak points, such as perforations, crescents etc, to split.

The use of dehumidifiers is advised when drying takes pace in a closed environment.

1.9. PRINTING

A system of printing has been developed which allows sophisticated designs to be achieved in two colours on both sides of the ring. The system involves the surface treatment of the tubing then printing with waterproof inks.

1.10. PERFORATIONS/CORNER CUTS

Customers often need perforations or other types of facility to assist in removal of the Viskring. A list of available perforations and other features is found on Pages 17 to 20 of this Technical Manual.

1.11. STABILITY TO LIGHT

Light can affect Viskrings in two ways:-

Oxidation of the softener system catalysed by the pigments can cause browning of the ring on prolonged exposure, however, there is no significant change in colour on exposure to daylight for six months.

The second effect is on printed rings, where the printing is oxidised and fades. This is a faster breakdown but printing will survive more than 30 days continuous exposure to sunlight.

1.12. PRESENTATION

Viskrings are generally sold as cut bands but special requirements can be addressed.

1. Cut Bands:

   Diameter : 12-119 mm
   Length : 10-135 mm

1.13 STORAGE & HANDLING

Cut Bands are guaranteed for 12 months provided the tins or pails remain unopened.

- DO NOT ALLOW THE BANDS TO FREEZE. This weakens them. Store wet viskrings between 0 and 35°C.

- UP-END THE TINS OR PAILS MONTHLY. This prevents the upper layers drying and prevents separation of the preservatives. Once opened the bands must be handled carefully to prevent contamination with bacteria or fungus if they are not to be used immediately.

- KEEP COVERED WITH PRESERVATIVE SOLUTION. This can be purchased from Viscose Closures.

- RE-SEAL THE PLASTIC BAG IF BANDS ARE TO BE UN-USED FOR ANY LENGTH OF TIME.

- DO NOT STORE IN WATER. This removes the plasticiser and the bands will split after application.

2. APPENDICES

2.1. APPENDIX I - TECHNICAL MANUAL FOR VISKRINGS/CELONS

2.1.1. FLAT WIDTH CONVERSION TABLE

Diameter(mm)		12.0	13.5	14	15	16	17	18	19	20
Flat Width(mm)		20.75	22.5	24.0	24.5	26.0	28.0	29.0	31.0	32.5

Diameter(mm)	21	22	23	24	25	26	27	28	29	30
Flat Width(mm)	34.0	35.5	37.0	38.5	40.5	42.0	43.5	45.0	47.0	48.0

Diameter(mm)	31	32	33	34	35	36	37	38	39	40
Flat Width(mm)	49.0	51.0	53.0	54.5	56.5	57.5	59.0	61.5	62.5	64.5

Diameter(mm)	41	42	43	44	45	46	47	48	49	50
Flat Width(mm)	65.5	67.5	68.5	71.0	72.0	74.0	75.0	76.5	78.0	79.5

Diameter(mm)	51	52	53	54	55	56	57	58	59	60
Flat Width(mm)	81.5	83.0	85.0	86.0	88.0	90.0	91.0	92.5	93.5	96.0

Diameter(mm)	61	62	63	64	65	66	67	68	69	70
Flat Width(mm)	97.0	98.5	100.0	101.5	103.0	104.0	106.5	107.5	109.5	111.0

Diameter(mm)	71	72	73	74	75	76	77	78	79	80
Flat Width(mm)	113.0	115.0	116.0	117.0	118.5	120.0	122.0	123.5	125.0	127.0

Diameter(mm)	81	82	83	84	85	86	87	88	89	90
Flat Width(mm)	128.0	130.0	131.5	133.0	134.5	136.0	137.5	139.0	141.0	143.0

Diameter(mm)	91	92	93	94	95	96	97	98	99	100
Flat Width(mm)	144.0	145.5	147.0	148.5	150.0	152.0	154.0	155.5	156.5	158.0

Diameter(mm)	101	102	103	104	105	106	107	108	109	110
Flat Width(mm)	159.5	161.0	163.0	165.5	168.0	169.5	171.0	172.5	174.0	176.0

Diameter(mm)	111	112	113	114	115	116	117	118	119	
Flat Width(mm)	177.0	179.0	180.5	182.0	183.5	185.0	187.0	188.0	190.0	

CUT LENGTH

Viskring	min	Max	Tolerance
	mm	mm	mm
Printed	15	132	± 1
Plain	10	132*	± 1

*Larger cutlength on request

Flat Width

Flat width	Tolerance
mm	mm
20.0- 88.0	± 1.0
89.0-119.0	± 1.5
120.0-168.0	± 2.0
169.0-195.0	± 3.0
196.0-233.0	± 4.0

2.1.2. PACKAGING - PAILS AND TINS

Packing is in Pails or Tins for pre-cut bands, and in Drums for tubing.

Pails

Bands are packed inside a polythene bag with solution which is contained within a plastic pail.

Pail Size (approx.) : 31cm dia. x 35cm high
Pail weight (approx.) : 19.5Kgs net - 22.5 Kgs gross

Tins

Bands also packed inside a polythene bag with solution which is contained within a size A10 tin. The tins are further packed into cardboard cartons: normally 6 tins per carton.

Carton Sizes:

6 Tin: 48cm x 32cm x 19cm. Approx. weight Net 18.0 Kgs; Gross 21.7 Kgs.

Cut Bands:

Preservative solution is added to immerse the rings completely and an airtight lid is fitted for despatch. The contents of the pails and tins are precise and consistent and are determined by the product size. The following formulae may be utilised to determine the individual contents:-

Pails:

$$\text{Bands per pail} = \frac{13,800,000}{\text{diameter of band x cut length}}$$

(Round up or down to the nearest 500 units)

Tins:

$$\text{Bands per tin} = \frac{2,000,000}{\text{diameter of band x cut length}}$$

(Round up or down to the nearest 50 units)

NB: Below 22mm diameter or 19mm cut length, the bands may be tip-packed and the quantities per tin variable.

2.1.3. SPECIAL EXTRUSIONS

Pigmented Special Colours:
Occasionally a customer will require bands in an identical colour match to a bottle label, or possibly a competitive closure, or may require sizes not included in the standard range. In these cases, samples should be supplied to the Sales Office with the enquiry.

Special colours and sizes are also subject to a ± 10% production tolerance.

Special Deluxe Colours:
The deluxe range of colours includes golds, silvers and several other pearl type finishes.

Special Deluxe *High Gleem* Colours
Deluxe colours may also be obtained with *High Gleem* finish. Please note that these colours are restricted to the diameter group 16-46mm.

There is a surcharge for *High Gleem*, Special Deluxe and Special Deluxe *High-Gleem* colours.

Stripe Overlay Extrusion
It is possible to produce bands with contrasting coloured vertical stripes. A *Hi-Gleem* overlay can also be applied to this type of tubing.

Size range : 17-46mm diameter.

"Window Extrusion" for Use Over Government Duty Stamps:
Window bands are produced in the same way as colour panel closures. In this case, transparent Viscose is used to produce the panels.

The use of *Window* bands was adopted by the wine and spirit trades for application on bottles with decorative paper strips or Government duty stamps.

It is also possible to extrude coloured bands with an additional transparent panel in the centre of the rear main panel. This is of use where, in addition to the Government Duty Stamp, a Local Duty Stamp or decorative strip has also to be applied.

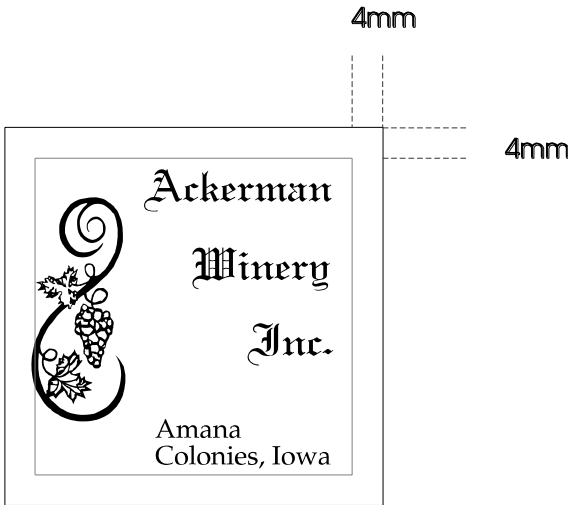
Size range: 16-46mm diameter.

2.1.4 PRINTING

Determination of Customer's Requirements:
Printed designs on *Viskrings/Celons* normally take the form of the company's name, brand name, house crest, trade mark, or any design which blends in with the bottle label.

Before proceeding with a new design, Viscose will supply a computer generated scale drawing showing the design as it would appear on the finished *Viskring/Celon*. Ideally, good quality artwork should be provided to Viscose to work from.
Tubing up to 144mm FW can be printed but the maximum size of design for printing is 95mm on one or two sides.

In certain instances, designs can be printed to the edge of the *Viskring/Celon.* However, it is advisable to allow a 4mm margin at the sides, top and bottom of the Vis*kring/Celon* as shown below. Our Technical Department will advise if the proposed designs required without a margin are acceptable.



Cut Lengths of Printed *Viskrings/Celons*:
Viskrings/Celons are printed on rotary presses and the cut length of individual *Viskrings/Celons* is, therefore, determined by the circumference of the printing drum. This can be modified to accommodate repeat lengths between 15.4-132mm.

Linear shrinking of *Viscose* tubing during and immediately following the printing process is not constant and the cut lengths of printed rings are subject to a tolerance of ± 5%.

Ink Colours:
With the inks and chemicals used for printing of wet regenerated cellulose tubing, it is almost impossible to match the colour with that on paper labels.

The printing inks are high insoluble dyestuffs unaffected by normal conditions. The exact shade produced is, however, affected by the background colour on which the ink is printed. For example, blue printed on a yellow background produces a green shade.

Ink Colours : BLACK and various shades of the following:-

RED	GREEN
ORANGE	PURPLE
BROWN	BLUE

Note: 1. A selection of pastel colours is also available and can be matched to customers' specific requests. Samples for customers approval would be supplied before production of order.

Note: 2. All shades of green are difficult to produce.

Multi-Colour Combination:
Viskrings/Celons can be printed in up to two colours on each side. However, the colours that can be printed together are restricted. The following lists indicate colours which can be printed combined with any other from the same group.

1.	2.
ORANGE	ORANGE
RED*	RED*
BLUE*	GREEN*
PURPLE	BROWN
BROWN	BLACK

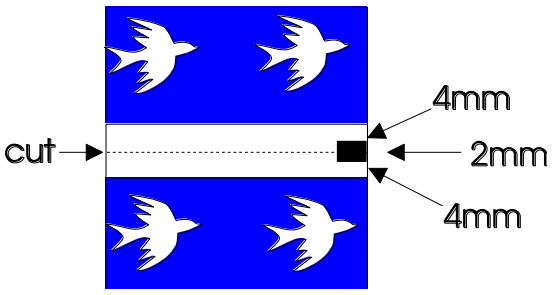
* In various shades

Note: 1. **It should be emphasised that due to the limitations of the printing process, it is impossible to print gold or white by direct printing.**

Reverse Printing:
To produce a light colour printing, i.e. White, Cream, Yellow, Blue, etc., on a dark *Viskring*/Celon, the method of *Reverse Printing* is used.

For example, a customer requires a red *Viskring*/Celon with yellow printing. To obtain this, red tubing is extruded with a yellow front panel. This is overprinted in red leaving the required design in yellow. Maximum diameter 46mm.

Marginal Reverse Printing



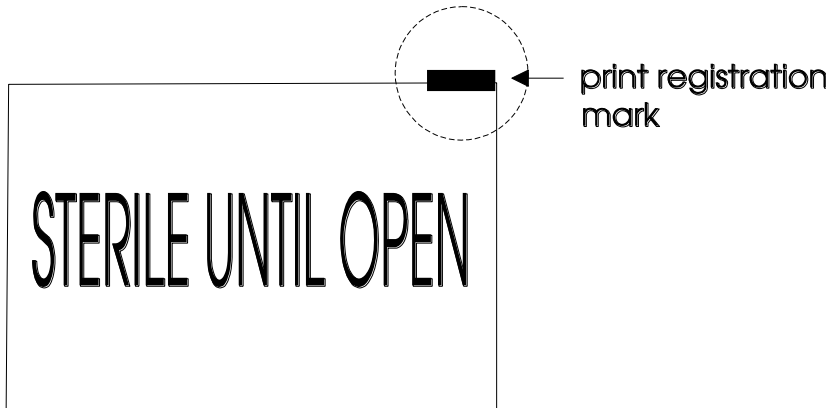
Marginal Reverse printing is designed to give the effect of light printing on a dark background. It may completely cover the band from left to right but must have at least 5mm top and bottom margin for trimming purposes.

The trimming registration mark can be placed on the right or left of the *Viskring*/Celon.

This print option is subject to print design and a minimum order quantity.

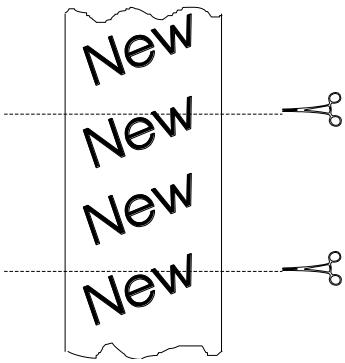
Overall Reverse Printing
Overall Reverse printing is also designed to give the effect of light printing on a dark background. It completely covers the band from left to right and has no top or bottom margin. In the case of a window band, the print normally extends into the transparent side panel for a distance of 2mm.

This print option is subject to print design and a minimum order quantity.
Registration Marks:
To ensure cutting mechanisms on the production machine used for trimming *Viskrings*/Celons to the actual required length remain constant, the inclusion of a cutting registration mark is necessary on most designs, due to their fineness or lack of contrast between printing and background colours. The registration mark can appear either at the top or bottom of the ring and, in the case of double sided work, on either the back or front.



2.1.5. PRINTING DESIGNS - MACHINE APPLICATIONS

Continuous Design



Continuous printing is where a brand name or company name is printed continuously on the tubing. This layout enables our cutting machine to cut at any place on the tubing without perforations and still leaves two or three full designs on each *Viskring*/Celon.

Scatter Design:
The design, normally one name, is reproduced many times on each side of the tubing. With this style of printing it is not necessary for registration in length or alignment by our cutting machine.

new new new new
new new new new
new new new new
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new new new new

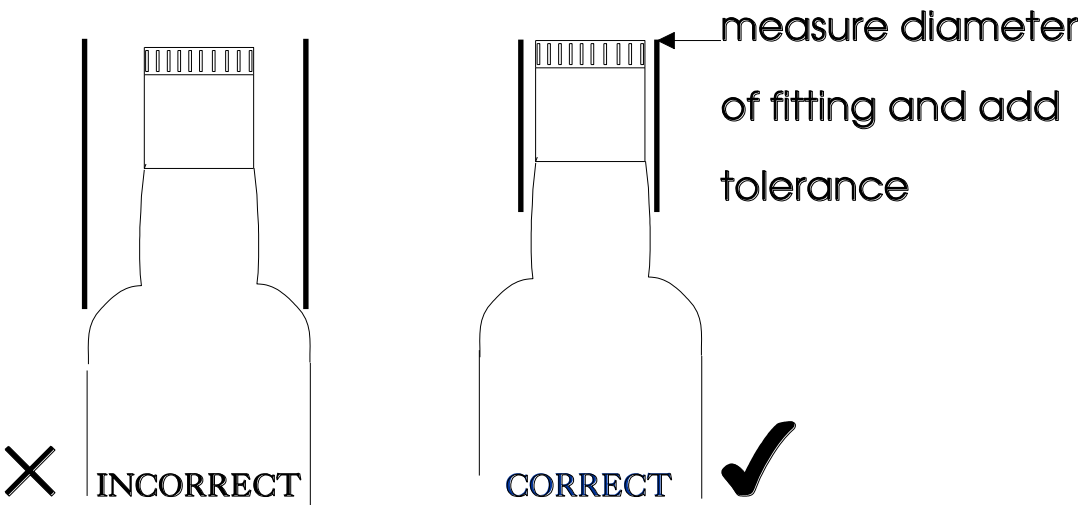
2.1.6. DETERMINATION OF SIZE AND LENGTH

STRAIGHT-SIDED CONTAINERS:

Measure the widest point over which the Viskring/Celon must pass, then add the appropriate tolerance.

Diameter:	Tolerance:
12mm	0.5mm
13 - 75mm	1.0mm
76 -119mm	2.0mm

The length is to suit customer requirements and may include a proportion for folding over the top of the closure. Add 10% to the measured length to allow for shrinkage.

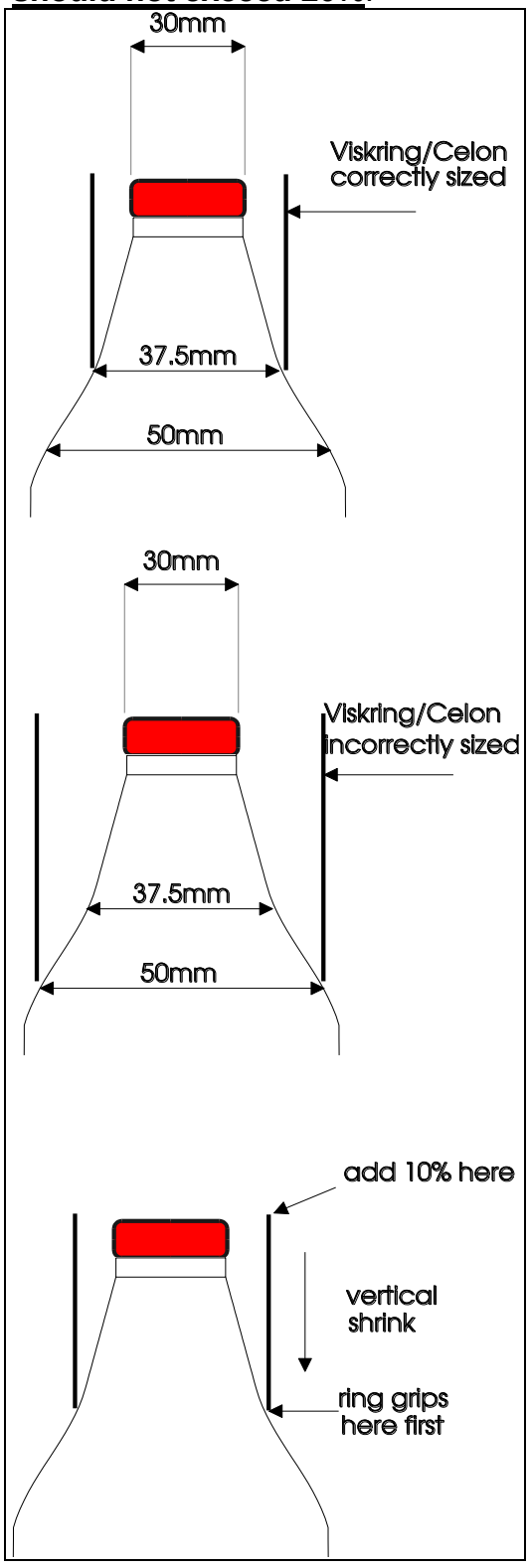


If too large a Viskring/Celon is used there is a risk the finish will not be smooth and in extreme cases it will split.

TAPER SIDED CONTAINERS:

In sizing Viskrings/Celons for containers with tapered sides it is important that the difference between the smallest diameter and the largest diameter to be covered by the Viskring/Celon

should not exceed 20%.



Method 1:

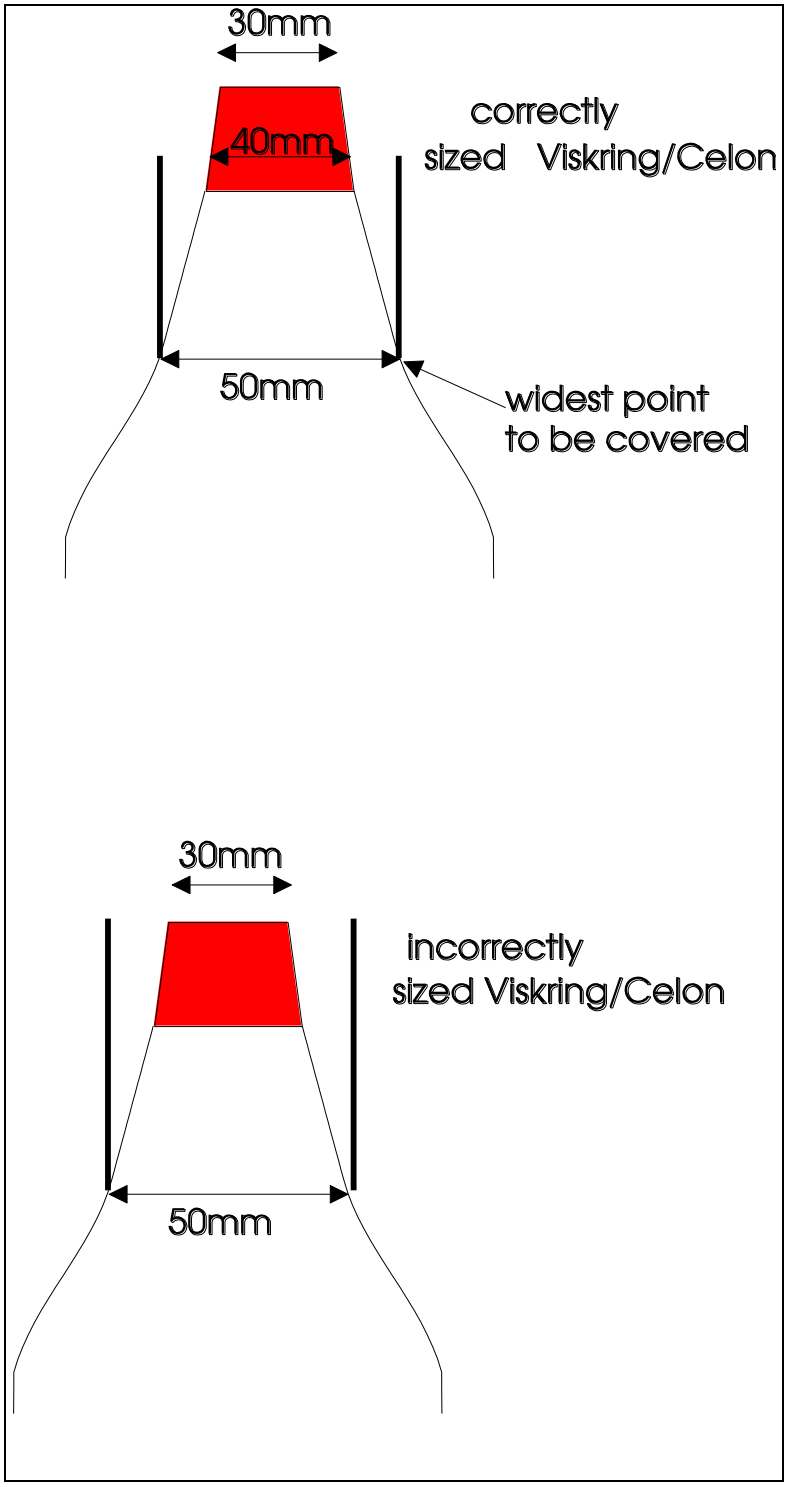
1. First measure the narrowest part which must be covered, e.g. 30mm.

2. Divide this figure by 0.8 and round up to the nearest 0.5mm = 37.5mm.

3. Find the position on the container where the diameter is 37.5mm and that marks the lowest point which may safely be covered by the Viskring/Celon.

- If too large a Viskring/Celon is used there is a risk that the finish will not be smooth and in extreme cases it will split.

- When the Viskring/Celon is applied it will grip the container first at the widest point. All the vertical shrinkage will then take place towards this anchorpoint. 10% should be added to the measured length to allow for this.

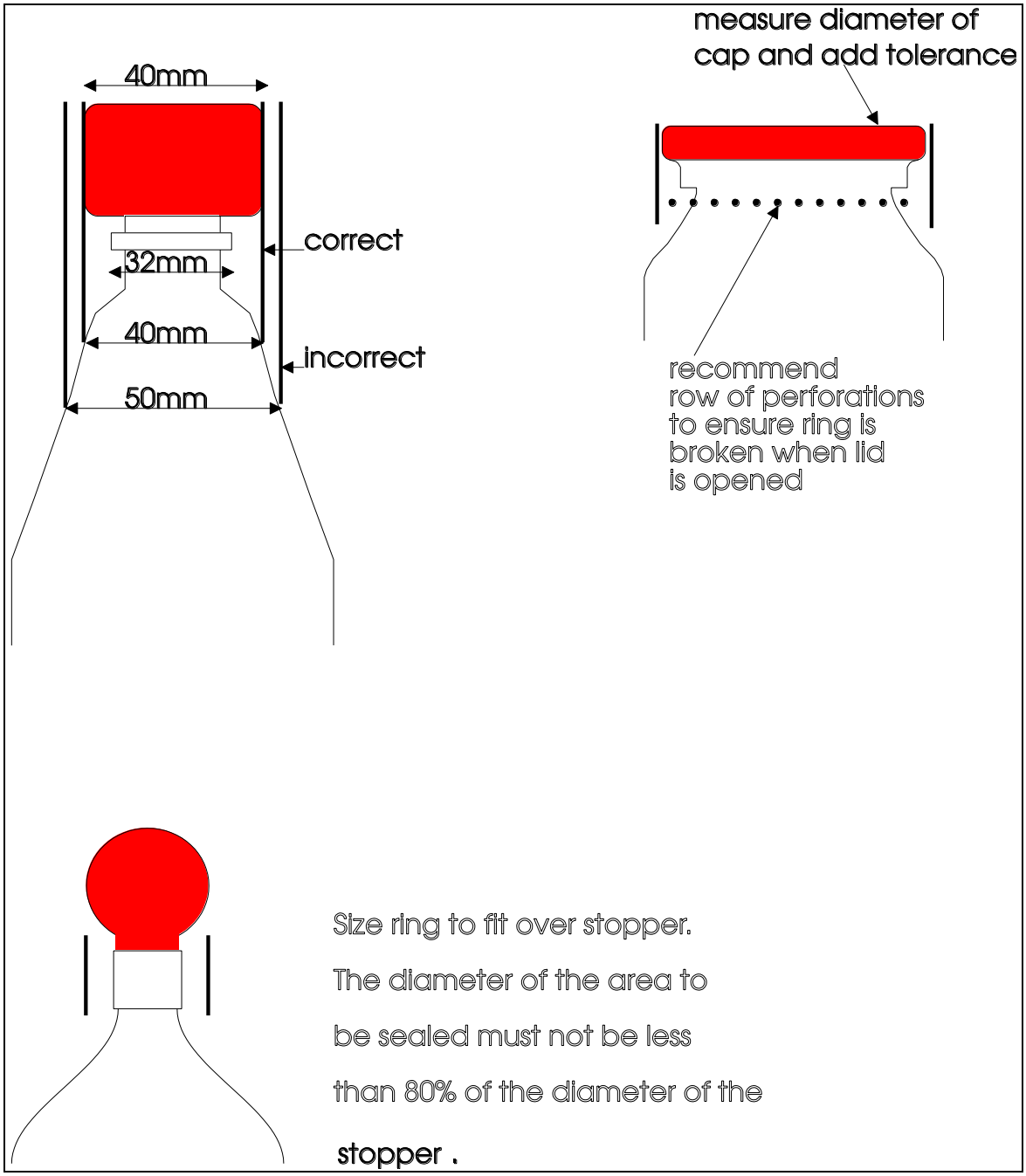


Method 2:

1. Measure the widest point over which the Viskring/Celon must fit, e.g. 50mm.

2. Multiply this measured figure by 0.8 to give the narrowest diameter which may be covered, i.e. 40mm.

COMPLEX PROFILES:



NB:

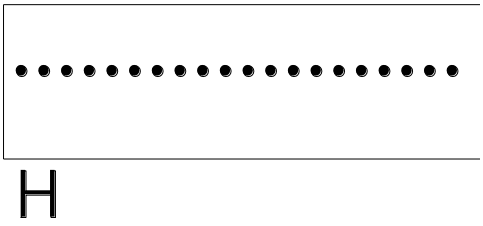
- For complex profiles it is best to send samples of containers to Viscose Closures for proper sizing.
- For printed Viskrings/Celons some distortion of print will occur where excessive shrinkage is involved.

2.1.7. PERFORATIONS

To facilitate the removal of Viskring Celons from containers, a range of perforations is available in different styles as set out in the following pages. Once determined, the style code should be entered on all orders. There is a production tolerance of approximately 2mm on the positions of each type of perforation.

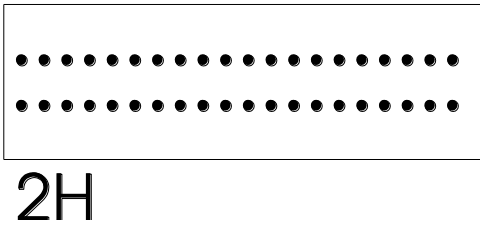
Code H

One simple row of holes
Maximum diameter : 43.5mm
Maximum length : 65.0mm



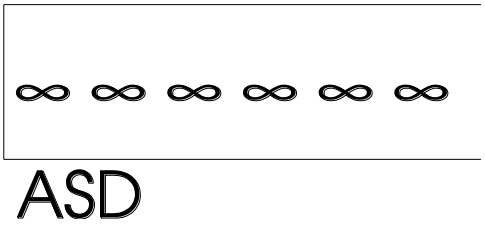
Code 2H

Two rows of holes
Maximum diameter : 45.0mm
Maximum length : 65.0mm



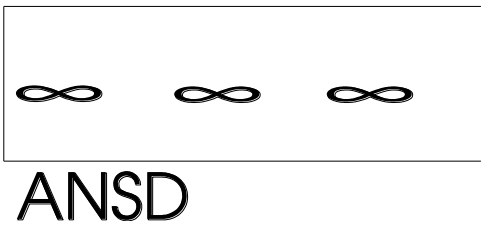
Code A.S.D.

This is the American standard
Maximum diameter : 54.5mm
Maximum length : 75.0mm

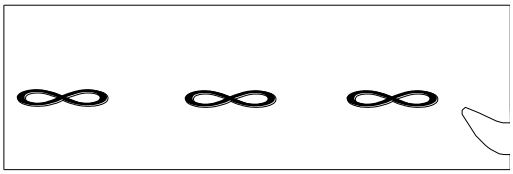


Code A.N.S.D.

This is similar to the A.S.D. style, except that the dumbbell perforations are longer. This style is recommended on screw cap bottles and is easily broken by a twisting action.
Maximum diameter : 46.0mm
Maximum length : 75.0mm



Code A.N.S.D.C.

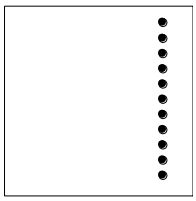


ANSD C

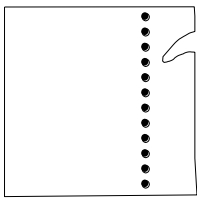
This is a development of Code A.N.S.D to which a crescent has been added to allow the portion of the ring remaining on the bottle to be easily removed.
Maximum diameter : 43.5mm
Maximum length : 65.0mm

Code V.H.

This is a vertical perforation designed to provide a tear strip on the side of the bottle neck. It is particularly recommended for use on very wide tubing which is difficult to perforate horizontally. This perforation is available on any size band.

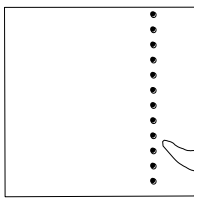


VH
STANDARD
VERTICAL
PERFORATION



VHC

VERTICAL PERFORATION Max. Diameter=54.0mm
WITH CRESCENT TO BE Max. Length =75.0mm
PULLED TOWARDS BASE



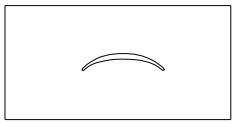
VHCT

VERTICAL PERFORATION Max. Diameter=54.0mm
WITH CRESCENT TO BE Max. Length =75.0mm
PULLED TOWARDS TOP

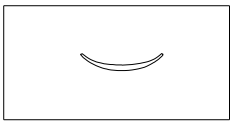
Codes CM and C.M.T

The following perforations provide a tear-tab which can be pulled towards the top or bottom of the band to facilitate its removal. The tail of the crescent should be placed not more than 9mm from the end to which it should tear, to avoid the tab breaking.

Maximum diameter: 43.0mm
Maximum length : 75.0mm



CM



CMT

Codes C.E and C.E.T

These perforations provide the same type of tear tab as types C.M. and C.M.T. The tail of the crescent should be placed not more than 9mm from the end to which it should tear, to avoid the tab breaking.

Maximum diameter: 54.0mm
Maximum length : 75.0mm

CE

CET

Code L/CET

A large crescent perforation is available as follows:

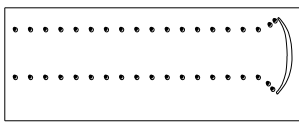
Maximum diameter: 68.0mm (If the crescent is in the middle of the band)
Maximum diameter: 56.5mm (If the crescent is on the side of the band)
Maximum length : 75.0mm

Please note that requests for the large crescent should be stipulated by using the Prefix "L", i.e. Perforation code L/CET.

Code T.S.

As with 2 H.T.T. but providing an easy start feature.

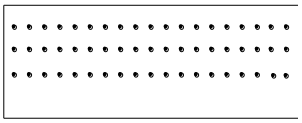
Maximum diameter: 40.0mm
Maximum length : 65.0mm



TS

Code 3 R.H.O.
An additional non-standard type of perforation.

Maximum diameter: 40.0mm
Maximum length : 65.0mm



3 RHO

Code C.C.1 and C.C.2.
This type of band has been especially designed for use on 4.5 and 2.5 litre glass jars with one or two handles placed high on the neck. The corner cut band fits around the handles, allowing a greater length of closure and so creating an effective seal. The width of the corner cut remains constant at 10mm but the depth may vary between 6mm and 13mm.

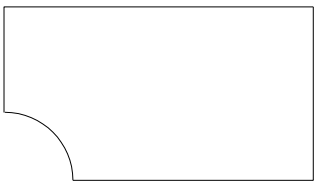
When ordering cut bands, a special code is used as follows:-

(a) The number of cuts should be specified
e.g. C.C.1 - one corner cut
C.C.2 two corner cuts

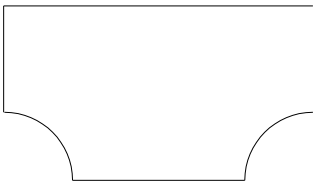
(b) This should be followed by the depth in millimetres.
A.6 - A13

Examples:
To order a corner-cut band with a single cut, 8mm in depth, the code reference would be:- C.C.1/A.8.

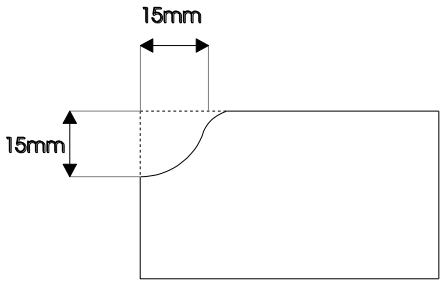
Maximum diameter: 47.0mm
Maximum length : 42.0mm



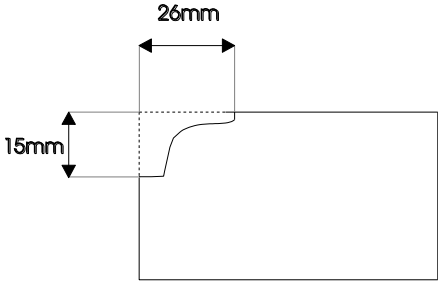
CC1



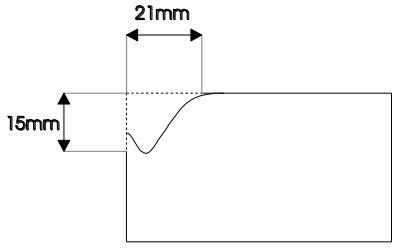
CC2



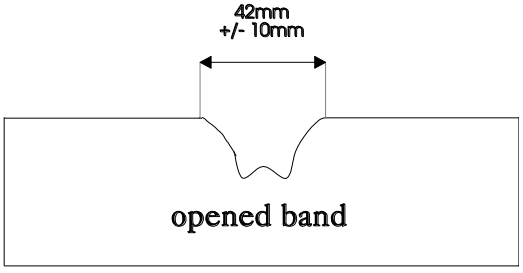
CC4



CC5



CC6



CC6

2.1.8. PLASTICISER SOLUTION CHART

Standard Solution
Cut Rings/Printed Viskrings/Plain, Printed Tubing

6.0 - 8.0 % PEG 200
0.08 – 0.13 % P.C.M.C.
0.04 – 0.1 % Hibitane
Water

Designation: CH soluation

Higher Softener Concentration
In cases where lower temperatures or low humidities are involved, use PEG levels of 10% and 12% accordingly designated.

Special Solutions
This solution is for customers who re-pack and re-juice viskrings.

42 - 48.0% P.E.G. 200
0.56 – 0.91 % P.C.M.C.
0.28 – 0.7 % Hibitane
Water

Designation: CONC solution

Rust Inhibitor
For Viskrings applied to steel caps, Anti Rust Solution containing 3.4% mono and 1.7% disodium phosphate is firstly prepared and supplied for addition at point of use Customers are advised to dilute phosphate 10-fold prior to use.

Shower proof and Waterproof Solution

Shower proof and waterproof solutions are available to prevent viskrings from becoming loose due to absorption of water from rainfall or complete submersion in water.

Chemical Names for Additives in Solutions

Trade Names	Chemical Names
PEG 200	Polyethylene Glycol-200 refers to molecular size.
P.C.M.C.	Nipacide PC BP 4-chloro-3-methyl phenol
Hibitane	Hibitane Diacetane chlorohexidine acetate
MSP - Anti Rust DSP	Mono Sodium Phosphate Di Sodium Phosphate

2.2. APPENDIX II - HEALTH AND SAFETY DATA

2.2.1. HEALTH & SAFETY AT WORK ACT 1974

Material:: ***Viskrings***

1. Chemical Nature
Regenerated cellulose, (similar to cellophane) produced by the Viscose process, contained in a softening and preserving solution. Pigments are included to obtain coloured rings and rings may be printed with AZO dyes.

2. Application
Decorative secondary security seals for bottles and containers. Applied wet and shrink to a tight fit on drying. Dry rings are an effective barrier against ingress of micro-organisms into the container contents.

3. Areas of Application
Not limited by safety aspects - widely used for 50 years in food, drink and pharmaceutical industries.

4. Toxicity

Viskrings (regenerated cellulose):	non toxic
Toy grade pigments:	non toxic
Softening and preservative solution:	low toxicity

5. Softening and Preservative Solutions
Solution may cause sensitisation by skin contact. Normal hygiene should be observed i.e. hands should be washed thoroughly after handling Viskrings and a barrier cream can be applied prior to use. A MSDS of the solution is available on request.

The solution can be disposed off via a domestic sewer.

Note: Do not mix this solution with other chemicals.

6. Storage
Store wet viskrings between 0 and 35°C.
Keep viskrings covered with softening and preservative solution (do not store in water). When possible up end container on a monthly basis.

Subject to correct storage, the product is guaranteed for 12 months from manufacture.