

BERICAP Technology

for beer



DOUBLESEAL O₂S

DOUBLESEAL SuperShorty[®] O₂S

cap with gas barrier
and **o₂**xygen **s**cavenger
for **PET bottles**

B **BERICAP**

BERICAP Technology

for beer and O₂ sensitive drinks in PET bottles

Oxygen sensitive products can be protected by oxygen scavengers. This is well known and several technologies are available. BERICAP produces closures for carbonated and still beverages with a built-in oxygen scavenging capacity.

The impact of an oxygen scavenging closure on the oxygen sensitive product is shown in **Chart 1**. Immediately after filling there is oxygen from various sources inside a bottle – in the beverage, in the walls of the bottle, in the headspace. Modern filling technology can keep this initial level relatively low. After filling, until consumption, oxygen ingress occurs through the bottle and through the cap. Ingress through the cap is possible by a poor mechanical seal or by permeation. The oxygen scavenger integrated in the closure will predominantly absorb the oxygen which is or gets into the headspace after filling. The closure contributes to preservation of the oxygen sensitive product, but the closure cannot absorb all oxygen getting access to the beverage from other sources. BERICAP oxygen scavenging closures – O₂S – have proven in the field to preserve O₂ sensitive products in combination with barrier- and/or oxygen scavenging bottles.

The BERICAP DoubleSeal SuperShorty® O₂S and DoubleSeal O₂S are based on BERICAP's DoubleSeal closure concept for carbonated soft drinks which stands for a safe mechanical seal and high carbonation retention in cold and hot environment. The oxygen scavenging compound which complies with EU and USA regulations is moulded inside the bore seal and covers the maximum possible surface.



Effects of O₂ scavenger properties of BERICAP closure on oxygen levels in a PET barrier bottle:

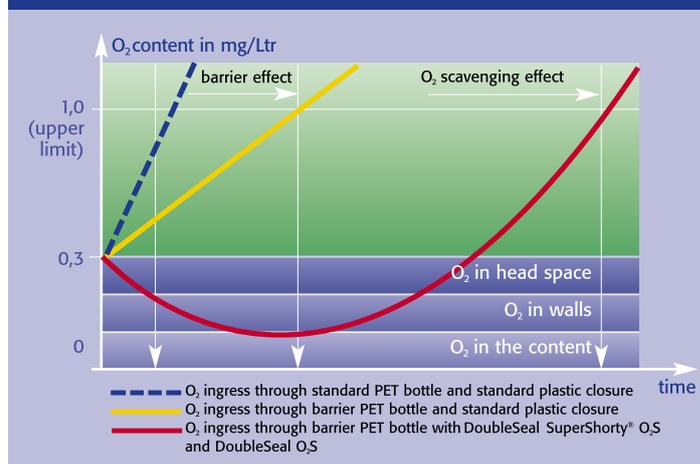


Chart 1

The layer of oxygen scavenging compound is designed to expose a maximum surface to the O₂ sensitive drink to enhance the scavenging speed. The inner side of the top plate and the inner surface of the boreseal are totally covered by the oxygen scavenger. The DoubleSeal of the closure remains totally free from any compound. To avoid any infiltration of sterilizing liquid used for aseptic filling the oxygen scavenging compound overlaps the lower end of the boreseal.

BERICAP DoubleSeal SuperShorty® O₂S and DoubleSeal O₂S can be applied on standard cappers. BERICAP provides technical service to evaluate, modify and set the cappers.



DOUBLESEAL O₂S

o₂xygen scavenging on PCO 28



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Incremental oxygen content measured with carbonated water filled in a multi-layer barrier bottle with oxygen scavenging feature

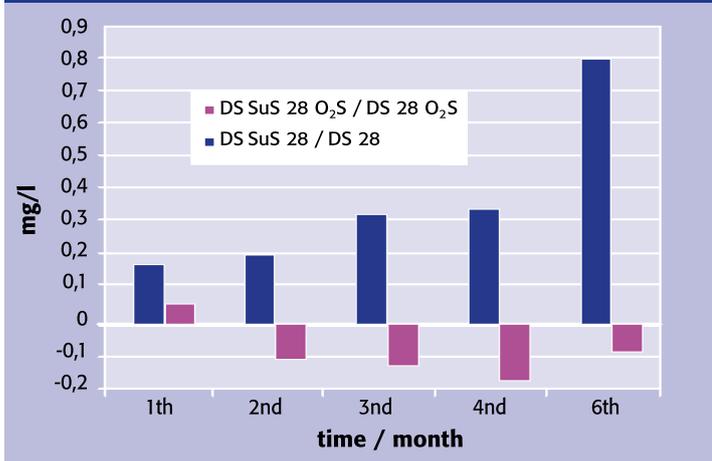


Chart 2: shows the evolution of incremental total oxygen content measured in mg/ltr. in a bottle over a period of 6 months. The combination of a multi-layer barrier bottle with an oxygen scavenging feature and a BERICAP DoubleSeal SuperShorty® O₂S or DoubleSeal O₂S shows after 6 months a slightly lower total oxygen content than immediately after filling.

Speed of oxygen absorption immediately after filling

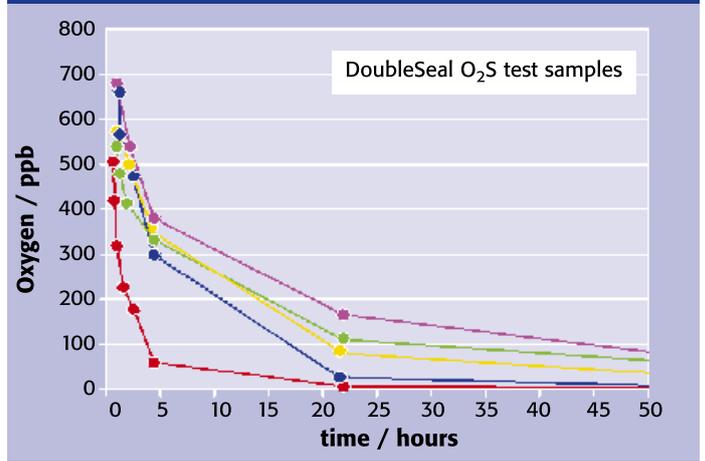


Chart 4: TNO Holland have developed a test procedure to check the speed of the oxygen scavenger performance in a closure. The initial oxygen in the headspace unavoidable immediately after filling is nearly fully absorbed in about 24 hours after filling.

Incremental oxygen content measured with carbonated water, filled in an inside coated barrier bottle without oxygen scavenging feature

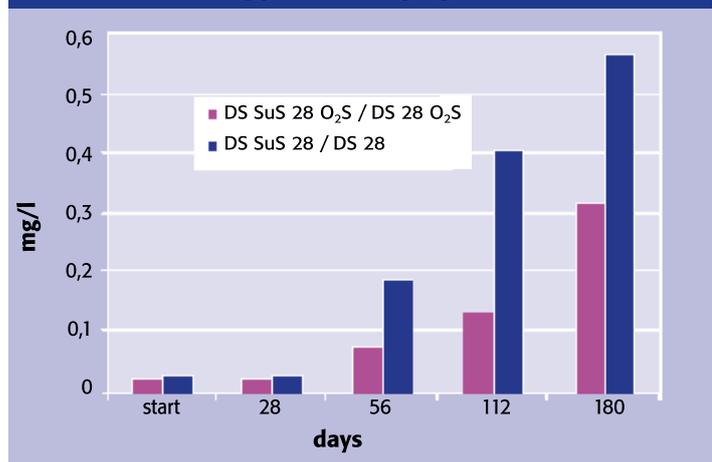


Chart 3: shows that the combination of a bottle with inside barrier and the BERICAP DoubleSeal SuperShorty® O₂S or DoubleSeal O₂S allows for a small incremental increase of total oxygen content in the bottle over a period of 6 months. This ingress of oxygen added to the initial total oxygen content immediately after filling is too small to have a negative impact on the content. Such negative impact is expected only at a level of > 1 mg/ltr. total oxygen content.

The results in chart 2 and 3 compare:

- DoubleSeal SuperShorty® (DS SuS 28) and DoubleSeal (DS 28) standard closures with oxygen scavenger
- DoubleSeal SuperShorty® O₂S (DS SuS 28 O₂S) and DoubleSeal O₂S (DS 28 O₂S) without oxygen scavenger

Speed of oxygen absorption after artificially refilling oxygen to the headspace

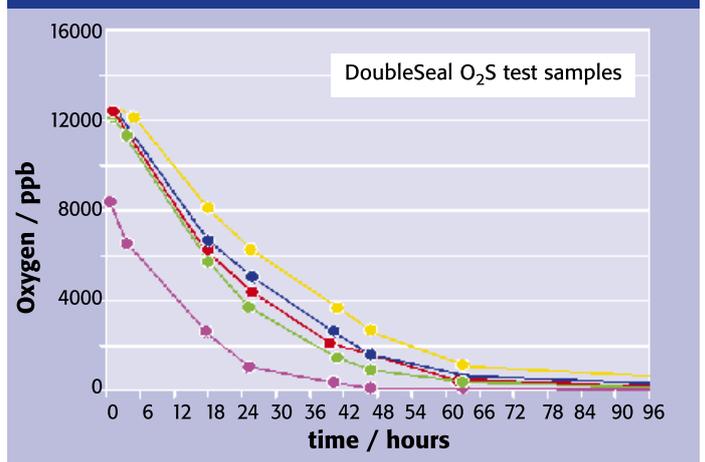


Chart 5: This test simulates the oxygen ingress during the shelf life of the filled bottle. The samples having passed the test as described in chart 4 are artificially overloaded with oxygen. The chart shows that the oxygen scavenging capacity of the closure is powerful enough to absorb this artificially increased level of oxygen in about 63 hours.



Key advantages

- no liner but a safe inner and outside seal: the well proven „DoubleSeal“-concept as known from the soft drink industry
- scavenger performs independent of sealing function
- strong oxygen scavenging performance
- moulded in organoleptic resin – no off taste
- excellent CO₂ retention at ambient and elevated temperature
- slit TE band for enhanced tamper-evidence
- consistent and convenient removal torques
- accommodates slightly damaged bottlenecks
- pasteurisation at 65°C possible
- resistant to temperature peaks during transport
- up to three colour top printing
- embossment on top possible
- EU and FDA conform

Printing

We can customise DoubleSeal SuperShorty® O₂S and DoubleSeal O₂S by printing up to three colours. We can also assist with artwork origination to ensure maximum impact whilst recognising the constraints of printing on plastic closures.



Embossing

Embossment requires large production lots to justify the cost of mould inserts and downtime to change the inserts.



Colours

BERICAP has already tested and approved about 50 different pigments to give our customers an „off the shelf“ range of colours to choose from.



Capping

The BERICAP DoubleSeal SuperShorty® O₂S or DoubleSeal O₂S can be handled on virtually any appropriately designed and correctly set capper.



BERICAP also prides itself on its technical assistance and has developed a state-of-the-art BNX capping head. The calibrated scale allows an easy adjustment to guarantee a consistent application torque, independent from the head speed and a consumer friendly opening torque. The new liquid tight and corrosion resistant capping head allows a torque adjustment without special tooling - just by hand.