



POLYOX™

Constantly Improving
for Our Customers

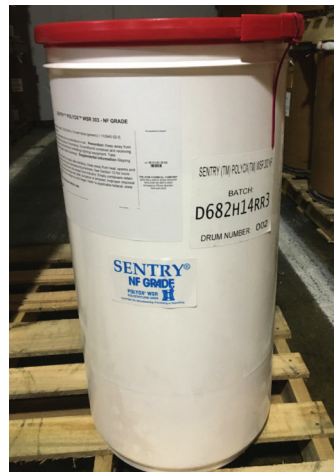
Throughout the years, the majority of POLYOX™ requests from pharmaceutical customers have been centered on longer retest intervals, smaller packaging offerings, and improvement of Off-Color Particles (OCP). Significant focus has been put on addressing these concerns – and our efforts are coming to realization with exciting new offerings to the market..

SMALLER PACKAGE OFFERING

This year, we have tackled a popular customer request: package size. We are pleased to inform you of an additional packaging option we are offering for four of our SENTRY™ POLYOX™ Water Soluble Resins NF grades. Beginning in April 2017, 25kg of the following grades will now be offered in high density polyethylene (HDPE) drums:

Product Name	Product Number
SENTRY™ POLYOX™ WSR Coagulant NF	99083593
SENTRY™ POLYOX™ WSR Coagulant LEO NF	99082394
SENTRY™ POLYOX™ WSR 303 NF	99083584
SENTRY™ POLYOX™ WSR 303 LEO NF	99082396

A polyethylene drum liner is used for these 25kg drums, similar to our current 140lb drum packaging of these grades. The new drum is pictured below:



A stability study was conducted on material in the 25kg drum, which concluded the new package has no impact on product stability.



Controlled Release Alliance



IMPLEMENTED IN 2016 – LONGER RETEST INTERVAL

Last year marked the launch of an extended retest interval for several of our SENTRY™ POLYOX™ Water Soluble Resins NF grades. Understanding the challenges of the short retest intervals previously seen in this product, the retest interval for all mid molecular weight POLYOX™ grades was expanded from 6-months to 12-months. The POLYOX™ product families are shown to the right, which include both LEO and non-LEO, FP, and SFP grades:

This change represents a significant response to our most frequently received customer request: longer retest intervals. A multi-year internal study was initiated which resulted in a better understanding of product stability and our ability to extend retest intervals through the use of tighter manufacturing controls. The results of this study supported an expansion of the retest intervals for the grades where indicated.

Product Family	Current Retest Interval	New Retest Interval
N10	24-months	24-months (no change)
N80	24-months	24-months (no change)
N750	6-months	12-months
205	6-months	12-months
1105	6-months	12-months
N12K	6-months	12-months
N60K	6-months	12-months
301	6-months	12-months
Coagulant	6-months	6-months (no change)
303	6-months	6-months (no change)

ALWAYS ONGOING – QUALITY IMPROVEMENTS

There are unseen improvements happening with POLYOX™ that we want to share with you. Off-Color Particles (OCP), also referred to as Technically Unavoidable Particles (TUP), are an industry-wide concern, and steps have been taken to reduce these occurrences with POLYOX™. To reduce foreign particles, drum liners were added to our packaging several years ago. The plant also evaluated reactor design and additional screening steps to reduce the number of OCPs. Dow invested in significant upgrades to the package room equipment:

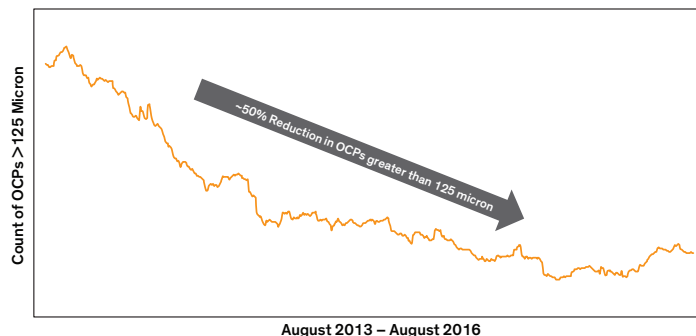
The combination of these efforts has led to the significant downward trend our product has seen in OCP particles in the past few years. The data below is taken from internal product evaluations of all POLYOX™ NF materials produced in this timeframe. We continue to seek the best way to measure OCPs, and we have found instrumentation to remove human eye error in currently accepted methods. Although we still maintain this method as confidential during this time, we felt it was essential to show the progress of our efforts – and we hope to continue showing improvement in this space in the years to come.



LISTENING TO YOUR NEEDS

We value our pharmaceutical customers and strive to provide the best polyethylene oxide product and offering to the industry. We are proud of the improvements we have made through concerted efforts in the past 5 years, but we also know our work is not done. We continue to evaluate ways to support our customer needs and make our offerings better to you. We encourage your engagement and feedback on how we can continue to improve – as you can tell from our efforts, we're listening...

POLYOX™ Off-Color Particle (OCP) Measurements



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