



Kemgard MZM

New Product Advisory

**SIGNIFICANT IMPROVEMENT IN
SMOKE SUPPRESSION AND DYNAMIC STABILITY
FOR RIGID PVC SYSTEMS**

KEMGARD MZM

PROVIDES SUPERIOR SMOKE SUPPRESSION

Sherwin-Williams is now supplying a new and far more effective product for rigid PVC applications. Focused development work has resulted in a new product that demonstrates greater smoke suppression than Kemgard 911C and AOM. This new product is trade named Kemgard MZM. This new product also addresses the stability problem in rigid PVC systems and has produced superior stability performance.

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Rigid PVC smoke suppression has often been a somewhat difficult task. This is due to several factors. These include the limited ability of rigid PVC to accept filler loading, tin stabilization of rigid PVC, the impact modifiers used in rigid PVC systems, cost, and a variety of different smoke standards which must be met by these rigid PVC systems.

Sherwin-Williams supplies smoke suppressants and flame retardant synergists based on their proprietary technology. This technology produces a highly effective product supported or coated on a low cost filler. Sherwin-Williams has offered the Kemgard group of products for many years. Kemgard 911C has been one of the major smoke suppressants used in PVC since its introduction. Kemgard products compete with AOM, ammonium octamolybdate, and the Kemgard products show superior effectiveness. Now, Sherwin-Williams has raised the performance bar with the introduction of Kemgard MZM, their new Kemgard technology. To demonstrate the effectiveness of Kemgard MZM, an impact modified rigid PVC formulation was selected. NBS Smoke Chamber results are shown in the table below.

Table 1. NBS Smoke Chamber Results

Component	1	2	3	4	5
Oxyvinyl 240	100	100	100	100	100
Mark 1900 Tin Stabilizer	3	3	3	3	3
Halstab 1214 Acid Scavenger	1	1	1	1	1
Calcium Stearate	1	1	1	1	1
Paraloid K120N	1	1	1	1	1
Paraloid K175	1	1	1	1	1
Antimony Oxide	1	1	1	1	1
Paraffin Wax	1	1	1	1	1
Zerogen 50SP	18	13	8	8	8
Kemgard MZM		5	10		
Kemgard 911C				10	
AOM					10
NBS Smoke Flaming Mode					
ASTM E662 D90	45	40	34	40	45
ASTM E662 D4	250	215	191	207	215
ASTM E662 Dmax	412	374	363	423	410

The formulations shown in the table were compounded in a 75 ml Brabender Plasticorder with type 6 roller blades. Smoke production was assessed using plaques pressed from the compound formulations. Flame retardancy was assessed using the Limited Oxygen Index test. All formulations shown in the table provided a LOI of 52 or higher. The Kemgard MZM formulations #2 and #3 were 53 and 55 respectively on LOI.

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To further illustrate the superior smoke suppressant performance provided by Kemgard MZM, the smoke data generated in the table above is displayed graphically in Figures 1 and 2. Figure 1 shows the superior smoke suppressant performance of both formulations 2 and 3 when compared with the other formulations tested in the NBS Smoke chamber at 90 seconds. Both of these formulations contain Kemgard MZM in combination with magnesium hydroxide. Formulation 2 contains just 5 parts Kemgard MZM and 13 parts magnesium hydroxide while Formulation 3 contains 10 parts Kemgard MZM and 8 parts magnesium hydroxide. Figure 2 shows the same five formulations of Table 1 evaluated for NBS smoke performance at 4 minutes.

Compared to the other formulations, Formulation 3 with 10 parts Kemgard MZM provided the best smoke suppression performance in the ASTM E662 (NBS Smoke) test for all three measurement points, 90 seconds, 4 minutes, and maximum smoke density. Formulation 2 provided the second best maximum smoke density.

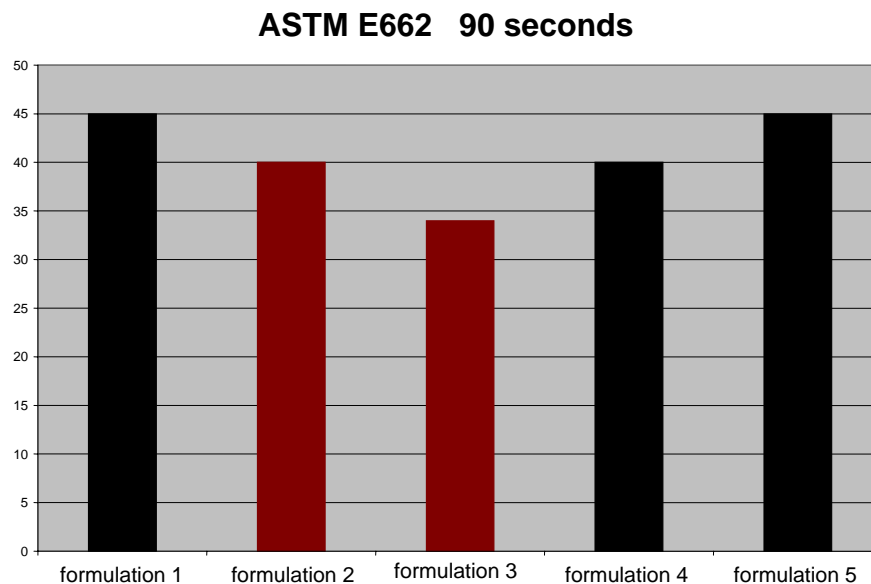


Figure 1. Kemgard MZM Superior Smoke Suppression

ASTM E662 4 minutes

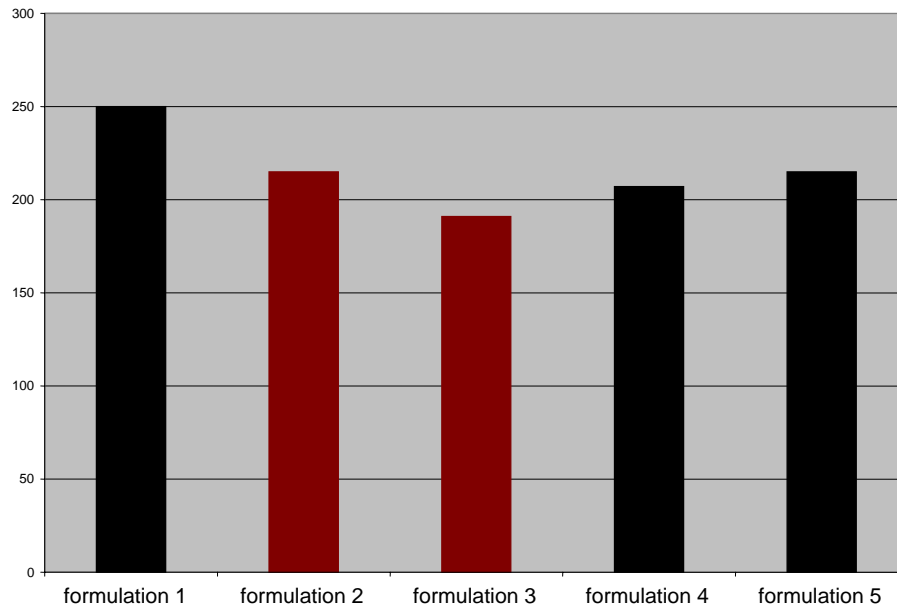


Figure 2. Kemgard MZM Superior Smoke Suppression

What does the D value in the ASTM E662 test actually mean?

Let's look at how the D value is derived. The D value is a calculation which reflects the relationship of the smoke in the test chamber to light transmission. The formula for D is shown below.

$$D_s = G [\text{Log}_{10} (100-T) + F] \quad \text{where } G = V/AL$$

G is a calculated value based on smoke chamber volume (V), length of light path through the smoke (L), and exposed area of specimen (A). (Units should be consistent in feet or meters.) T is the percent of light transmittance. F is a light density filter factor which depends on whether it is movable and whether it is in the light path when transmittance is measured.

To get a feel for the actual D values, note that a D_{90} of 34 equates to 55% light transmittance through the smoke. A D_{90} of 45 equates to 46% light transmittance. A D_{max} of 363 equates to only 0.18% light transmittance. It helps to remember that these D_s calculations are log scale values and small changes are significant.

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KEMGARD MZM PROVIDES SUPERIOR DYNAMIC STABILITY

Stability in processing rigid PVC is a serious consideration. Kemgard MZM is far superior to both Kemgard 911C and AOM. In fact, it is over 30% better on dynamic stability in comparison to AOM. To demonstrate this improved stability, three formulations were evaluated. Formulations and test results are shown in Table 2.

Table 2. Dynamic Stability Test Results

Component	Kemgard 911C	AOM	Kemgard MZM
Oxyvinyl 240	100	100	100
ATH 9402	8	8	8
Mark 1900 Tin Stabilizer	4	4	4
Halstab 1214 Acid Scavenger	1	1	1
Calcium Stearate	1	1	1
Paraloid K120N	1	1	1
Paraloid K175	1	1	1
Kemgard 911C	10		
AOM		10	
Kemgard MZM			10
Dynamic Stability (minutes)	5:26	7:02	9:30

Stability was determined at 205°C and 100 rpm using a Brabender PlastiCorder Digi-System equipped with Type 6 Roller Blades (3:2 Speed Ratio).

These results are displayed graphically in the Figure 3. Note the dramatic improvement in dynamic stability time for Kemgard MZM versus both Kemgard 911C and AOM.

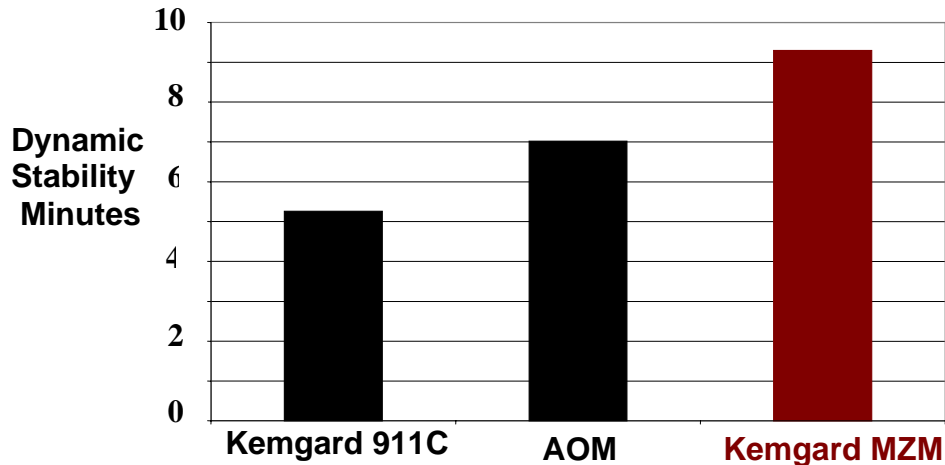


Figure 3. Improved Dynamic Stability

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KEMGARD MZM IS A SUPERIOR SMOKE SUPPRESSANT !

Kemgard MZM is a significant new product for smoke suppression in rigid PVC. This new product provides superior smoke suppression as well as superior dynamic stability.

For further information on this exciting new product from Sherwin-Williams, please contact us at any time to obtain samples or to answer any questions on this product.



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