EXILVA THE NATURAL PERFORMANCE ENHANCER

TECHNICAL GUIDE

# IMPROVED RHEOLOGICAL PROFILE AND STABILITY FOR WATERBORNE POLYCHLOROPRENE DISPERSION ADHESIVES

Polychloroprene has a long history in the world of adhesives. It has been the primary choice when fast, high-strength and permanent bonds are needed in wide variety of applications, from shoe soles to foam bonding. Historically polychloroprene adhesives have been solvent borne but recently there has been a shift towards waterborne polychloroprene adhesives due to environmental and occupational safety reasons. One of the challenges in waterborne polychloroprene dispersion adhesives has been the compatibility with other commonly used ingredients in the adhesive formulation, often leading to challenges in storage stability.

## THE EFFECT OF EXILVA ON RHEOLOGY OF POLYCHLOROPRENE DISPERSIONS

The potential as well as compatibility of Exilva as a rheology modifier for waterborne polychloroprene dispersion adhesives was evaluated with two different polychloroprene dispersion, one with high pH (Dispercoll® C 84) and the other with medium high pH (Dispercoll® XP 2694).

As polychloroprene dispersion are known to be shear sensitive, Exilva was first dispersed in colloidal silica dispersion (Dispercoll® S) under medium shear (tip speed > 6 m/s) and the formed paste was further mixed with polychloroprene under low shear (Table 1).

TABLE 1: Formulations

| Pre-mixutre | w-% | w-% | w-% | w-% |
|---|---|---|---|---|
| Exilva P 01-V | 6.43 | | | |
| Dispercoll® S 4510 | 20.41 | | | |
| **Final mixture** | **A** | **B** | **C** | **D** |
| Premixture | 0 | 15 | 25 | 35 |
| Dispercoll® C | 100 | 85 | 75 | 65 |

The viscosity of the mixtures was measured with a rheometer by using constant shear. The shear thinning behavior of the formulations was measured by rheometer using a bob and cup measuring geometry.

TABLE 2: Viscosity of the samples at constant shear rate of 10 (1/s)

| Dosage of Exilva/ Dispercoll® S paste (~9 % solids) (%) | Dispercoll® C84 (mPa.s) | Dispercoll® C XP 2694 (mPa.s) |
|---|---|---|
| 0 | 80 | 10 |
| 15* | 3 600 | 2 400 |
| 25* | 7 030 | 9 390 |
| 35* | 14 400 | 37 800 |

* Amount of active Exilva: 0.3 w% (15%), 0.5 w% (25%) and 0.7 w% (35%)

The strong thickening effect of Exilva can be seen in the table 2. As can be seen, Exilva works efficiently even with the high pH (pH 13) system.

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The strong stabilizing and anti-sagging and anti-dripping power of Exilva can be seen from the shear curves (Figure 1 & 2). At low shear area the viscosity is thousand times higher even with the lowest dosage of Exilva (formulation B), when compared to polychloroprene without additive. At high shear are, the viscosity is only a fracture, allowing the spraying of the formulation.

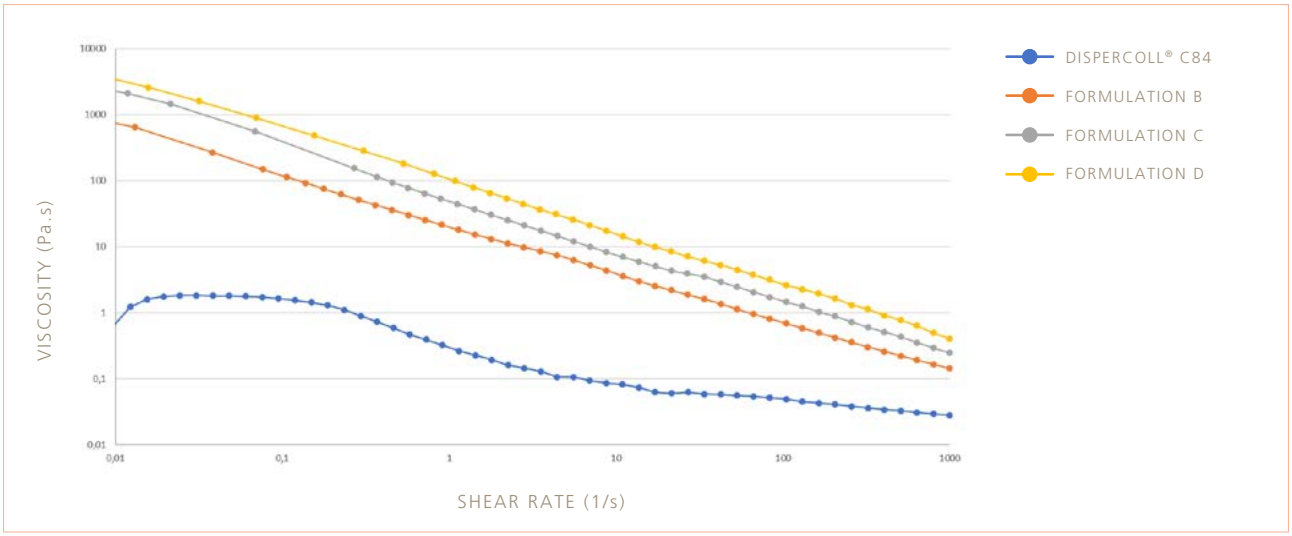


FIGURE 1: Shear curves of Dispercoll® C84 with varying amounts of Exilva

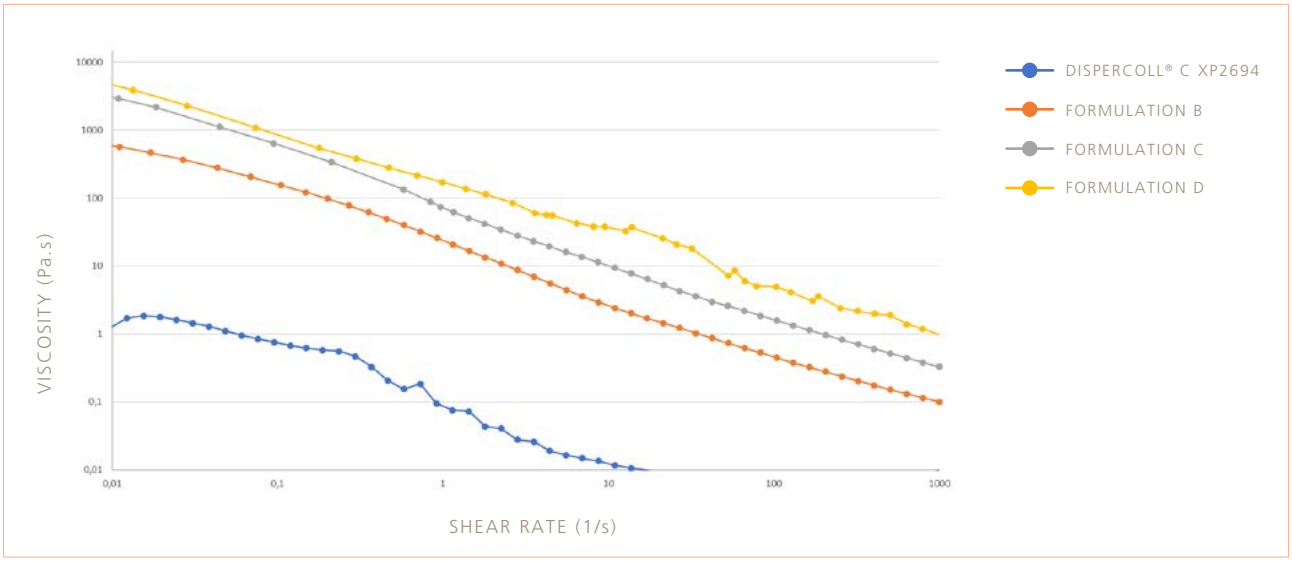


FIGURE 2: Shear curves of Dispercoll® C XP 2694 with varying amounts of Exilva

## SUMMARY

Exilva shows excellent compatibility with waterborne polychloroprene dispersion systems. The high shear thinning of Exilva enables spraying of the product, whereas the high viscosity at rest, stabilizes the formulation during storage and transport. The viscosity can be easily adjusted by the amount and grade of Exilva. Exilva allows the application of polychloroprene adhesives by roll, brush or spray. In addition, the inertness of Exilva to pH and temperature variations as well as the compatibility with other additives, leads to better heat and viscosity stability over time.

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