

Joncryl® HPD User's Guide

Stronger inks for a
more colorful world



 **BASF**

The Chemical Company

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Joncryl HPD series of high performance dispersion resins and resin solutions offer excellent color development, ink stability, processing efficiencies, and improved cost-in-use. At BASF, we create chemistry.



The quest for improved tonal reproduction has placed an increased demand on the color strength of inks. The changing landscape of printing technology is pushing the limits of high quality imaging, leading to higher line screens and lower volume anilox rolls. The use of inks formulated with Joncryl HPD (High Performance Dispersion) resins and resin solutions provide strong, high performance, viscosity-stable inks that meet the needs of high quality imaging.

Using Joncryl HPD resins and resin solutions in the manufacture of color concentrates provides the ideal combination of increased color strength with excellent flow properties, while maintaining good shock and storage stability. These key features, balanced with excellent pigment wetting and milling characteristics, provide a potential lower cost-in-use.

Inks formulated with Joncryl HPD resins and resin solutions can provide the following benefits:

- Enables lower viscosity, higher pigment load dispersions
- Improves both dispersion and ink viscosity stability
- Improves shock stability to enable use of the dispersions in automated dispensers
- Improves milling efficiency
- Enables the ink manufacturer to more effectively produce high strength, viscosity-stable inks



Lower viscosity and higher pigment loading dispersions

Joncryl HPD resins and resin solutions combine the benefits of high pigment loading and low viscosity, making it possible to produce dispersions with 40% pigment loading and viscosities below 2000 centipoise. This combination allows ink formulators to produce inks with increased color strength without reducing formulating flexibility.

Stable dispersion and ink viscosity

Inks and dispersions with unstable viscosity can lead to waste. Prints may have to be re-worked or scrapped, wasting valuable raw materials and adding to disposal costs, as well as adding additional time to re-print. Print waste due to viscosity instability is estimated between 1% and 3%.

With Joncryl HPD resins and resin solutions, inks have better stability and are more consistent. Press operators will not need to add water as frequently – which can make inks weaker – and have more consistent color on press throughout the run. Inks made with Joncryl HPD resins and resin solutions also have improved storage stability.

Improved shock stability

By using Joncryl HPD resins and resin solutions, ink manufacturers may not need to buffer their dispersions with additional resin to use them in automated dispensing systems. This may eliminate a step in the manufacturing process.

Joncryl HPD resins and resin solutions may reduce pigment loss in ink manufacturing. Depending on the color, a significant amount of pigment is “filtered out” due to shocking the pigment dispersion in ink making processes. Joncryl HPD resins and resin solutions significantly reduces the tendency of the dispersions to shock.

Improved milling efficiency

Joncryl HPD resins and resin solutions can lower the cost of manufacturing concentrated pigment dispersions in several ways.

Increased pigment levels - Increase the level of dry pigment processed in the mill by 10% or more versus conventional resins by using Joncryl HPD resins and resin solutions. The increased level of dry pigment in a Joncryl HPD-based

dispersion can lower the cost per dry pound processed. Based on a full-scale industrial dispersion trial using standard pigments, Joncryl HPD resins and resin solutions demonstrated an average of a 25% increase in milling efficiency due to the higher pigment loading.

Reduced milling time - Milling and processing time represents a significant cost to the dispersion manufacturer. Laboratory evaluations using Joncryl HPD 296 resin solution in carbon black dispersions show that the residence time in the mill can be lowered by up to 50% while maintaining the same color strength and pigment particle size as conventional dispersion resins. A significant decrease in mill time was also observed with organic color dispersions.

Higher pigment to binder ratios - In addition, Joncryl HPD resins and resin solutions allow higher pigment to binder ratios. Dispersions with higher pigment loading and lower resin levels are possible with Joncryl HPD resins and resin solutions without the use of surfactants that may have a negative effect on the performance of finished inks. Dispersions made at 5:1 and 6:1 pigment to binder ratios with Joncryl HPD 296 exhibit shock stability comparable to standard 4:1 pigment to binder ratio dispersions.

Joncryl HPD resins and resin solutions can increase production throughput and lower the cost of producing pigment dispersions.

High strength inks

Inks made with Joncryl HPD-based pigment dispersions can be up to 300% stronger than inks made with conventional dispersion resins. Pigment levels of 20% and higher are often required to make high chroma inks suitable for high quality flexographic printing. The higher pigment levels and low viscosity made possible by using Joncryl HPD resins and resin solutions allow the ink maker more formulation latitude by reducing the level of pigment dispersion needed to make high strength inks that deliver the combination of strong, bright colors, good printing characteristics and end-use performance properties.

Joncryl HPD resins and resin solutions can reduce ink manufacturing complexity, and help reduce cost-in-use throughout the value chain.

Product Selection

Joncryl HPD 71 is a 27% solids solution of Joncryl HPD 671 designed for high quality pigment dispersions with very good viscosity stability.

Joncryl HPD 96 is a 34% solids solution of a high molecular weight acrylic resin for improved color development and gloss of pigment dispersions without compromising ink stability.

Joncryl HPD 96 MEA is a 39% solids solution of a high molecular weight resin in water and mono-ethanol amine, for improved color development and gloss of pigment dispersions without compromising ink stability.

Joncryl HPD 196 is a 36% solids solution of a mid-range molecular weight acrylic resin in water and ammonia for dispersing organic pigments without compromising stability.

Joncryl HPD 196 MEA is a 40% non-volatile solution of a mid-range molecular weight acrylic resin in water and mono-ethanol amine for dispersing organic pigments at high concentrations without compromising ink stability.

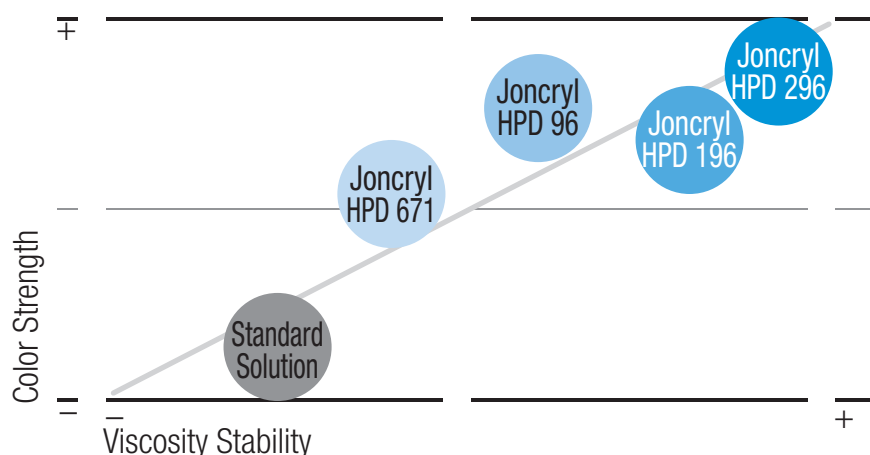
Joncryl HPD 296 is a 36% solids, high performance resin solution for improved viscosity and shock stability of highly pigmented dispersions.

Joncryl HPD 671 is a cost-effective, high molecular weight acrylic resin for high quality pigment dispersions with very good viscosity stability.

Joncryl HPD 696 is a high molecular weight acrylic resin for improved color development and gloss of pigment dispersions without compromising ink stability.

| Product | Product Type | Appearance | Non Volatile (%) | Viscosity @ 25°C (cps) | pH | Typical VOC (% wt) | Molecular Weight (Mw) | Acid Number (NV) | Tg (°C) |
|---------------------|--------------|--------------|------------------|------------------------|-----|--------------------|-----------------------|------------------|---------|
| Joncryl HPD 71 | Solution | Clear | 27.5 | 4,000 | 8.5 | 0.2 | 17,250 | 214 | 128 |
| Joncryl HPD 96 | Solution | Clear | 34.0 | 5,000 | 8.5 | 0.6 | 16,000 | 220 | 88 |
| Joncryl HPD 96 MEA | Solution | Yellow-amber | 39.0 | 5,000 | 8.6 | 8.6 | 16,000 | 220 | 86 |
| Joncryl HPD 196 | Solution | Clear | 36.0 | 3,800 | 8.6 | 0.4 | 9,200 | 200 | 85 |
| Joncryl HPD 196 MEA | Solution | Yellow-amber | 41.5 | 3,500 | 8.5 | 7.82 | 9,200 | 200 | 85 |
| Joncryl HPD 296 | Solution | Yellow | 36.3 | 600 | 8.1 | 0.4 | 11,500 | 141 | 15 |
| Joncryl HPD 671 | Solid | Clear | 99.4 | — | — | 0.4 | 17,250 | 214 | 128 |
| Joncryl HPD 696 | Solid | Clear | 98.9 | — | — | 1.1 | 16,000 | 220 | 88 |

Figure 1: Color development and stability of pigment dispersion resins.



Starting Point Formulations

The formulations below illustrate the versatility of Joncryl HPD resins and resin solutions. Contact a BASF representative for additional formulation assistance.

Flexo Tag and Label Ink

Ink formulations can benefit from the high pigment loading and low dispersion viscosity capability of Joncryl HPD 296. High strength ink formulations containing over 20% of organic pigment can be made by utilizing this dispersion resin in combination with Joncryl 2664 letdown vehicle.

| High Solids Organic Color Dispersion | Amount (%) |
|---------------------------------------|------------|
| Pigment | 45.0 |
| Joncryl HPD 296 Resin Solution | 31.0 |
| Antifoam | 0.5 |
| Water | 23.5 |
| Total | 100.0 |

| Flexo Tag and Label Ink | Amount (%) |
|---|------------|
| Joncryl HPD 296 Pigment Dispersion | 50.0 |
| Joncryl 2664 | 49.8 |
| Antifoam | 0.2 |
| Total | 100.0 |
| Pigment Solids | 22.5 |

Flexo Film Ink

Ink formulations utilizing high performance dispersions based on Joncryl HPD 196 resin solution enhance the color intensity of inks for flexible film packaging. Press ready inks with pigment loadings of 20% and very good water resistance and adhesion properties can typically be achieved with the combination of Joncryl HPD 196 resin solution and Joncryl FLX 5000-A emulsion.

| Cost-effective, High Solids Organic Color Dispersion | Amount (%) |
|--|------------|
| Pigment | 44.0 |
| Joncryl HPD 196 Resin Solution | 30.6 |
| Antifoam | 0.5 |
| Water | 24.9 |
| Total | 100.0 |

| Flexo Film Ink | Amount (%) |
|---|------------|
| Joncryl HPD 196 Pigment Dispersion | 50.0 |
| Joncryl FLX 5000-A | 40.0 |
| Joncryl Wax 26 | 5.0 |
| Wetting Agent | 0.5 |
| Antifoam | 0.3 |
| Water | 4.2 |
| Total | 100.0 |
| Pigment Solids | 20.0 |

Gravure Folding Carton Ink

High strength, viscosity-stable gravure folding carton ink formulations as well as flexo formulations for paper and paperboard applications can be made utilizing Joncryl HPD-based pigment dispersions. Joncryl HPD 671-based dispersions containing pigment loadings of 35% or more allow wider formulation flexibility for the ink manufacturer.

| Joncryl HPD 671 Neutralized Solution | Amount (%) |
|--------------------------------------|------------|
| Joncryl HPD 671 Resin | 27.5 |
| Ammonium Hydroxide, 28% Solution | 6.5 |
| Water | 66.0 |
| Total | 100.0 |

| General Purpose Organic Color Dispersion | Amount (%) |
|---|------------|
| Pigment | 38.0 |
| Joncryl HPD 671 Neutralized Solution | 35.0 |
| Antifoam | 0.5 |
| Water | 26.5 |
| Total | 100.0 |

| Gravure Folding Carton Ink | Amount (%) |
|---|------------|
| Joncryl HPD 671 Pigment Dispersion | 40.0 |
| Joncryl 1612 | 30.0 |
| Joncryl 2350 | 23.0 |
| Joncryl Wax 26 | 5.0 |
| Wetting Agent | 1.0 |
| Antifoam | 0.3 |
| Water | 0.7 |
| Total | 100.0 |
| Pigment Solids | 15.2 |

About BASF

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