

# Indigo Guide to Sapphire Treatment

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P.O. Box 150, Rehovot 76101, Israel, Tel: +972-8-938 1818, Fax: +972-8-938 1339

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**IMPORTANT SAFETY INFORMATION**  
**READ BEFORE PREPARATION OF SAPPHIRE TREATMENT**

**1. *Sapphire Treatment Solution***

**CONTACT WITH SOLUTION MAY IMPAIR VISION  
VAPOR AND SOLUTION CAN IRRITATE EYES AND SKIN**

- Contact with eyes may result in irritation.
- Wear safety goggles when mixing or transferring solution.
- Do not wear contact lenses while handling solution.
- If eye contact occurs, flush with tepid water for at least 15 minutes until irritation subsides.
- Prolonged or repeated skin contact may result in irritation.
- Wear protective butyl rubber gloves when handling or dispensing solution.
- If skin contact occurs, flush area thoroughly with soap and water.
- If eye or skin irritation develops or persists, seek medical attention.
- Avoid breathing vapors.
- Inhalation of Sapphire Treatment Solution may result in gastric disturbances .
- Ingestion of Sapphire Treatment Solution may result in respiratory irritation .
- If ingested, do not induce vomiting, contact a physician.
- Handle solution in hood or well ventilated area.
- Do not leave bottles open or uncapped.
- When cutting paper, keep hands clear of cutter blades. Use caution when changing cutter blades.

**2. *Ethylene Imine (CAS# 151-56-4)***

**In accordance with California Proposition 65 regulations section 25249.5 et seq: Sapphire Solution contains Ethylene Imine, a chemical known to the State of California to cause cancer.**

The solution used in the preparation of Sapphire Treatment contains trace levels of ethylene imine.

- Ethylene imine may be irritating to eyes, throat, and skin.
- Splashing of solution containing ethylene imine in eyes may damage the cornea of the eye and can impair vision.
- Breathing ethylene imine vapors can cause dizziness or other symptoms.

**Read the Material Safety Data Sheets (MSDSs) for more information regarding the proper safety procedures for working with Sapphire solution.**

**This alert indicates specific safety hazards and ways to avoid accidents.  
Ignoring safety information may lead to injury or property damage**

## A. Sapphire Solution Preparation

### 1. *Sapphire Treatment Essence*

A polymer based adhesion promoter suspended in water. This solution is used to treat paper substrates in order to improve the paper printing properties. The recommended coat weight is 7-15 mg/m<sup>2</sup> (solids).

Not all papers will respond with equal quality at coating level of less than 15 mg/m<sup>2</sup>.

Shelf life of Sapphire treated papers is 5 month in a vapor barrier wrapping paper. Sapphire can cause paper to yellow. The yellowing is emphasized with excess amount of Sapphire coating.

### 2. *Sapphire Solution Preparation*

**see safety warning on page 3**

#### 2.1 *Materials & Equipment*

- Polymin P (manufactured by BASF) 50% in water (w/w)
- De-ionized water
- Balance for Polymin P dilution
- Moisture balance for % solids determination
- Mixer container
- Packing material

#### 2.2 *Procedure*

Load in a mixer container 4.00 Kg (8.80 lb.) of Polymin P 50% solution in water. Add 96.0 Kg (211.2 lb.) of de-ionized water and mix for 30 minutes till an homogenous solution is obtained. (keep the same Sapphire/water ratio for any larger or smaller batch size)

Measure % solids using the moisture balance. It should be 2+/- 0.1% n.v.s. pH is ca. 11.

Shelf life of Sapphire solution is 12 month at tightly sealed containers at temperature range: -10°C to +30°C (14-86°F).

### 3. *Sapphire application*

This section describes processes that we have experience with and is not intended to represent all potential application methods or equipment configurations.

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**Note: It is recommended that all substrates to be treated with Sapphire and printed on the E-Print or Omnius Presses will be neutral or alkaline, not acidic. (Use an Abbey chlorophenol red marking pen to determine surface acidity).**

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#### *Warning:*

***In all cases Sapphire must not come into contact with exposed Aluminum plates during Sapphire treatment. This will degrade the Sapphire coating and the Aluminum.***

3.1 *Sheet fed Press*

Treatment of parent sheets or cut sheets is possible. A press with a CONTINUOUS dampening system is required, not a doctor-type. See pages at end of document for full explanation.

3.2 *Web-fed Press*

Sapphire is easily applied with any of the following: gravure, flexo, tinter. Cylinders: Offset Gravure 300 QCH, Flexo 360 anilox with rubber roll NO PLATE.

**4. Testing**

**see safety warning on page 3**

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**Note: Test Often, Keep Good Data and Samples**

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4.1 Sapphire Treatment Testing

4.1.1 Sapphire Indicator Solution (Bromo Cresol Purple, a pH indicator in ethanol).

Using a graduated eyedropper (pipette), dispense 10 drops of the Sapphire Indicator on the treated sheet. Now stream the Sapphire Indicator across the length and width of the sheet, including edges. Wait 30 seconds, blot excess indicator with a absorbent towel (synthetic wipers is recommended. Some towels grade might affected the test results). Read the density of the spot with the densitometer set to read Cyan. The density should be 0.35 - 0.45 at the most. Streams should be consistent in color.

## B. Sapphire Treatment Procedure - Sheetfed Press

### 1. **Press Specifications**

- 2 color Perfector
- Dahlgran or continuous dampening system
- Hard back (rubber or chrome) dampening rollers (No sleeve rollers)
- Ability to run with inking rollers deintegrated.

### 2. **Materials**

- 30 liters (4 - 8 gallons) Sapphire Solution
- Sapphire Indicator Solution
- Sheets SRA1 640X900mm.
- Delivery Bottles
- Calibration stripes
- Densitometer Calibrated to Manufacturer's Specification
- New 3 Ply Compressible Blankets
- Plates fully exposed
- 8 liters (2 Gallons) Vinegar
- Graduated Eyedroppers

### 3. **Procedure**

**see safety warning on page 3**

- Check paper size to ensure cutting with a back trim.
- Turn Off spray powder.
- Set up press with new 3 ply blankets and fully exposed plates. 3 ply blankets will reduce Sapphire build up and clean up time.
- **Undercut** packing paper to (width - 12 mm) X (length - 25mm).
- Set impression cylinder setting to paper thickness.
- Water settings are initially the same as offset printing.
- All surfaces that come into contact with the treated paper must be clean.
- Inking rollers should be lubricated and DEINTEGRATED.
- Block Dampening system pan drain COMPLETELY.
- Gently Shake Sapphire
- Fill Dampening System trays with Sapphire.
- Fill dispensing bottles with Sapphire solution. Mount.
- Stick calibration strip on the dispensing bottle at the level of the Sapphire solution.
- Use Sapphire indicator solution on an untreated sheet and zero densitometer for Cyan measurement. Retain sheets for future reference.
- Begin the run.
- **Caution:** If more Sapphire is fed than the paper is capable of removing a build up of Sapphire will occur along the tail edge and sides of the blanket and drop onto the sheets causing them to stick together. ALWAYS check the tail edge of the blanket for this build up. If it occurs reduce Sapphire (water) feed.

- Use the Sapphire indicator solution to check the first sheets off for uniformity and coverage. The Sapphire indicator density should be between 0.35 and 0.45.
- Adjust water setting if needed.
- Observe the rate of Sapphire Usage. The minimum acceptable level is:
  - \* 200 ml. per side, per 1000 sheets SRA1 640X900mm.
  - \* 14 ounces per side, per 2000 sheets 25”X38”

#### **4. Frequency of testing**

**see safety warning on page 3**

- Sapphire indicator solution test for coverage and density, at the beginning, middle and end of the load. Record each result.
- Check for patterns in the paper using the Sapphire indicator. If the same pattern appears on both sides of the sheet the pattern is “in the paper.”
- Observe and record consumption within 2000 - 3000 impressions.
- Check for droplets on the sides and trailing edge of the blanket.  
(More often if there has been a history of droplets forming.)
- If there is a time lag between treatment and cutting, wrapped in a vapor barrier paper to maintain humidity level.

#### **5. Quality Check**

Rerun the tail end of the treatment run back through the press using the double sheet detector to check for sheets sticking together.

#### **6. Cleaning**

**see safety warning on page 3**

- Clean-up immediately following treatment.
- Use a 50/50 cut of vinegar to warm water or diluted citric acid or any other suitable cleaning solution. Drain pans and wipe with solution. Fill pans with the vinegar/water solution. Test for any remaining trace of Sapphire using the indicator. If present repeat cleaning procedure. Run 100 waste sheets. Drain pans and wipe all surfaces thoroughly with the solution.
- Wash-up carefully as residual Sapphire can degrade Aluminum plates.
- Vinegar dissolves Sapphire faster than regular water.

#### **7. Cutting**

**see safety warning on page 3**

- All paper requires back trim to ensure squareness of cut.
- Wipe or vacuum to remove cutter dust .
- Change blades often to eliminate “drag.”
- If there is a time delay between cutting and wrapped with vapor barrier wrapping paper to maintain humidity level.

## **8. Packaging**

- Check for sticking or blocking by fanning paper.
- Pack per customer requirements in a vapor barrier wrapping paper to maintain humidity level.
- A label that records paper grade, basis weight, treator's lot number, date of treating and number of sheets in a pack must be on the outside of each pack.
- If boxes are used, or packs are piled, each box or pile should have a label as well.

## **9. Shipping**

- Always record treator's lot numbers and date of treating on the shipping record.
- Stack no more than 8000 150gsm (reference) sheets one on top the other.
- Always ship on solid bottom pallet.

## **10. Storage and inventory**

- Store away from light
- Consume Sapphire treated papers within a month from production
- Sapphire solution may be stored and shipped in the following temperature range: -10°C to +30°C (14-86°F).

## **11. Shelf life**

Shelf life of Sapphire treated paper is 5 months wrapped in a vapor barrier wrapping paper

## **12. Tips**

- Retain some of both treated and untreated sheets from first run indefinitely.
- Store in an opaque vapor barrier wrapping paper to maintain humidity level away from light and air.
- Clean out fountain pans with wet vac.
- Don't allow Sapphire to dry on press. If a short break is needed - keep the dampening system running.

## **13. Lithography and Sapphire treatment**

The pH of Sapphire is 11. Sapphire is rewet in contact with water soluble materials. Since fountain solution is pH 7 or lower the Sapphire does raise it's pH causing scumming. This makes for a very difficult situation when Sapphire treated paper and regular litho need to be combined. Thus you should not use Sapphire treated paper for Litho printing. Lithographer should be aware of it and plan another sequence of treating/printing.