

Substrate Optimization and Priming Guidelines for HP Indigo Industrial Digital Presses

How-to Guide



Progressive Profitable Printing



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Substrate Optimization and Priming Guidelines

for HP Indigo Labels and Packaging Digital Presses

Who can benefit from reading this document?

Press owners and operators can choose three options for substrate optimization:

- Purchase off-the-shelf certified/optimized substrate from a listed media supplier or using the HP Indigo Media Locator.
- Purchase optimized substrate using services of HP Indigo authorized treatment center.
- Optimize their own substrate in-house.

NOTE: Certified substrates are always optimized. Optimized substrate may not be certified.

This guide is intended for use by press owners and operators who have chosen to optimize their own substrate. It applies to HP Indigo WS6000 Digital Press, HP Indigo press ws4500, HP Indigo press ws4050, HP Indigo press ws4000, HP Indigo press ws2000, and HP Indigo press s2000.

Introduction

HP Indigo industrial presses can print on a wide variety of substrates including paper, polyethylene, polypropylene, polyester, PVC, polycarbonate, etc. to facilitate ink transfer and adhesion a connecting “primer” layer is mandatory. This guide provides background and support (mainly for customers intending to perform in-house substrate priming, often also called offline treatment) on substrate requirements, available primers, successfully applying and monitoring them.

Print quality is affected by a combination of factors including press settings, ink and substrates. Substrate surface and construction may vary from supplier to supplier. The following substrates-related properties can affect print quality:

- Thickness
- Surface texture
- Surface energy and chemistry
- Corona treatment
- Surface cleaning
- Top coated substrates
- Environment, substrate handling and storage

These factors are described below.

NOTE – all substrate-related parameters must be defined correctly on the press to ensure consistent print quality. Refer to the press documentation.

Thickness

Substrate thickness must be defined properly on the press (in the *Substrate Properties* window) to ensure consistent print quality.

The substrate thickness ranges that can be printed on different presses are:

- HP Indigo WS6000 Digital Press - 12 to 450 microns (0.5 to 17.5 mil)
- HP Indigo press ws4500 - 12 to 350 microns (0.5 to 13.5 mil)
- HP Indigo press ws4050 - 12 to 350 microns (0.5 to 13.5 mil)
- HP Indigo press ws4000 - 50 to 250 microns (2 to 10 mil)
- HP Indigo press ws2000 - 12 to 350 microns (0.5 to 13.5 mil)
- HP Indigo press s2000 - 250 to 600 microns (10 to 23 mil)

Surface texture

This refers to the smoothness or roughness of the substrate surface (e.g. embossed, structured, uncoated label, etc.)

For rougher substrates, more primer may need to be applied to achieve good ink transfer and adhesion. Increasing the wet applied weight will ensure that all areas of the rough surface are primed.

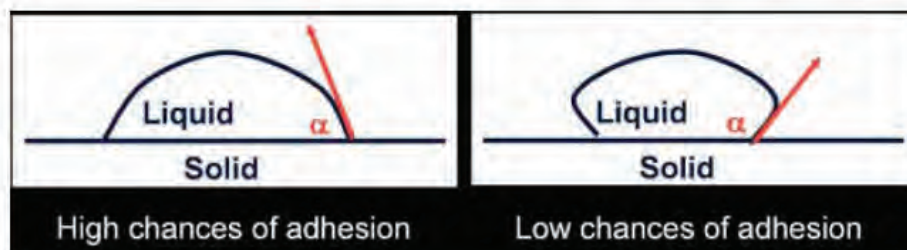
Surface energy and chemistry

Testing the surface energy of non-absorbent surfaces is common practice when priming, varnishing, laminating or printing plastic films. Surface energy is measured in dynes. The higher the dyne level, the higher the surface energy.

For water-based primers, a minimum surface energy of 42 dynes is required for wetting the substrate surface. To achieve this, inline "re-fresh" corona must be used on the in-house priming machine. In addition, the correct primer must be used for each substrate. For choice of primer, refer to guidelines provided in this document.

Dyne (surface tension) solutions or pens of a known value (e.g. 38; 40; 42 dynes) are used to measure surface energy. If the chosen solution or pen (e.g. 42 dyne) wets the surface (does not bead), then the energy of the tested surface will be at least that of the chosen solution or pen (>42 dynes).

To obtain dyne solutions or pens, follow the recommended test procedure provided by your corona supplier.



Corona treatment

HP Indigo highly recommends the use of corona treatment for the effective production of Indigo digitally printed labels and packaging films. Raising the surface energy of a substrate improves wetting and primer adhesion. It broadens the operating window of material performance which improves both primer to substrate and varnish to ink adhesion properties.

Some substrate suppliers will supply their substrate corona treated. In most cases, it is necessary to refresh the corona to achieve the required minimum dyne level.

In corona treatment, the substrate surface is bombarded with electrons to raise the dyne level. The minimum recommended level is 42 dynes.

To achieve higher surface energy, inline *refresh* corona must be used on the in-house priming machine. Check the dyne level prior to priming the surface, as mentioned above.

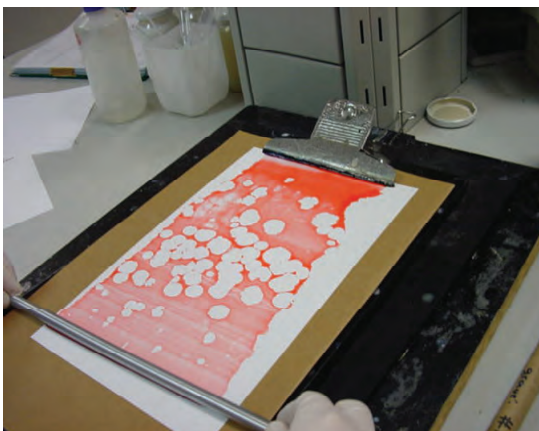
NOTE: Corona treatment deteriorates with age. Refresh inline corona treatment prior to priming and/or varnishing is mandatory. On very rare occasions, corona may not be required or beneficial.

Symptoms requiring corona treatment:

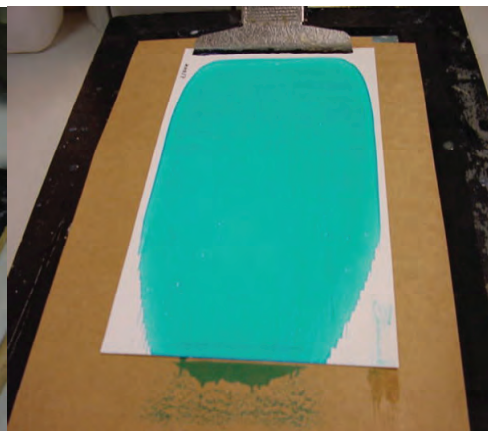
- Poor ink transfer, ink sticking to the blanket.
- Poor adhesion, ink scuffs or rubs off.
- Picking, voids or pin holes in the ink film.
- Pattern streaks or irregular marks in the primer.
- Primer does not lay down smoothly and even across the web. (poor “wet-out”)

The following picture shows influence of corona treatment on wetting with primer.

No corona treatment



Corona treatment



Frequently asked questions about Corona treatment

Q: Is this new?

A: No. Corona treatment has always provided benefits to the Indigo printing process.

Q: Why is this so important for Label and Packaging converters?

A: As our industry has moved away from solvent based chemistry to more environmentally-friendly aqueous chemistry, corona treatment has become significantly more critical for the entire label construction.

Q: If I am not going to prime my own substrates, is corona beneficial?

A: Yes. Corona treating the printed web prior to varnish/laminate will improve the varnish/laminate bond to the Electroink because it increases surface energy and it serves also to clean the surface of minor contaminants enabling the varnish to adhere better to ink.

Q: Are there instances where I wouldn't benefit from corona?

A: If there are then they would be rare.

Q: Do HP finishing partners include this with the finishing unit every time?

A: Corona units are optional on finishing equipment. It is your decision.

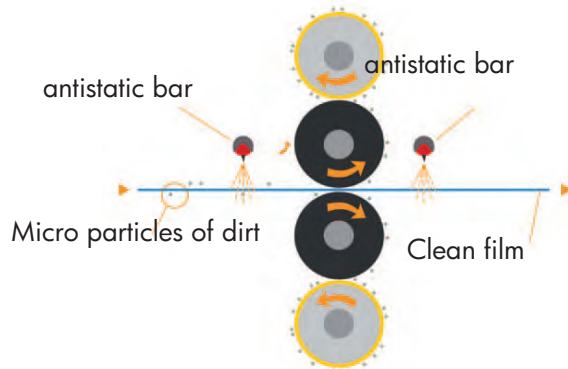
Q: If I would like to add corona treatment to existing finishing unit who should I contact?

A: Many converters already have corona on flexo presses so you can work through your current provider. If not, then contact your finishing partner or a third party provider.

Surface cleaning

The use of substrate –surface cleaners removes dust and particulates and may neutralize electrostatic charge which may improve priming quality. Customers should consider the use of separately purchased substrate cleaning units.

The following figure illustrates a surface cleaning process.



Top Coated Substrates

Some off-the-shelf substrates are top-coated, mainly for use with flexo-machines. Some top-coated substrates may be incompatible with primers. In this case, it is recommended to purchase non top-coated substrates.

Environment, substrate handling and storage

Good ink transfer and adhesion to the substrate is essential to maintain print quality.

To prolong life-span of primed substrates, follow the recommendations provided in the press site preparation and user guides.

- The press room environment, paper handling and storage conditions must be consistent.
- Controlled temperature and humidity storage environment.
- Allow substrate to acclimatize in the press room 24 hours before printing.
- Sudden changes in temperature and humidity may adversely affect ink transfer and adhesion.
- Maintaining consistent humidity and temperature will minimize the affect of static charge.

Media locator

Consider using an off-the-shelf certified substrate, or to use a recommended substrate treatment centre prior to attempting to prime your own substrates.

Refer to the HP Indigo Media Locator list of certified substrates. The Media Locator link is: www.hp.com/go/myhpindigo.

Substrate optimization

Optimizing substrate with a primer can facilitate ink transfer and adhesion.

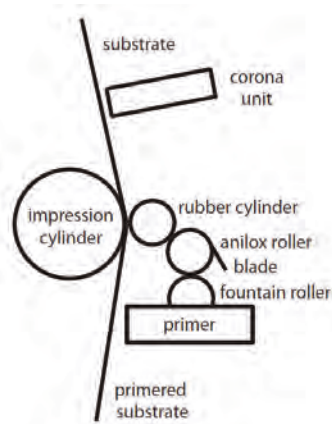
Primers can be applied in-house to a variety of substrates to increase substrate diversity.

Most commonly used priming methods are flexography, rotogravure, and screen.

Flexography

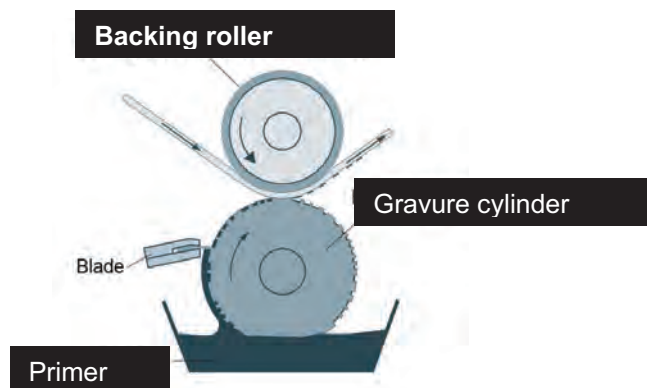
Flexography is the most common priming method used by our customers.

In flexography, an engraved cylinder surface (anilox roll) with millions of very fine cells provides a measured volume of primer to a flexo rubber cylinder and from the rubber cylinder to the substrate.



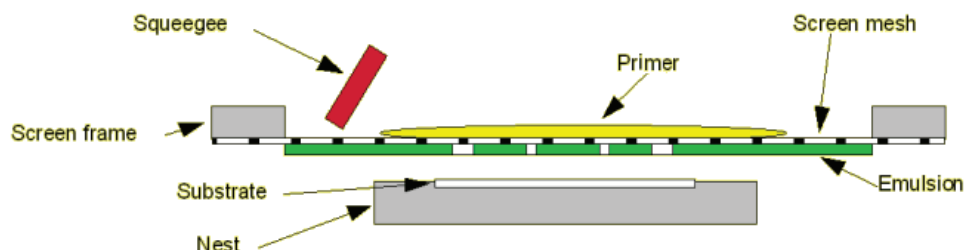
Rotogravure

With rotogravure coating, an engraved cylinder is immersed in primer. The recessed areas fill with primer; excess primer is returned to the reservoir by a doctor blade. The substrate is pressed against the cylinder and a continuous wet film of primer is transferred to the substrate.



Screen

With screen coating, primer is poured onto a fine screen mesh. A rubber-bladed bar (squeegee) sweeps over the screen allowing a metered amount of primer through the mesh to contact and transfer to the substrate below. Screen coating is used for individual substrate sheets.



Primer

A primer is a solution that is applied to the substrate surface prior to printing ensuring optimum ink transfer and adhesion. The amount of wet primer applied to the surface is expressed as *wet applied weight* and can be shown in units of grams per square meter or ounces per msi.

Once the primer is dried, the amount of dried primer is expressed as *laydown* as can be shown in units of milligram primer per square meter of substrate.

Recommended Primers

Most substrates can be successfully primed with more than one primer. Selecting a primer for a particular substrate, determining the applied coat weight and considering any additional requirements depends on the surface properties of the substrates.

The following primers are available:

Digiprime 4431 - A water-based third party primer dispersion, used for synthetic and paper substrates. Digiprime 4431 can be applied by a variety of priming methods, most commonly flexography. It provides excellent aging characteristics with a shelf-life of up to 6 months.

Sapphire - A polymer-based adhesion promoter suspended in water. Sapphire is used primarily to optimize paper substrates but may also work on some synthetic surfaces. For synthetics, wetting of the surface maybe improved with the addition of 10-20% isopropyl-alcohol (IPA). The shelf-life of Sapphire optimized substrates depends on the substrate, priming and storage conditions. We recommend experimenting to establish the shelf-life of your chosen substrate. Ensure you wrap your optimized substrates in a vapor barrier poly-wrapping.

Digiprime 1000/2000 – A water-based third party primer dispersion, used for synthetic and paper substrates. Digiprime 1000/2000 can be applied by a variety of priming methods, most commonly flexography. It provides excellent aging characteristics, with a shelf-life of up to 6 months.

Digiprime 5000 - A water-based third party primer dispersion, used specifically for plasticized PVC and can be applied by a variety of priming methods, most commonly flexography. Digiprime 5000HV (=high viscosity) is used for screen application. Recommended parameters for screen applying Digiprime 5000HV: Mesh count 225 to 380 mesh/inch (90 to 150 mesh/cm) with 20 to 28 newtons (tension) and 70 to 80 durometer (hardness) squeegee.

Digiprime 6029 - A water-based third party primer dispersion, used for paper and specifically effective for uncoated textured/embossed surfaces such as wine label substrates. Digiprime 6029 has been successfully applied by flexography and provides excellent aging characteristics, with a shelf-life of up to 6 months.

Emicote 2 - A water-based third-party primer or polymer adhesion promoter, similar in chemistry to Sapphire. It is used to optimize synthetic substrates and will work on some papers. The shelf life of Emicote 2 optimized substrates depends on the substrate, priming and storage conditions. We recommend experimenting to establish the shelf-life of your chosen substrate. Ensure you wrap your optimized substrates in a vapor barrier poly-wrapping.

Curecoat 1 - A water based third party primer or polymer adhesion promoter, similar in chemistry to Sapphire. It is used to optimize synthetic substrates and paper. Surface wetting can be improved with the addition of 20% alcohol. The shelf life of Curecoat 1 optimized substrates depends on the substrate, priming and storage conditions. We recommend experimenting to establish the shelf-life of your chosen substrate. Shelf-life can be influenced by storage conditions and is recommended to wrap your optimized substrates in a vapors barrier poly-wrapping. Curecoat 1 is not a press-ready primer. It must be mixed according to the instructions provided by the manufacturer prior to use.

Table 1: Recommended primers

Primers	Substrate types	Priming method	Coat-weight
Digiprime 4431	Several media types	Flexography	1.0 - 1.6 gsm/m ² (0.0547 - 0.0875 oz/MSI)
Digiprime 1000/2000	Paper	Flexography	1.0 to 3.0 gsm/m ² (0.0547 - 0.1641 oz/MSI)
Digiprime 5000/5000HV	PVC	Flexography/Screen	1 - 1.6 gsm/m ² (0.0547 - 0.0875 oz/MSI) (for flexo)
Digiprime 6029	Paper, specifically uncoated textured/embossed surfaces e.g. wine labels	Flexography	1.0 - 3.0 gsm/m ² (0.0547 - 0.1641 oz/MSI)
Sapphire products	Several media types	Flexography	1 - 1.6 gsm/m ² (0.0547 - 0.0875 oz/MSI)
Emicote 2	Synthetic and Paper	Flexography	1.6 - 3.0 gsm/m ² (0.0875 - 0.1641 oz/MSI)
Curecoat 1	Synthetic and Paper	Flexography	1 - 1.6 gsm/m ² (0.0547 - 0.0875 oz/MSI)

NOTE: Read the Technical Data Sheet (TDS) and Material Safety Data Sheet (MSDS) for more information regarding the safety procedures for working with these primers.

NOTE: Refer to the In-house priming guidelines (page 18) for more details.

Primer indicators

Sapphire and Digiprime indicators can be used to identify the presence of these primers.

- Sapphire indicator will quickly turn blue in the presence of Sapphire, Emicote 2 or Curecoat 1.
- Digiprime indicator is dark blue/violet and will quickly turn yellow in the presence of Digiprime.

For Digiprime, the color change is time dependent.

Primer indicators are used solely to identify the presence of a primer. They cannot be used to determine the correct coat-weight or printability.

In some cases, the Digiprime indicator may show a false positive result. When in doubt, apply the Digiprime indicator on a known unprimed surface and visually compare to the tested surface.

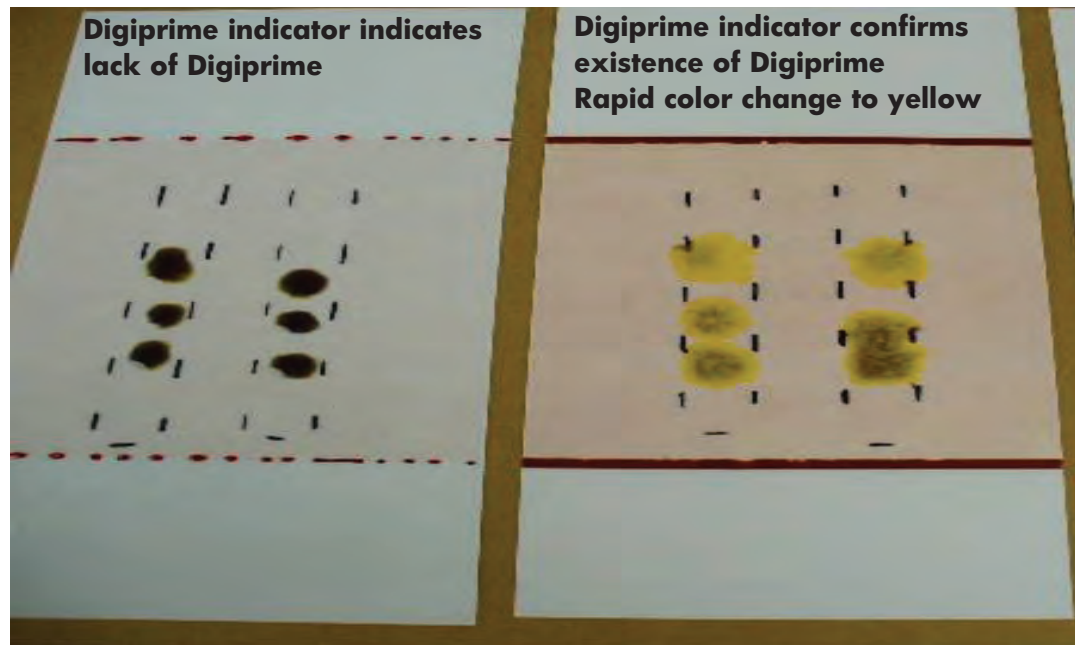
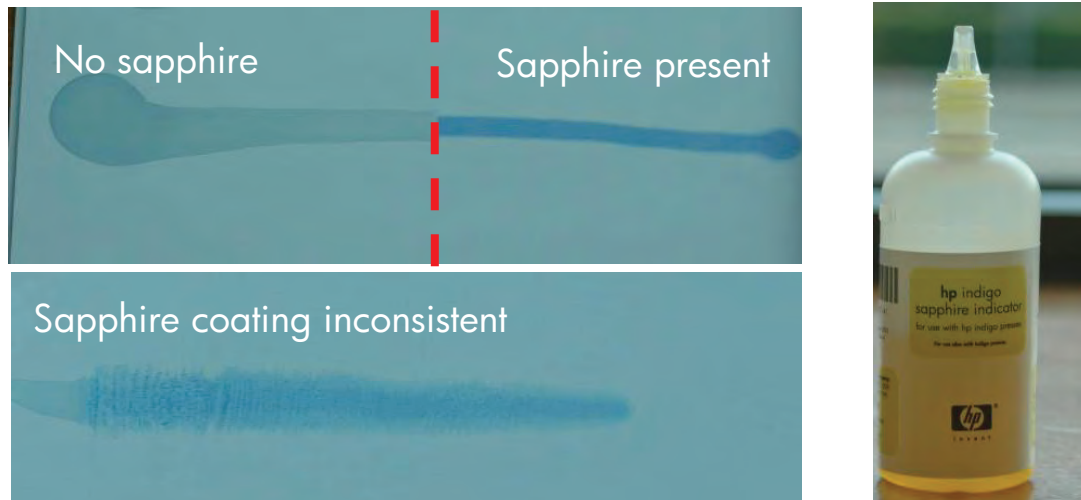


Table 1: Digiprime and Sapphire primers compared

Digiprime	Sapphire
Adheres to a wide variety of media, synthetic and paper, etc.	Used mostly for paper, will work on some synthetics (for synthetics, may require addition of isopropyl alcohol)
Excellent aging normally in excess of 6 to 12 months. Does not yellow.	Variable shelf life of Sapphire-primed media, dependent on media surface, storage conditions, etc. Extra attention is needed to avoid substrate expiration.
Inline corona treatment is a must for synthetics and most top-coated surfaces.	May severely affect blanket life and give yellow coloration to media surface if too much primer is applied.
Water resistance is better than Sapphire.	Cleaner is easier than Digiprime.

Priming your own substrate

Preparation and application

The preparation and application varies among different primers. However, there are some basic principles:

- Important safety information - Detailed safety information, Material Safety Data Sheet (MSDS) is available from the suppliers.
- Pre-priming cleaning - Make sure that the priming equipment is adequately clean and that no residues from other primers or materials are present.
- Equipment set - Assemble all materials and equipment, including chemicals, mixing containers, measuring and indication equipment, application system, etc. Ensure that the priming machine is set to the correct conditions to achieve the required priming level.
- Post-priming cleaning procedure – Maintain the priming machine according to the manufacturer recommendations, ensuring cleanliness of the various parts.
- Handling primers - Refer to supplier guidelines and relevant Material Safety Data Sheet (MSDS). follow these general guidelines:
 1. Handle solution in hooded or well-ventilated areas.
 2. Contact with eyes may result in irritation – wear safety goggles when mixing or transferring solution.
 3. Avoid breathing vapor.
 4. Ingestion of treatment solution may result in respiratory irritation. If ingested, do not induce vomiting. Contact a physician.

Choosing the Anilox

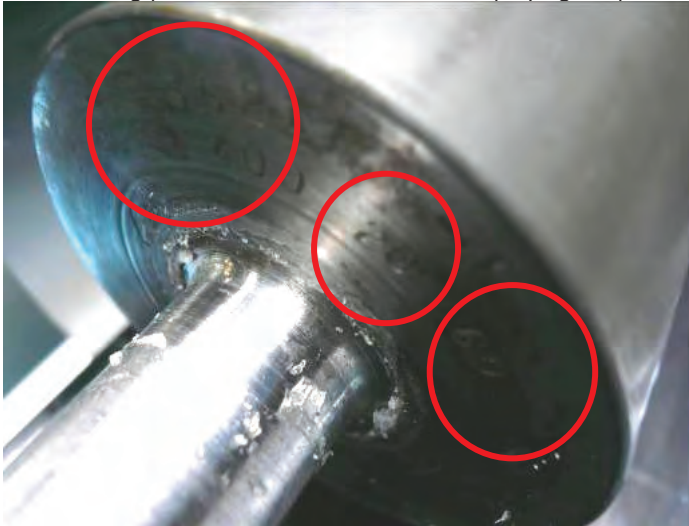
An anilox roll is a hard cylinder (usually ceramic) whose surface contains millions of very fine cells. It is used to provide a measured amount of ink, varnish or primer via a rubber roller (tint roller) onto the substrate. The anilox receives the primer (indirectly from either an open tray or chambered doctor blade) and the doctor blade is used to remove excess primer leaving a measured amount in the cells. Anilox rolls are specified by the number of lines per cm or inch and the depth of the engraved cell. The cells theoretical volume is shown in cc/m² or BCM.

The key to successful priming is to achieve an accurate and consistent target wet-weight. In flexography, the anilox must be bladed.

The most common anilox specifications for synthetic substrate and smooth paper is 400|pi (160|pcm)/20 micron depth/60 degree angle. Theoretical volume is 6 cc (3.9 BCM).

For rough and/or absorbent paper (wine label, etc.) a coarser anilox maybe required. 300|pi (120 |pcm)/30 micron depth/60 degree angle. Theoretical volume is 10.9 cc (7 BCM) or 200|pi (80|pcm)/40 micron depth/60 degree angle. Theoretical volume is 14.7 cc (9.5 BCM).

The following picture shows an anilox roller displaying its specifications stamped into the side of the roller



Drying primers

Primer drying conditions depend on the chosen anilox (applied wet-weight/speed of coater/substrate surface properties/efficiency of hot air dryer).

Example - Starting point for all primers.

Substrate	Anilox	Applied wet-weight	Drying temp	Speed
All substrates	400 pi/20micron	1.0 - 1.2 grams / m ²	80 - 90 degrees C.	25 - 50 meters / min.

Changing the anilox specifications will change the applied wet-weight and affect speed of drying. A coarser anilox will apply more primer and requires slower drying speed, and possibly increasing temperature.

Verifying primer adhesion

Verify primer adhesion using the tape peel test.

1. Apply tape (Paper = 3m Scotch 230. Film = 3m Scotch 810) to the primed surface smoothly (without wrinkling).
2. Apply sufficient pressure using a 2kg roller evenly along the tape. Run the roller back-and-forth two times.
3. Wait 20 minutes before peeling the tape. After removing tape, check substrate surface for primer removal.
4. Verify presence of primer by applying Primer indicator in the peeled area.

Refer to the FINAT test methods for detailed test descriptions.



Verifying ink adhesion

1. Use the FINAT test procedure (FTM21) for verifying ink adhesion in the same way as you verify primer adhesion.
2. Wait for 15 minutes after printing before applying tape to the printed surface.
3. Wait 20 minutes before peeling the tape. After removing tape, check substrate surface for ink removal.
4. This test method is used for certifying optimized substrates. Refer to FINAT (www.finat.com) for test details.

NOTE: Primer and ink adhesion may improve over time. For example, improved results may be noticeable after 60 minutes.

Monitoring primer application

We recommend measuring primer usage over a sufficient length.

1. Primer usage/length x width will equal wet coat-weight. Expressed in weight per unit area e.g., g/m² or oz/yd².

For example:

1000 m (length) x 320 mm (width) = 320 grams of primer (coated at 1 gram/m²)

1000 yards (length) x 12 inches (width) = 9.82 oz of primer (coated at 0.0294 oz/yd²)

2. Gravimetric (weight difference) method is possible with Digiprime on uncoated synthetic substrates.

Hints and tips

Substrate surface and construction may vary from supplier to supplier. The correct amount of primer should be determined for each particular substrate. Use the following guidelines:

- Evaluate your choice of primer (read priming guidelines).
- Evaluate each substrate independently.
- Ensure you achieve at least the recommended target wet-weight.
- For Sapphire chemistry be careful not to apply an excessive amount (may cause yellowing).
- Monitor primer adhesion to substrate and ink adhesion to primer at regular intervals.
- Build up a history and maintain good records.
- Date label and wrap in vapor barrier poly-wrapping.
- Clean up immediately following treatment to prolong equipment life and avoid cross-contamination.
- Drain pans, flush pipes and all surfaces thoroughly with water.

Cleaning

- Clean equipment immediately after priming substrate.
- It is important to keep the anilox in good condition.
- Always clean as soon as possible to avoid drying in the cells.
 - Water-based primers are particularly difficult to clean once they have dried in the cells.
 - Anilox must rotate and remain constantly wet.
 - When anilox stops rotating, remove and clean immediately with water.
 - Cleaning solutions for anilox, tray, and rollers:
 - Digiprime – contact manufacturer for details
 - Sapphire – Thoroughly clean with water, then neutralize using a 1:5 diluted vinegar:water solution, rinse again with water.
 - Topaz – Clean with isopropyl-alcohol (IPA).
- **In the event of problems**
 - Contact anilox and primer supplier for advice.
 - Use stainless steel scrubbing brush with appropriate chemical cleaner.
 - To thoroughly clean anilox, ideally use an ultra-sonic cleaning device.

Recovering poorly optimized in-house primed substrates

If you are attempting to recover substrate in the event of poor print quality or ink adhesion related to primed substrate, consider the following:

- The most common priming problems are:
 - Primer adhesion (same standard as ink adhesion)
 - Inability to wet the substrate (corona)
 - Particle contamination (dust or fibers)
 - Low coating weight (choice of anilox)
 - Non uniform priming (attention to setup issue)
 - Excess coating (choice of anilox)
 - Insufficient drying (hot air flow and drying temperature setup)

Identifying and solving priming problems.

1. Know your substrate, primer supplier and date of manufacture

- Verify that the product/roll label is on file.
 - Look for manufacture date, batch number, product name.
- Verify that ink adhesion meets trade standards.
 - HP Indigo uses FINAT for pre-optimized media certification.
- Know that similar substrates from different suppliers may vary in their performance.
- It is recommended to use non-top-coated media for in-house coating.
- For best results, follow the maintenance instructions from the equipment manufacturer and primer supplier.
- See *Substrate Process Parameters (SPP)* (on the My HP Indigo, Media locator website) to improve media performance.
- Refer to the In-house priming guidelines (page 18).

2. Is this your first attempt at priming?

- Check all the parameters that can affect shelf-life of primed substrates.
- Are you using the correct anilox?
- Are the anilox and priming machine clean?
- Did you estimate the applied coat weight by monitoring the amount of primer used over a known run length?
- Did you use corona treatment prior to priming?
- What primer was used?
- Check primer manufacturer/expiry date.
- Treatment date (how old?)
- Are the site conditions to specifications?
- What are the substrate's storage conditions? (Refer to your Digital Press Site Preparation Guide).
 - Was the substrate acclimated to press room conditions 24 hours before printing?
 - What are the conditions of substrate storage when in inventory?

3. Have you primed the particular substrate before?

- If yes – check the anilox condition (blocked/contaminated):
 - The anilox condition can affect priming uniformity.
- Are you using corona treatment?
 - Is it turned on?
 - What are the settings?
 - Check and record substrate dyne level before and after corona.
- Try to:
 - Refresh the corona.
 - Increase the coat weight (change anilox or double-coat).
 - Check guidelines for an alternative primer. Try another primer.

4. How is the priming solution being handled?

- Are you using the solution directly from the container or mixing (diluting) it?
- Most primers are supplied press ready. They should only be mixed if directed by the manufacturer.

5. Check transfer failure, adhesion, post processing etc.

- When in doubt, switch to a known substrate for reference.
- Ink adhesion generally improves 15 to 60 minutes after printing.
- Leading edge failure (triangular voids or ink strings) are an indication of low coat weight.
- Heavy ink coverage areas are sensitive to low coat weights.

Priming troubleshooting

Refer to the following table to troubleshoot common priming issues.

Category	Symptom	Cause	Solution/action
Good ink transfer/poor ink adhesion	Identifiable only by tape peel test.	Poor treatment/low coat-weight/wrong choice of primer	Verify presence of primer using Primer indicator.
			Verify by printing known substrate.
			Apply second coat using same primer.
			Choose an alternative primer. Replace the substrate with a certified substrate.
Leading edge failure	Image leading edge failure associated with high ink coverage.	Poor treatment/low coat-weight	Verify presence of primer using Primer indicator.
			Verify by printing known substrate.
			Apply second coat using the same primer.
			Choose an alternative primer. Replace the substrate with a certified substrate.
Primer adhesion failure	Areas of primer separate from the substrate (verify by tape peel test).	Ineffective corona treatment	Verify presence of primer using Primer indicator. Check corona unit settings.
		Plasticizers in substrate (e.g. PVC) migrating through primer	Choose alternative primer.
		Contamination (e.g. silicone)	Replace the substrate with a certified substrate.
Stickiness	Stickiness of substrate (unwinding of roll) or/and at the press nip or idler.	Excess applied primer	Verify anilox and settings. Before printing, clean nip and rollers.
		Primer not dried properly	Verify correct settings of corona, anilox, drying temperature and speed.
		Adhesive bleeding accumulating on press components	Clean press nip and rollers.
		Poor storage conditions - excessive heat or humidity. Poor wrapping	Ensure press is in correct environment. Ensure substrate is acclimatized (24 hours) prior to printing. Replace the substrate with a certified substrate.

In-house priming - Flexo priming guidelines for HP Indigo WS6000 Digital Press

Application	Target media	Primer Choice	Corona treatment. (min 42 dynes required)	Recommended drying temperature and speed	Anilox Specifications	Target Wet Weight	Estimated Shelf-life of primed media
Pressure Sensitive Label /Synthetics and Metalized Synthetics	PE/PP	1. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended	70 to 90° C. (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within weeks
		2. Emicote 2	Recommended				
Pressure Sensitive Label /Synthetics	PET	1. Digiprime 4431	Mandatory	70 to 90° C. (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
		2. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended				
		3. Emicote 2	Recommended				
		4. Digiprime 2000 +15% IPA	Mandatory				
Pressure Sensitive - Label/Paper – general	Paper - coated	1. Digiprime 2000	No	70 to 90° C. (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
		2. Sapphire 5 (Sapphire 3.2 for NA)	No				
Pressure Sensitive - Label/Paper	Paper - metalized	1. Digiprime 2000	Recommended (low setting)	70 to 90° C. (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
		2. Emicote 2	Recommended (low setting)				
		3. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended (low setting)				

In-house priming - Flexo priming guidelines for HP Indigo WS6000 Digital Press

Application	Target media	Primer Choice	Corona treatment. (min 42 dynes required)	Recommended drying temperature and speed	Anilox Specifications	Target Wet Weight	Estimated Shelf-life of primed media
Pressure Sensitive - Label/ Wine Label	Paper uncoated - textured/ embossed	1. Digiprime 6029	Recommended*	70 to 90 °C (160 to 200 ° F) at 15 to 25 m/min (50 to 80 ft/min)	300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz/MS	Up to 6 months
		2. Digiprime 1000	No	70 to 90 °C (160 to 200 ° F) at 15 to 25 m/min (50 to 80 ft/min)	200 lpi X 40 µ, 14.7cc or 9.5 BCM	2.5 g/m ² or 0.1368 oz/MSI	Up to 6 months
		3. Digiprime 2000 (double coated)	No	70 to 90 °C. (160 to 200 ° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM (double coated)	2 g/m ² or 0.1094 oz/MSI	Up to 6 months
		4. Sapphire 5 (Sapphire 3.2 for NA)	No		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within days
Folding Carton	Paper coated /uncoated/ textured/ embossed	1. Sapphire 5 (Sapphire 3.2 for NA)	No	70 to 90 °C. (160 to 200 ° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within days
		2. Digiprime 2000	No		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
		3. Digiprime 1000	No	70 to 90 °C (160 to 200 ° F) at 15 to 25 m/min (50 to 80 ft/min)	200 lpi X 40 µ, 14.7cc or 9.5 BCM	2.5 g/m ² or 0.1368 oz/MSI	Up to 6 months

* Corona setup optimization may be needed

In-house priming - Flexo priming guidelines for HP Indigo WS6000 Digital Press

Application	Target media	Primer Choice	Corona treatment. (min 42 dynes required)	Recommended drying temperature and speed	Anilox Specifications	Target Wet Weight	Estimated Shelf-life of primed media
Shrink sleeve	PVC/PET/OPS	1. Digiprime 4431	Mandatory	70 to 90 °C. (160 to 200 °F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
		2. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within weeks
		3. Emicote 2	Recommended		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz/MSI	Within weeks
Flexible Packaging	PE/PP	1. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended	70 to 90 °C. (160 to 200 °F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within weeks
		2. Emicote 2	Recommended		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz/MSI	Within weeks
	PET	1. Digiprime 4431	Mandatory		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
		1. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within weeks
	Laminates (including PE or PP as top printable layer)	1. Digiprime 4431	Mandatory		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz/MSI	Within weeks
		2. Emicote 2	Recommended		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Up to 6 months
Laminates (excluding PE or PP as top printable layer) Plasticized PVC Paper	To be confirmed	1. Sapphire 5 (Sapphire 3.2 for NA)	No	70 to 90 °C.(160 to 200 °F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within days
					2. Digiprime 2000	No	400 lpi X 20 µ, 6cc or 3.9 BCM
	Paper	1. Sapphire 5 (Sapphire 3.2 for NA)	No		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz/MSI	Within days
					2. Digiprime 2000	No	400 lpi X 20 µ, 6cc or 3.9 BCM

NOTES:

- Verify ink adhesion according to industry trade standards. HP Indigo uses FINAT for pre-optimized media certification.
- Similar substrates from different suppliers may show variety in performance.
- Recommend to use non-top coated media for inhouse coating. Special attention should be given to the presence, nature and chemistry of top-coated media.
- Corona unit power settings - refer to manufacturer and primer supplier recommendations.
- For best results follow equipment manufacturer and primer supplier maintenance instructions.
- Refer to Press Substrate Process Parameters (SPP) to improve media performance. PTH may improve ink adhesion.
- Before calling support, please test print using reference media to rule out press-related issues.
- Excessive Sapphire coating may result in yellowing.
- Shelf-life of primed media depends on applied primer coat-weight and storage conditions.
- For additional assistance, please contact your local support.

In-house priming - Flexo priming guidelines for HP Indigo press ws4xx0 series

Application	Target media	Primer Choice	Corona treatment. (min 42 dynes required)	Recommended drying temperature and speed	Anilox Specifications	Target Wet Weight	Estimated Shelf-life of primed media
Pressure Sensitive - Label /Synthetics and Metalized Synthetics	PE/PP	1. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
		2. Emicote 2	Recommended		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz./MSI	Within weeks
Pressure Sensitive - Label /Synthetics	PET	1. Digiprime 4431	Mandatory		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
		2. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
		3. Emicote 2	Recommended		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz./MSI	Within weeks
Pressure Sensitive - Label/Paper - General	Paper - coated	1. Digiprime 4431	No	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
		2. Sapphire 5 or (Sapphire 3.2 for NA)	No		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within days
Pressure Sensitive - Label/paper	Paper - metalized	1. Digiprime 2000	Recommended (low setting)	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
		2. Emicote 2	Recommended (low setting)		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz./MSI	Within weeks
		3. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended (low setting)		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within days

In-house priming - Flexo priming guidelines for HP Indigo press ws4xx0 series

Application	Target media	Primer Choice	Corona treatment. (min 42 dynes required)	Recommended drying temperature and speed	Anilox Specifications	Target Wet Weight	Estimated Shelf-life of primed media
Pressure Sensitive - Label/Wine Label	Paper uncoated - textured/ embossed	1. Digiprime 1000	No	70 to 90 ° C (160 to 200 ° F) at 15 to 25 m/min (50 to 80 ft./min)	200 lpi X 40 µ, 14.7cc or 9.5 BCM	2.5 g/m ² or 0.1368 oz./MSI	Up to 6 months
		2. Sapphire 5 or (Sapphire 3.2 for NA)	No	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft./min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within days
		3. Digiprime 2000 (double coated)	No	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft./min)	400 lpi X 20 µ, 6cc or 3.9 BCM (double coated)	2 g/m ² or 0.1094 oz./MSI	Up to 6 months
Folding Carton	Paper coated /uncoated/ textured/ embossed	1. Sapphire 5 (Sapphire 3.2 for NA)	No	70 to 90 ° C. (160 to 200 ° F) at 25 to 50 m/min (80 to 170 ft./min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within days
		2. Digiprime 2000	No	70 to 90 ° C. (160 to 200 ° F) at 25 to 50 m/min (80 to 170 ft./min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
		3. Digiprime 1000	No	70 to 90 ° C (160 to 200 ° F) at 15 to 25 m/min (50 to 80 ft./min)	200 lpi X 40 µ, 14.7cc or 9.5 BCM	2.5 g/m ² or 0.1368 oz./MSI	Up to 6 months
Shrinkleeve	PVC/PET/ OPS	1. Digiprime 4431	Mandatory	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft./min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
		2. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft./min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
		3. Emicote 2	Recommended	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft./min)	300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz./MSI	Within weeks

In-house priming - Flexo priming guidelines for HP Indigo press ws4xx0 series

Application	Target media	Primer Choice	Corona treatment. (min 42 dynes required)	Recommended drying temperature and speed	Anilox Specifications	Target Wet Weight	Estimated Shelf-life of primed media
Flexible Packaging	PE/PP	1. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended	70 to 90° C (160 to 200° F) at 25 to 50 m/min (80 to 170 ft/min)	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
		2. Emicote 2	Recommended		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz./MSI	Within weeks
	PET	1. Digiprime 4431	Mandatory		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
		1. Digiprime 5000	Mandatory		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within days
	Plasticized PVC	1. Sapphire 5 +15% IPA (Sapphire 515 in NA)	Recommended		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
		2. Emicote 2	Recommended		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
	Laminates (including PE or PP as top printable layer)	1. Digiprime 4431	Mandatory		300 lpi X 30 µ, 10.7cc or 6.9 BCM	1.6 g/m ² or 0.0875 oz./MSI	Up to 6 months
					400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within weeks
	Laminates (excluding PE or PP as top printable layer)	1. Digiprime 4431	Mandatory		400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
					400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months
Paper	1. Sapphire 5 (Sapphire 3.2 for NA)	No	400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Within days		
			400 lpi X 20 µ, 6cc or 3.9 BCM	1 g/m ² or 0.0547 oz./MSI	Up to 6 months		

NOTES:

- Verify ink adhesion according to industry trade standards. HP Indigo uses FINAT for pre-optimized substrate certification.
- Similar substrates from different suppliers may show variety in performance.
- Recommend to use non-top coated media for inhouse coating. Special attention should be given to the presence, nature and chemistry of top-coated media.
- Corona unit power settings - refer to manufacturer and primer supplier recommendations.
- For best results follow equipment manufacturer and primer supplier maintenance instructions.
- Before calling support, please print test a reference media to rule out press-related issues.
- Excessive Sapphire coating may result in yellowing.
- Shelf-life of primed media depends on applied primer coat-weight and storage conditions.

In-house priming - Screen or Offset priming guidelines for HP Indigo press s2000

Application	List target substrate	Primer Choice	Coating technology	Corona treatment	Recommended drying temp. & speed	Screen Specifications	Target Wet Weight	Estimated Shelf-life of primed substrate
Synthetics	PP/PE/PET/PVC/ OPS/PC/PETG/APET	Topaz 17	Screen	Recommended	60° C (140 ° F) Maximum airflow	100 mesh/ cm. 40 micron thread diameter	11 g/m ² or 0.6 oz./MSI	Within weeks
Cardboard	Board	Sapphire 5 (Sapphire 3.2 for NA)	Offset	No		N/A	0.5 to 1.0 g/m ²	Within days
Pressure Sensitive - Label/synthetic	PP/PE/PET/PVC	Topaz 17	Screen	Recommended	60° C (140 ° F) Maximum airflow	100 mesh/ cm. 40 micron thread diameter	11 g/m ² or 0.6 oz./MSI	Within weeks
Pressure Sensitive - Label/paper	Paper	Sapphire 5 (Sapphire 3.2 for NA)	Offset	No		N/A	0.5 to 1.0 g/m ²	Within days

NOTES:

- Verify ink adhesion according to industry trade standards. HP Indigo uses FINAT for pre-optimized substrate certification.
- Similar substrates from different suppliers may show variety in performance.
- Recommend to use non-top coated substrate for inhouse priming.
- Corona unit power settings - refer to manufacturer and primer supplier recommendations.
- For best results follow equipment manufacturer and primer supplier maintenance instructions.
- Before calling support, please print test a reference substrate to rule out press-related issues.
- Excessive Sapphire may result in yellowing.
- Shelf-life of primed substrate depends on applied primer coat-weight and storage conditions.
- For further assistance, please contact your local support.

Primer supplier overview

Primer	Supplier
Sapphire 3.2 (NA only) Sapphire 515 (NA only)	POSCO Inc.
Emicote 2	Twenty Four Seven Global Coatings
Curecoat 1	WSL
Sapphire 5 Topaz 17 Digiprime 1000 Digiprime 2000 Digiprime 4431 Digiprime 5000 Digiprime 6029	Michelman

Supplier Contact Information

- POSCO Inc.
310 Ballardvale Street
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Tel: +1 978 658 5290
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www.poscoinc.com
- Twenty Four Seven Global Coatings
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Obtaining support

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- Germany: +49 (0)6 93 80 78 91 93
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- Luxembourg: +352 (0)24 87 13 98
- Netherlands: +31 (0)20 547 6870
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