



**Laser Engraved
Ceramic Anilox Roll**

**Volume and
Screen Guide**

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**PRAXAIR**
SURFACE TECHNOLOGIES

Selecting the Correct Laser Engraved Ceramic Anilox Roll

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The relationship of volume, screen and angle

The primary function of an anilox roll is to deliver a precise, uniform, wet-ink film thickness to a printing plate. The volume of the engraving determines the film thickness, while the screen count and angle control the uniformity of the film.

What is the proper volume?

The first step in selecting the correct roll is to determine the volume of ink required to give proper solid-ink density for the job to be printed. Normally, this is done through experience (selection based upon anilox volume used for previous applications), or by consultations with your ink supplier and your regional Praxair technical specialist.

Factors to consider when choosing volume

- Consider the ink being used (whether it is solvent, water-based, or UV), the percentage of pigments and solids in the ink, and the viscosity.
- Examine the doctoring systems: Are they chamber, blade or two-roll, and what are the blade or roll materials?
- Think about the plate material (the substrate upon which you print), and color-density requirements of the job.
- Ink strength is another consideration. Tests have shown that "press-ready" inks from different manufacturers may have different solid ink densities, even when used with the same anilox roll.
- It may be necessary to use a "banded" test roll, with different screen and volume combinations. To

choose the correct volume for an application, always consult your anilox roll supplier for help in selecting a banded anilox roll. Praxair offers technical consulting assistance, at no charge, to help specify suitable combinations of volumes and screen counts when a banded roll is necessary.

Depth-to-opening ratio

Although depth-to-opening can be a factor in efficient cell loading and release of ink from the engraved cell to the printing plate, there is no industry standard for a "correct" ratio. The depth-to-opening ratio takes into consideration the opening at the top of the cell, rather than the profile of the cell. Proprietary engravings on Praxair's **ProLine** anilox rolls provide a superior cell profile producing a uniform roll. These proprietary engraving methods reshape the recast material that protrudes above the cell to produce a very flat, uniform roll surface. The cell wall below the surface is also reshaped to produce a smoother wall and a more consistent cell width from top to bottom. Thin, smooth, well-defined cell walls provide more cell capacity that translates to greater available ink volume of a given line count, without affecting the depth-to-volume ratio. The proprietary engravings available on Praxair's **ProLine** rolls provide more effective doctoring and more consistent ink delivery.

Which screen count?

Once a volume is selected, choose the screen count (measured in cells per inch). It is customary to choose the highest possible screen count that will provide the ink volume selected earlier, yet remain

within Praxair Surface Technologies' recommended range of volumes for that specific screen count. When screen or process work is being printed, the industry standard has been to select an anilox screen count that is three-to-five times the value of the plate screen. For example, printing a process application with a plate screen of 133 lines per inch (LPI) would require an anilox roll with a minimum screen count of 400-to-530 LPI. Typically, a converter would choose a 550-to-600 LPI anilox roll when using a 133-line plate, depending upon volume requirements.

With the introduction of Yttrium-Aluminum-Garnet (YAG) technology, the industry has seen a shift to very high screen counts. The greater ink volumes and higher screen counts available with YAG technology result in better ink density delivered to the plate, as well as reduced dot gain. Finer, screen-count rolls can now be used, where resolution was once limited by available volume. **ProLine** anilox rolls with Praxair's proprietary engravings have proven to be valuable for very high line-process printing and combination printing, where both screen and solids are on the same plate. Previously, with conventional laser technology, a converter might use a 440 LPI screen with a volume of 4.5 BCM, then struggle to maintain the required solid in density while keeping the dots "open". Specialized engravings on Praxair's **ProLine** rolls allow the converter to use a roll with a volume of 5.0 BCM. This feature ensures that density requirements are met, and a screen count of 600 LPI is maintained to prevent plate dots from becoming plugged.

Which screen angle is best?

The 60° angle is the most prevalent pattern in use today, whether for solids and type, or screen and process work. Both the 30° and 60° engravings have 15 percent more cells per unit area than the 45° engraving. The higher the numbers of cells per area, the more uniform the dispersion of ink across the roll face to achieve higher print quality. For this reason, it is usually better to select the 30° or 60° engraving. However, when higher viscosity, radiation or UV-cured inks are used, the 30° engravings also can be used to reduce anilox "spitting", especially when the cells are slightly channeled.

Super finishing: when and why

Another consideration is whether to have your roll super finished. Super finishing is a controlled, diamond-polishing operation that provides a more uniform roll surface to reduce doctor-blade wear during startup. It is important to remember that super finishing slightly reduces the maximum volume achievable at any given screen count, as it removes a small amount of coating from the top of the cells. Excessive super finishing of a laser-engraved anilox roll will result in cell walls that are too wide, thereby producing poor ink flow with a reduced print quality. If you have doubts about super finishing, consult a Praxair technical specialist.

ART and REV Open-cell technology

Specialty engravings (cell shapes) were introduced to the anilox industry in 1999. Prior to that, anilox manufacturers did their best to offer the end user conventional engravings with abnormally high- or low-volume specifications. The idea was to balance the

Typical Screen & Volume Guidelines

Type of Printing	Anilox Screen Count (cells per inch)	Anilox Volume (BCM / in ²)
Process 175 – 200 LPI	900 – 1200	1.0 – 2.5
Process 150 LPI	700 – 900	1.4 – 2.5
Process 120 – 133 LPI	500 – 800	2.0 – 2.6
Process 85 – 120 LPI	440 – 700	2.5 – 4.0
Screen / Solid (Combination Plate)	440 – 700	4.0 – 6.0
Screen / Text	360 – 600	3.0 – 5.0
Line / Text	300 – 550	3.5 – 6.0
Line / Solid	250 – 500	4.0 – 7.8
Solid	200 – 400	5.0 – 9.0
Heavy Solid / Varnish	180 – 400	6.0 – 13.0

- Anilox screen count is typically 3 – 5 times the plate screen count.
- Print density is determined by a number of factors including anilox volume, ink chemistry and substrate absorbency.
- The data above should be considered as general guidelines only. Exact specifications will vary with inks, substrates, metering systems, plate materials and other considerations.

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density requirements against issues such as dot gain, or fill-in on line, reverse type. Today, Praxair's continued research and development has resulted in two open-cell engraving techniques that provide printers with the special characteristics that are unachievable with conventional cell patterns.

Utilizing the unique characteristics of the proprietary ceramic coating featured on **Proline** anilox rolls, Praxair's customized laser engraving software can create patterns within the ceramic that are truly revolutionary.

Praxair's **Proline** anilox rolls with REV engraving techniques show distinct benefits in the ability to print solids, fine type, and half tones, with the same anilox roll cell volumes and at the quality level required by today's converters or printers. Additional benefits to this technology include easier cleaning, less ghosting, good ink flow, better wear resistance, reduction in fine-score lines, and less foaming.

Praxair's **Proline** anilox rolls with ART engraving methods demonstrate the unique ability to virtually eliminate pinholing, while providing easier cleaning and smoother ink films. Especially suited for carrying solids for heavy lay-down applications, the rolls can be customized to carry specific-sized particulates while insuring that they are not captured and held in the anilox as in a conventional engraving. This benefit allows the converter to specify a higher line count anilox roll than typically available, for increased print quality, degree of gloss in the coating, and uniformity of the applied ink film. These advantages are achieved while providing the industry with an unmatched, volume-carrying capacity of 90+ BCM.

Proline[®] Proline[®]ART Proline[®]REV

Volume and Screen Guide

Screen Count <small>(Lines Per Inch)</small>	Volume		Volume		Volume	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
50	15.0	43.0*	18.0	90.0	NR	
60	13.0	38.0*	15.6	80.0	NR	
85	12.0	33.0*	14.4	55.0	NR	
100	11.7	25.0*	14.0	45.0	NR	
120	10.0	21.5*	12.0	35.0	NR	
140	8.1	17.5*	9.7	30.0	NR	
180	5.2	16.0*	6.2	25.0	NR	
200	5.2	14.5*	6.2	20.0	NR	
220	4.7	12.5*	5.5	17.0	NR	
250	3.8	11.5*	4.6	15.3	NR	
280	3.7	9.5*	4.6	13.8	3.7	8.0
300	3.5	8.5*	4.6	12.4	3.5	7.5
330	3.3	7.5*	4.6	8.0	3.3	7.0
360	2.8	6.5	4.6	7.0	2.8	6.6
400	2.0	5.2	4.6	6.0	2.4	6.0
440	1.9	4.3	**		2.2	5.5
500	1.8	6.5	**		2.0	5.2
550	1.7	5.9	**		1.9	4.8
600	1.6	5.0	**		1.8	4.5
650	1.5	4.5	**		1.8	4.1
700	1.4	4.1	**		1.8	3.7
750	1.4	3.6	**		1.8	3.4
800	1.4	3.2	**		1.8	3.0
900	1.4	2.5	NR		1.6	2.5
1000	1.4	2.3	NR		1.4	2.3
1100	1.4	2.2	NR		1.4	2.2
1200	1.4	2.0	NR		NR	
1300	1.4	1.8	NR		NR	
1400	1.4	1.6	NR		NR	
1500	1.4	1.4	NR		NR	

Praxair's **Proline**[®] engraved rolls are manufactured utilizing the latest in laser technologies and the highest-quality, hardest, densest coating in the industry. Using state-of-the-art computer and laser technology, Praxair can control and manipulate laser engraving. Consult your Praxair technical specialist to specify and order a **Proline**[®] anilox roll that best fits your needs and application.

Praxair's ART and REV engravings are industry-leading technologies that alter the conventional-cell format into proprietary designs that offer the end user unique options in lay down, gloss and opacity, previously unheard of by conventional engravings. Using our proprietary **Proline**[®] anilox roll coating, these technologies can allow you to perform combination work that you've never considered, freeing up stations on your press for more flexibility. Or you can use rolls engraved with ART technology to reduce the number of bumps for those heavy, lay-down, high-opacity jobs to allow for more drying time and/or the number of processes to create your end product. Consult your Praxair technical specialist to see how the ART and REV technologies can customize roll engravings to meet your unique requirements.

The volumes shown are available within Praxair's recommended depth to opening ratio. Under certain circumstances higher volumes may be available to meet specific customer needs.

*These volumes are available with super-finished engravings. Under certain circumstances, higher volumes may be available without superfinishing. Volumes are in billion cubic microns (BCM).

** These line counts achieved by using ART technology are available in specific applications. Please consult your Praxair technical specialist.

NR = The special cell shape produced by ART and REV engraving methods is not recommended in some line counts; however, it is available upon request.



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