HEXPOL COMPOUNDING

PRINTING ROLLER COVERINGS

Printing Overview

Offset printing is a widely used printing technique where the inked image is transferred (or "offset") from a plate to a rubber blanket, then to the printing surface. When used in combination with the lithographic process, which is based on the repulsion of oil and water, the offset technique employs a flat image carrier on which the image to be printed obtains ink from ink rollers, while the non-printing area attracts a film of water, keeping the non-printing areas ink-free.

Advantages of offset printing compared to other printing methods include:

1. Consistent high image quality.
   Offset printing produces sharper and cleaner images and type than letterpress printing because the rubber blanket conforms to the texture of the printing surface.

2. Quick and easy production of printing plates.

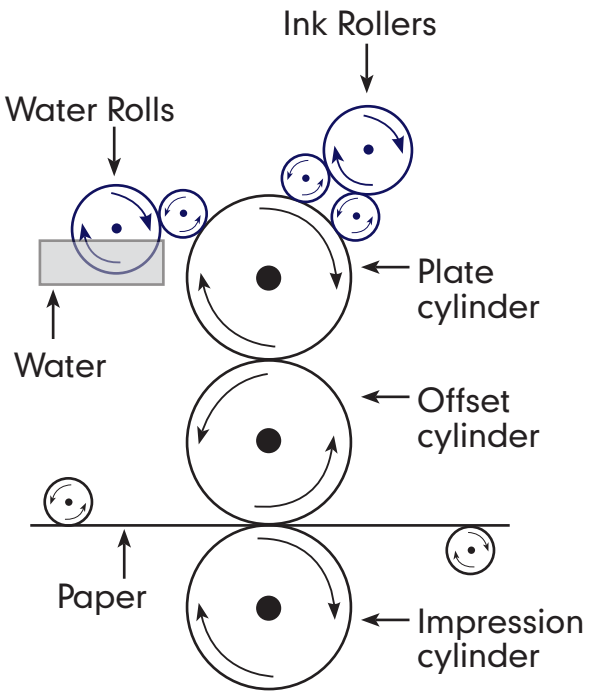
3. Longer printing plate life than on direct litho presses because there is no direct contact between the plate and the printing surface.

4. In Offset Printing, the more you Print, the Less you pay, because most of the price goes into the preparation undergone before the first sheet of paper is printing and ready for distribution. Any additional paper print will only cost the client paper price, which is very minimal.

5. High speed and high volume printing. Flexography also called surface printing), often abbreviated to flexo, is a method of printing most commonly used for packaging (labels, tape, bags, boxes, banners, etc.). A flexographic print is made by creating a positive mirrored master of the required image as a 3D relief in a rubber or polymer material. A measured amount of ink is deposited upon the surface of the printing plate (or printing cylinder) using an engraved anilox roll whose texture holds a specific amount of ink. The print surface then rotates, contacting the print material which transfers the ink.

History of Printing

Phaistos Disc	1850-1400 BC
Woodblock Printing	200 CE
Movable Type	1050
Intaglio	1480's
Printing Press	1489
Lithography	1796
Offset Press	By 1800's
Chromolithography	1837
Rotary Press	1848
Flexography	1890's
Screen Printing	1907
Dye Sublimation	1957
Photocopier	1960's
Pad Printing	1960's
Laser Printer	1969
Dot Matrix Printer	1970
Inkjet Printer	1976
Digital Press	1998



Requirement for Roll Coverings

In recent years, the printing industry has undergone major changes, and many of these changes have resulted in decreased roller life with complaints of rollers shrinking and hardening. These changes, driven by environmental reasons, changes in paper, and higher production needs, have resulted in more hostile physical & chemical conditions for the rubber covering. To simplify things slightly, roller coverings for offset printing press rollers must meet certain minimal requirements, which are outlined below.

Chemical Resistance

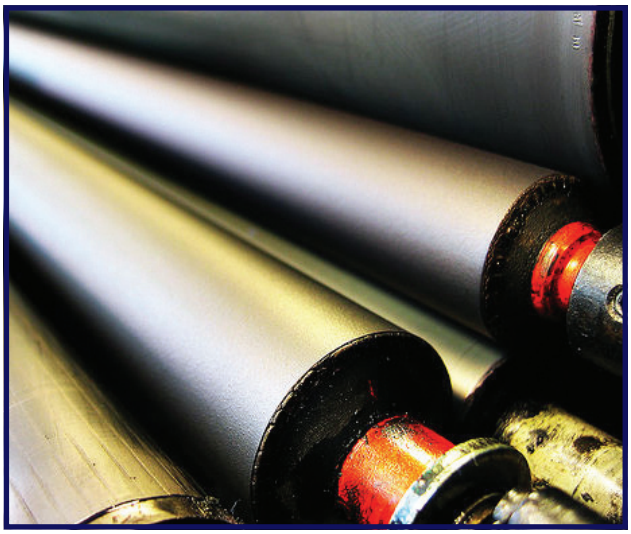
To begin, the rubber covering must be resistant to printing inks. Standard offset printing inks are based on a viscous aliphatic hydrocarbons vehicle, plus the necessary color pigment and minor amounts of other additives. The aliphatic hydrocarbon is the primary concern for selecting the roll covering. In addition, the rubber covering must also be resistant to dampening solutions. A wide range of dampening solutions are also used in these applications. This is also a source of problems for the rubber covering. Another major factor to consider is the roller coverings must have some resistance to the washes used in the printing industry. Unfortunately, anything strong enough to remove ink from the face of a roller is also strong enough to attack the surface of the rubber covering. Roller washes used in today's printing environment are more severe than what was used in the past because government regulations have limited the type of chemicals that can be used. What is being used is actually worse for the roller covering.

Minimal Heat Build-up

Roller coverings must exhibit minimal heat build-up characteristics, or low hysteresis. As press speeds continue to increase, it is essential that the roller continues to run at a stable temperature otherwise rubber coverings will soften and change in diameter. Hysteresis is lost energy resulting from repeated flexing or deformation of the rubber covering. If the rubber used for covering the rollers has good hysteresis properties, the energy expended to pass the rubber into & through the nip is essentially completely recovered as the rubber comes out of the nip. If a roller covering has fair/poor hysteresis properties, the energy expended is not totally recovered as the rubber comes out of the nip and is lost to heat build-up. In other words the roller gets "hot". Generally, compounds exhibiting poor resilience exhibit high heat build-up, however it is not necessarily true that compounds with good rebound will have low heat build-up. Resistance to heat build-up is used in formulating the rubber compound. Heat build-up is an extremely important property in high speed roll application i.e. high speed web press rollers.

Hardness Stability

Another basic property, for roller coverings which are to be used in offset printing, is hardness stability. The ability of the roller covering to maintain it's hardness in the application is extremely important for the printing process. This factor is affected by both the chemical resistance of the compound and the ability of the compound to have low heat build-up.



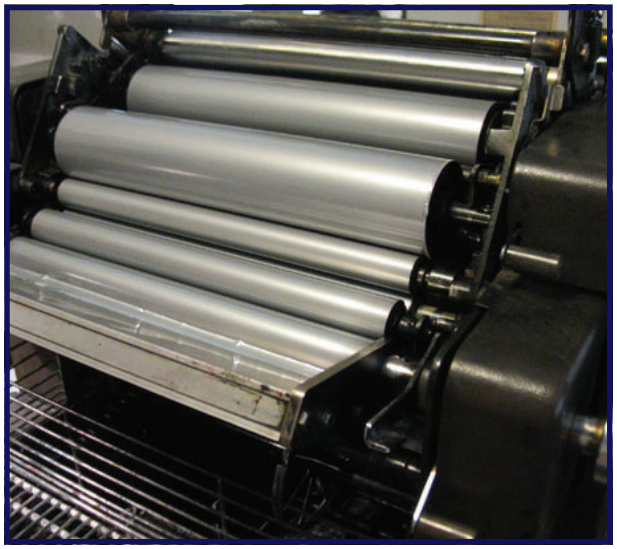
Recommendations

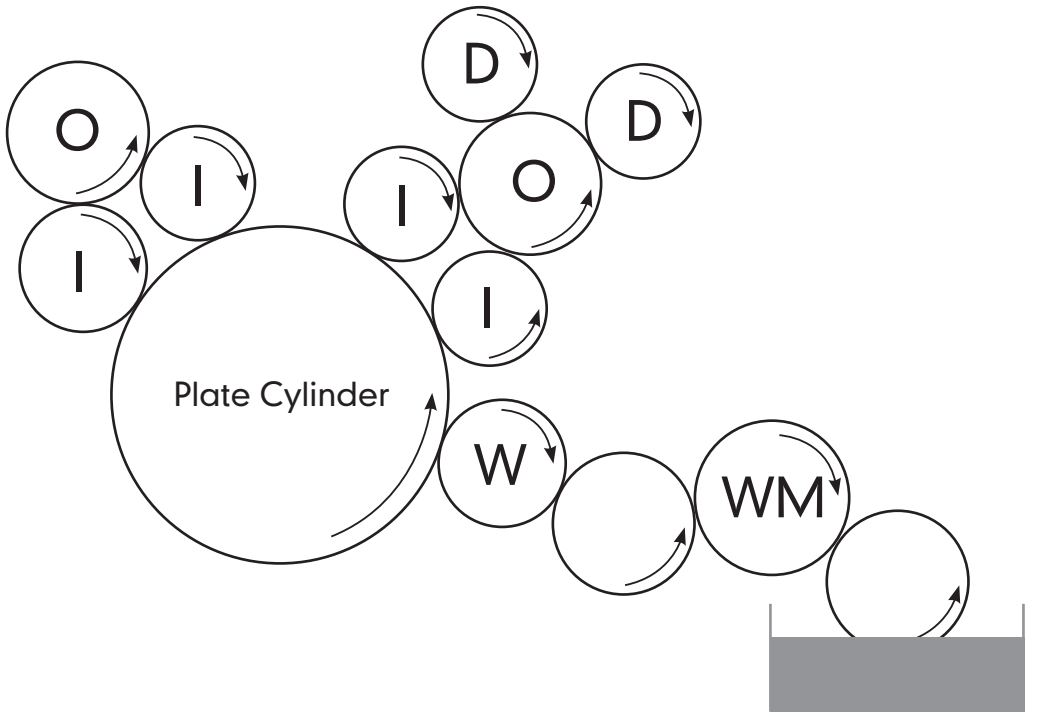
Recommended Compounds for Print Roll Positions

INK FORM	HT, HTP, NP, HW, HB, US, NP93, NB, NP34/37, 165, 166, 167, 76, 163, 169
WATER FORM	HF, HTP, NB, NP34/37, WA, 165, 166, 167, 76, 163, 164, 31, 32, 33, 169
WATER METER	HF, HTP, NB, NP34/37, WA, 165, 166,167, 76, 163, 164, 31, 32, 33, 169/H
INK DISTRIBUTOR	HT, HTP, NP, HW, HB, US, NP93, NB, NP34/37, 165, 166, 167, 176, 163, 169

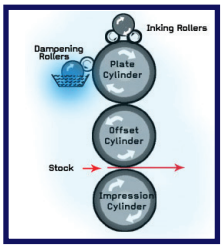
Roller Specifications by Position

WATER FORM	25—30 Durometer (Shore A)
WATER METERING	25-30 Durometer (Shore A)
INK FORM	20-25 Durometer (Shore A)
INK DISTRIBUTOR	25-30 Durometer (Shore A)
DUCTOR	35-45 Durometer (Shore A)
VIBRATOR	65 Durometer (Shore D)
HICKEY PICKER	40-50 Durometer (Shore A)





Offset Printing Compounds



HEXPOL COMPOUNDING

Nitrile/PVC

NB Series	Probably the best non-black universal compound on the market. Ideal for mixed-ink applications. Good performance in most fount solutions. Perfect for customers wishing to stock only one grade. Available in all colours.
NP & 34 Series	Easiest processing grades. Well established compounds, medium PVC level. Suitable for any type of process. Available in all colours.
93 Series	Easy processing, medium PVC content compound. Good inker compound. Available in all colours.
NPX	Excellent value for money compound with medium PVC level. Easy processing. Available in all colours.
NB (7) Series or AT Series	Similar to NB series, but black filled. Extremely good solvent resistance, more compatible with alcohol-free fount solutions than other NBR-PVC grades.

Nitriles

US Series	Exceptional stability due to the chemical make-up. Only available in Black. Tough compound, good in alcohol free founts.
169 Series	Exceptional stability, easier processing than US series. High performance compound, suitable for all offset applications with conventional inks.
HW Series/76 Series	Well established grade, suitable for sheet and web applications. Cool-running characteristics, good dimensional stability and performance life. Available in all colours
HT Series	Traditional offset inker grades, good all round properties. Available in all colours.
WA Series	Similar to HW Series, but with some of the improvements incorporated in the US series. Ideal as a dampener.
HM Series	Basic NBR dampener
HB Series	Black filled version of HW grades. Intermediate between HW & US grades for performance and cost.

EPDM's or EPDM blends for UV

EC or EP	Suitable for continuous UV usage
41 Series	Ideal for continuous use with UV inks. Excellent volume stability
UV Series	Available in all colours.

Hydrophilic and Special Grades

169/H Types	Very good hydrophilic properties. Proven performance.
BA Series	Good hydrophilic properties. Work well on KBA machines.
HI grades	Hicky Picker. Used as a hicky picker on sheet fed machines.
33 Series	Compounds containing cotton fibres, which can be used to replace the fabric sleeve systems used for dampeners.

Flexographic Printing Compounds

EPDM's

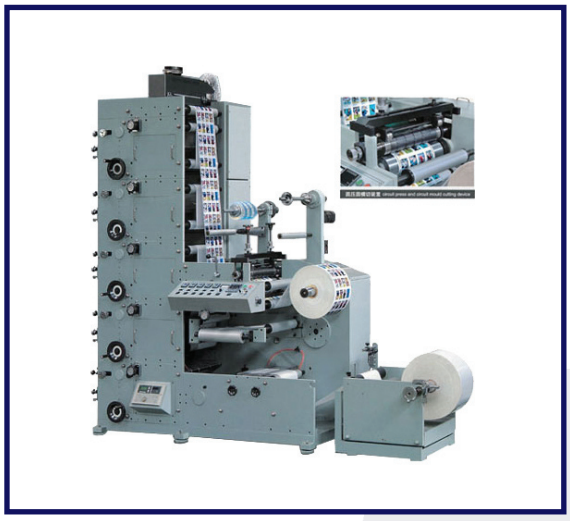
44 Series HR	High resilience, tough compound. Lasers well.
EC Grade	Relatively tough EPDM with superb recovery properties
EP Laser Series	The workhorse of the flexographic grades. Suitable for UV inks and has excellent lasering properties. Available in all colours.
EXPP Translucent Series	EPDM base, but much tougher that the EP grades, hence more difficult to grind and laser. However, service ife is very long and the ink transfer is good. Available in red, blue or green.
EP Conductive	For use where electrical conductivity is a requirement. Good service life and lasering properties.
F4472B	Easy processing grade.

SBR Grades For water based inks

F21260 Grades	Easy processing, good lasering properties
SB Grades	Similar to 2160, based on SBR polymer. Relatively easy to grind and laser. Ideal for water based inks. Available in all colours.
EXPP235	SBR based, but tougher than standard SB. Normally red. Appearance resembles cured photopolymer.

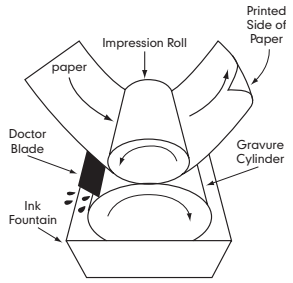
Silicones

SI High Resilience	Silicone based product. Excellent ink transfer onto plastic mediums
Nitrile-PVC	NP Grades, 70° normally used as backing rollers of pressure rollers. Tough with good solvent resistance.



Gravure Printing Grades

Mechanical Gravure

Neoprene NE	Tough neoprene grades normally 70° or 80° Shore	
Tough NBR, BX grades	Used for mechanical gravure and embossing applications.	

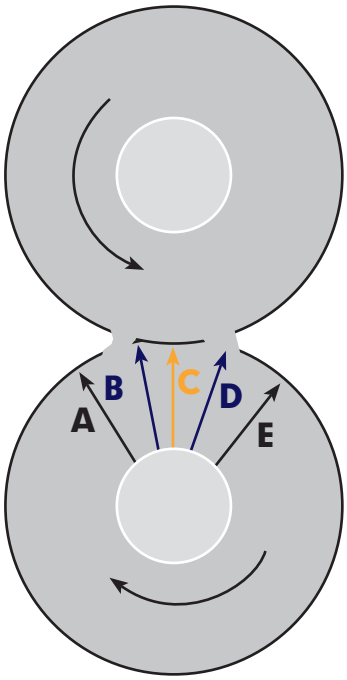
Electrostatic Gravure

For Spengler, Eltex and Heliastat systems

Insulating Base	F04965D - Insulating Ebonite
Conductive Compounds	As per Chart:

RefNo:	Description@	Hardness (Shore A) (+/-5)	S.G. (+/-0.03)	Electrical resistance	ESA System
F04965D	Insulating Compound	97	1.35 109 Ohm	Greater than Heliostat.	Spengler, eltex
F2185B	Conductive Compound	88	1.45	Less than 1K Ohm	Eltex GNN70
F2186B	Semi-conductive compounds for 3 layer system	88	1.60	0.1-0.8 M.Ohm	Heliostat
F62901B	Semi-conductive	90	1.60	0.5-5 M/Ohm	Spengler
F62881B	Semi-conductive compounds for 2 layer system	88	1.60	0.2-0.5 M.Ohm	Spengler
F2221B	Semi-conductive compounds for 3 layer system	90	1.60	10-30 M.Ohm	Eltex GNN70
F6280B	Semi-conductive compounds for 2 layer system	80	1.58	0.5-5 M.Ohm	Spengler
F62851B	Semi-conductive compounds for 2 layer system	85	1.58	5-10M/Ohm	
F62851R	Semi-conductive compounds for 2 layer system on steel stock of 1 layer system on GRP sleeves (red)	85	1.58	10-30 M.Ohm	Eltex GNH60
F62852B	Semi-conductive compounds for 2 layer system on steel stock of 1 layer system on GRP sleeves	85	1.58	10-30M/Ohm	Eltex GNH60
F62501B		50	1.47	10-30M/Ohm	
F62701B		70	1.49	10-30M/Ohm	
F6270B		70	1.49	0.5-5.0 M.Ohm	
F62802B		80	1.58	0.1- 0.8 M. Ohm	
F62803B		80	1.58	2-15	
F62853B		85	1.59	0.5-5.0	

Roller Dynamic



HARD ROLL

A	Entrance - compound relaxed
B	Entry Bulge - high extension & speed
C	Nip Center - high compression
D	Exit Bulge - high extension & speed
E	Exit - compound recovered

ELASTOMERIC ROLL

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