## Lithprinting Guide (revised January 2023)

#### **Unit 1 Basics**

A little theory to understand the processes.

This text was written about 25 years ago, some of the papers presented are hardly available anymore

Highly diluted hydroquinone developers produce coloured image tones with strong overexposure, especially if the oxidation products are not completely trapped away by sulphites, but can participate in the image build-up.

The lith developer contains only one developer substance, namely hydroquinone. Without oxidation protection, hq has only a limited life in alkaline solution, it oxidises to quinone. Quinone no longer has any developing capacity; the intermediate semiquinone is used for lithprinting. If enough semiquinone has been formed through use or supply from outside (inoculation with a small amount of used developer), it can intervene in the development process. Semiquinone is many times more aggressive than the slow original substance hydroquinone. Once developmental germs have reached a certain stage, the radical semiquinone initiates a reaction called "infectious development". Where development has progressed furthest - in the image shadows - an almost abrupt blackening sets in. Here, the development process should be stopped quickly, because the blackening cannot get any deeper, but only goes further. This means that the next shadow zone also becomes black without differentiation!

To build up a coloured image with delicate tonal values, the hydroquinone needs a lot of time. If the image is built up too quickly, the effect is minimal. From four minutes of development time, one can only speak of a lithprint at all, the best results only occur with times between six and twelve minutes. To achieve this, lith developers contain a high amount of development-inhibiting substances, usually potassium bromide. With a "normal dilution" of 1+9, the SE5 LITH would still be too fast if coloured lights are desired. The term "developer concentrate" is not very meaningful at a time when people like to use SUPERlatives for marketing reasons. There is no lith developer on the market that is as highly concentrated as the SE5 LITH, this can be easily determined by direct comparison. Therefore, this developer must either be strongly diluted or its power must be slowed down by adding development inhibitors. Both possibilities are available to the user. Beginners in the lithprint technique should first work without additives and only play with the dilution.

How to approach the desired result is described with the help of picture examples.

Lithprints need "overexposure".

The more light the emulsion gets, the more colourful the result will be.

The higher the amount of light, the more the developer has to be diluted.

The experienced lithprinter can estimate the degree of overexposure. For the first lithprint, one can proceed more systematically by making a normal print with the lens stopped down more than usual. For the lithprint, the aperture should be opened by one to four stops for the same exposure time.

Users who have so far worked exclusively with PE papers do not need to switch to barite processing or buy expensive special lith papers. Some PE papers are completely sufficient and can be used without any quality restrictions, such as our Select VC/PE, Forte or Classic Polywarmton, Agfa MCP, Fomatone PE.



Normal development

For the first lithprint, the gradation filtering can be adopted in order not to complicate matters. Later, if possible, you should expose with white light

in the interest of shorter times. Gradation filters swallow a lot of light and with exposure time extensions of up to four f-stops this can lead to gruelling battles with Schwarzschild. Gradation control via filters is absolutely dispensable in lithography.



Select Sepia VC PE in SE5 Lith Exposure: + one stop Dilution: 1+20 (20ml A + 20ml B + 800ml water) Development time 11 minutes

The result: a pronounced lith print with high contrast and the typical lith shadows. If you want more colour, you need more light.



Exposure: + 1.5 f-stops Dilution: 1+20 (20ml A + 20ml B + 800ml water) Development time 10 minutes

Result: More colour, softer gradation. Due to the shortened development because of the higher amount of light, the black area is not as wide, but the black still lacks depth. In the next example, the amount of light was increased again by half a stop, the developer diluted to 1+25 (20ml A + 20ml B + 1000ml water).



Exposure: + 2 f-stops Dilution: 1+25 (20ml A + 20ml B + 1000ml water) Development time 11 minutes

Result: For the amount of light, the developer is still too fat with the same development time. The highlight colour and gradation are correct, but the shadows are too heavy. So the development time should have been shorter.



Exposure: + 2 f-stops Dilution: 1+30 (20ml A + 20ml B + 1200ml water) Development time 11 minutes

Instead of shortening the development time, the developer can also be diluted more. You can go beyond 1+30 as in this example, but the effect of the developer will change greatly with each additional print. On the one hand, it is used up and therefore develops more slowly, and on the other hand, thin dyes naturally react more strongly to the oxidation products. The semiquinone concentration increases and development-inhibiting bromides are formed.

This can only be compensated by regular regeneration with equally diluted fresh working solution.

So far, only the two parts A and B have been used. The advanced user may want to take advantage of the additives included in the "full programme" MASTER SET. However, these additives are also available separately. Their function will be discussed in more detail later, here is just an example of the effect of the "brake" LITH D. Instead of high dilution, the rapidity of the developer is slowed down by development retarders. The advantage is that the working solution can be kept more stable. If one starts with an artificially high bromide content, the increase in bromide that inevitably occurs with every development cycle can be compensated for by regenerating with working solution of the same dilution without bromide if necessary.

Just to demonstrate the effect of Additive D, it was extremely overdosed in the following example, which caused further overexposure.



Exposure: + 3 f-stops Dilution: 1+15 (20ml A + 20ml B + 600ml water + 40ml ! D) Development time 9 minutes

The comparison with the previous print shows a very similar gradation with slightly cooler highlight tones despite the higher amount of light because the development time was three minutes shorter. The shadows are clearly colder and therefore also of higher density.

# Unit 2 FB or RC

Where are the differences? The first question to be answered is which emulsions are suitable for the lithprint technique at all.

Almost all emulsions that do not contain development accelerators are suitable. Incorporated accelerators react superadditively with hydroquinone, turning the (slow) lith developer into a highspeed developer and completely ruling out a lith effect. The "evil" can be eliminated in some cases by washing out before development, but the success is uncertain. Minor partial residues can lead to islands of rapid development that are simply annoying.

Now, one should not believe that once tested, emulsions are made exactly the same for all time. The Agfa MCC, for example, worked wonderfully in the first years after its market launch; it was my first alternative to Sterling Lith paper. At some point nothing worked - for years! For about two years now it has been working again, although the image tone is slightly different, but at least without any problems, with a huge advantage for the beginner, by the way. The onset of "infectious development" is clearly visible in darkroom light, there are no uncertainties with the "snatch point". What you see is what you get.



Agfa MCC 1+30 - the PE variant MCP behaves absolutely the same.

With some warm emulsions you need some experience. Often one stays too long in the developer because of insecurity, only in the fixing bath does the lithprint appear in its full power. It is as if a veil that lies over the image is pulled away.





Fortezo Museum 1+35

Kentmere Fineprint VC Warmtone 1+40

The Kentmere surface is slightly textured, the carrier has a creamy tone. The lith colour is very subtle, even diluting the lith developer to 1+60 and overexposing by four to five stops does not change this.

The surface of Kentmere Art papers is similar to that of coarse-grained watercolour paper. This can only be shown here in an approximate way, these papers only appear when you hold them in your hand.





Kentmere Ducument Art

The analogue community should not expect much from the big manufacturers in the future. The market has shrunk so much that investments in research and development do not pay off. There is one paper I still mourn, one of the most beautiful of all, the Kodak Ektalure. May the controller with the red pencil burn in hell!

Sterling Lith is unfortunately no longer produced. It was an Indian paper made according to a recipe by Argenta Munich, which is a shame! Annoyingly, great papers usually sink into oblivion without sound or reverence. I would like to make a small obituary at this point.

Some "lith papers" owed their excellent properties to an emulsion containing cadmium. All the moaning is of no use now, those days are irrevocably over (fortunately for our environment). Kentmere Kentona is still a good paper, but its former incomparable reddish tone can no longer be achieved with the cadmium-free emulsion.





M.Stalter Sterling Lith

A.S.C. Kentmere Kentona old emulsion with Cadmium

So let us turn again to the papers that the market is giving us today. There are some brands on the market where identical or very similar emulsions are cast on both barytes and PE. The differences in processing are so small that there is no need to go into detail. What is more or less evident in all brands, however, is a stronger colouring of the PE variants after drying. This is probably due to the fact that the silver threads that shoot out into the gelatine during lith development are compressed more strongly on the sealed surfaces during drying than on the open baryte surfaces.

It is therefore possible to take over the values of dilution, exposure and development time when changing from PE to barytes or vice versa. Of course, the results will not be completely identical right away, because the casting batches always turn out slightly different.

In addition to Select Sepia VC, several other brands are available with both carriers: Forte & Classic Polywarmtone, Agfa MCC/MCP, Maco Expo R and Lith PE, Fomatone MG.

Some of the Fomabrom papers are also suitable.



#### Fomabrom N112

For very colourful results with reddish-yellow highlights and green-black shadows, Fomatone is the first choice. A paper that is completely easy to handle and develops colour even with short development times.





Fomatone MG 131 SE5 LITH 1+30 15ml A + 15ml B + 900ml water Exposure +2.5 f-stops Development time 8.5 minutes Fomatone MG 131 Exposure +3 f-stops First developer: 1+30

- 15ml A + 15ml B + 900ml water

+5ml C + 5ml D, 7 minutes

Second developer: 1+15 - 20ml A +20ml B + 600ml water, 1 minute

Left: With even greater developer dilution and correspondingly longer exposure time, more colour can be expected here as well. Because we already know this from the Select example, I would like to show another possibility. Now the additives come into play again and two differently adjusted developers are used.

Right: Two-bath development has the advantage of being able to print negatives of different contrast levels one after the other without having to change the dilution. One developer is strongly diluted or its properties are changed with additives, the second one is stronger in order to be able to blacken quickly and thoroughly.



Oriental New Seagull SE5 Lith

## **Unit 3 Cold and Neutral Papers**

Oriental New Seagull - A classic among lith papers.

Attention , only the papers with the designation of origin ORIENTAL PHOTO IND. CO., LTD, TOKYO JAPAN (blue boxes) are guaranteed to be lithable.

The typical oriental creamy beige image tone changes very little with different developer dilutions. This paper is exceptional in differentiating shadows, even in the "lith shadows" the zones can be separated.

Processing recommendation: EasyLlith A+B+Water 1+1+20 to 1+1+40 MasterLith A+B+Water 1+1+20 to 1+1+30 Starter D as needed (0 - 30ml/litre) Lith C should be added in small quantities at most for regeneration.





Götz Pilarczyk A print from a lith workshop in Hürth: Oriental G2 MasterLith 1+15 (25A+25B+750Water+10D) 7:30 min

Kerstin Stelter Kodak Selenium Toner 1+10 4 minutes

Oriental liths can be toned very well in selenium and gold. Here is an example of a strong selenium toning, other toning patterns are under "Tonings".

**Graded papers** 

Fomabrom und Wephota Baryt Brillant

These papers are still listed here, although their availability in the future is not assured. The tone is yellowish, the shades greenish black. Toning is not absolutely necessary, but the maximum blackening can be raised enormously by selenium toning. With different dilutions and toning times, reddish-yellow to magenta image tones can be achieved.





Gerd Münz

Fomabrom SE5 Lith 1+15 (25A+25B+750ml water +20ml D) 8:30 mins untoned A:S:C:

Wephota Baryt Brillant SE5 Lith 1+20 (25A+25B+1000 water +20ml D) 9:30 mins Selenium toner 1+8 3 mins

Maco RF und Classic Art

These papers are excellent for litho and toning. The emulsions have a high bromide silver content which leads to an accentuated image grain in the dark mid-tones. The image tone can be varied from yellowish to reddish or deep brown by adjusting the amount of light and the developer.

If the grain is found to be too sharp, or if peppercorns occur, sulphite (Lith C) can be added. When using the ready-mixed lith developer (Easylith), a slight excess of B solution helps in these cases.



Helga Pisters

SE5 Master Lith 1+20 (25A+25B+1000ml water+10C+25D) 12 minutes Selenium toner 1+20 6 minutes



Patrik Budenz Maco RF EasyLith 1+30 (15A+20B+1050 water)



Carbon toning 1+10 3 minutes

# Classic Vario (Fotokemika Varycon)

A contrast variable cold tone paper with a high bromide silver content, lithet with sharp grain and muted colourfulness, but can be retoned into very beautiful colours.

Helga Pisters SE5 Lith 1+30 (15A+15B+900water+8D) 12 minutes untoned

Selenium toning + sulphur toning

Selenium toning + Sulphur toning + Gold toning



The following examples show the effect of different mixing ratios A:B (EasyLith) at the same dilution with water using the example of Classic Vario. The effect can be transferred analogously to other papers.







10A+20B+500ml water The print appears soft without deep black 20A+10B+500ml water The print becomes more contrasty, more colourful in the highlights and more grainy in the shadows. 15A+15B+500ml water Carbon toning 1+10 4min Forte Polygrade and Classic Arts Polygrade

Cold tone emulsion, lithet only with very extended development times, but then with a very special tone. A "lith" paper only for masochists.



Christa Lachenmaier SE5 Lith 1+15 30 minutes !

#### Unit 4 Warmtone Papers

The "lithable" warmtone papers react strongly to differently tuned lith developers, so that a wide variety of results can be achieved with a single paper.

Like all lith enthusiasts in the early days of lithography, I made my first lith prints with the lith developer from Fotospeed on the incomparable Sterling Lith paper. In search of inexpensive alternatives, I came across Agfa MCC, which had just appeared at the time, and began to try my hand at my own developer formulations. Obviously, the MCC emulsion had been changed several times in the past. For a long time, nothing worked, because no more lith was possible due to stored development accelerators.

When it became clear that one criterion for the "lithability" of emulsions was the absence of embedded development accelerators, a whole range of inexpensive, excellent papers were available. All these papers offered another advantage, the technology-related (higher) silver content.

Papers from Orwo, Foma and Forte, as well as the English Kentmere papers and Kodak Ektalure became an alternative to Sterling and Oriental. Some new brands and papers have been added, others have unfortunately probably disappeared from the market for good.

The Agfa MCC is not a warm tone paper, but lithes in subtle beige to bright ochre tones. It is ideally suited for first lith attempts because the "snatch point" is clearly recognisable even for beginners.

Selenium and sulphur toning increase the colourfulness of the mid-tones, whereas carbon toning usually has a "neutralising" effect.



Jos Mariën Agfa MCC

# Moersch Select Sepia, Select Shedlight and Select Ivory

#### Forte Fortezo Museum and Forte Polywarmton

The Select Sepia VC brings a high colourfulness even without toning. The highlight tone can be adjusted from yellow to reddish brown via the amount of light. The more time the print gets before lith black is applied, the more reddish the tone becomes. If the development time is less than five minutes, yellow tones are to be expected, at 7-8 minutes the print becomes more colourful, and at more than 10 minutes a reddish tone appears. If the development time is to be extended, the developer should be diluted more or, in the case of Master Lith, the Starter D should be used to slow it down. It should be noted that with both methods a point is reached at which maximum black is no longer possible.



Markus Pfeffer Select Sepia VC

The Select Shedlight differs only slightly from the VC paper in the result. Because of the higher silver content, the shadows appear somewhat deeper. Selenium and gold toning cause a very clear increase in densities, selenium mainly in the shadows, gold over the entire tonal range.



Select Shedlight

"Soft" lith print with high coverage in the highlights - to avoid the shadows running in, the development was stopped immediately when the "lith effect" occurred. A very short toning of 15 seconds in Selenium 1+4 only deepens the shadows and the tone also clearly settles.



A.S.C. Select Shedlight Lithprint with "clean" image whites due to tight exposure. Selenium toning 1+20 three minutes



A.S.C. Select Ivory

This print was also toned in selenium, dilution 1+4 two minutes! In this (for 1+4) long toning time the mid tones are achieved.

Kentmere Kentona and Kentmere Art Classic

The distinctly different kentona colour in the cadmium-free emulsion was already indicated in Lesson 2. The highlight tone is more yellowish, the shadows are distinctly green with a tendency to grain in the transitions to the midtones. If a pronounced grain is desired, the developer should be adjusted with a slight excess of A solution. To suppress grain, Additive C can be used with the MASTERSET, and a little B solution can be added with the EASYLITH. The clay, which is cool yellow when wet, appears slightly warmer after drying. Kentona is still a very interesting lith paper. It reacts very

quickly to toning, so toner solutions should be diluted heavily for first attempts. Toning examples will be shown in the next lesson.

Kentmere's Art Classic also comes out a little less reddish than it used to, but a light selenium toning is enough to push the tone into warm red or, with longer exposure, a cool magenta tone. Another way to create bright reddish tones is to use Additive F or the Polychrome technique with an ammonia alkaline second developer (see PDF Colour for Black & White).





Kentmere Kentona cadmium free

Kentmere Art Classic with selenium toning

## Formatone

The Fomatone has already been introduced, here is an example of a reddish tone without further toning. The image tone is created with strong overexposure and a high dosage of the retarding additive D, even with a development time of less than 10 minutes.



Wolfgang Moersch Formatone

## Forte Polywarmtone, Bergger Prestige, Adox Polywarmtone

The individual stamps hardly differ from each other as far as their lithability is concerned. The highlight colours are similar, mostly reddish yellow and the shadows greenish or brownish black. The edge between lith black and the mid tones is not very sharply defined, the transitions between highlights and shadows often appear greenish, especially with highly diluted developers. To create deep black shadows, a short toning in bold selenium toner is mandatory.







A.S.C.

Forte Polywarmton

Frank Peinemann

Bergger Prestige

Gerd Münz Adox Polywarmton

#### Lesson 5 Toning

Coloured lith prints can usually be retoned to even more intense colours. Multiple tonings of lith and polychrome prints have a more striking effect than those of conventional prints because tone groups can be clearly separated. Of course, the order of toning also plays a role. Because of the large number of toning possibilities, only a rough overview will be given here.

Let's start with a one-bath toning with selenium. With very diluted toners (1+100 or more) the highlights are also reached before the maximum blackening in the shadows decreases again:

If only the deepest black is to be intensified or de-greened, tone in a strict toner (1+5 to 1+20) for between 15 and 60 seconds.





Frank Peinemann Bergger Prestige

Selenium toned through

Gerd Münz Fomabrom Selenium 1+15 60sec

The highlight tone should not be changed, only the shadows should be strengthened.



Wolfgang Moersch Select Sepia VC

Here only 20 seconds were toned at 1+5, the green-black shadow tone changes to magenta, the mid-tones get a hint of blue, the highlights remain unchanged.





Rolf H. Funke Fomatone

A short selenium toning quickly shifts the greenish shade towards magenta, the blackening increases very clearly.

Christian Schicker Select Sepia Polychrome print with strong selenium toning

The images produced in the polychrome technique (two-bath lith+ammoniacal glycine developer) literally rip the selenium out of the toner. All colour shades between red and blue are possible, the decisive factor is the toning time.





Frank Peinemann Fortezo Museum Selenium+Sulphur Frank Stölben Select Shedlight strong selenium and weak copper toning

The second toning bath could have been dispensed with, but the touch of copper seemed just right.

Pure sulphur toning usually brings back the previously bleached highlights in the same tone without any change. The combination of selenium and sulphur has a different effect.





Matthias Stalter Agfa MCC Carbon-toner according to Bleicher

Wolfgang Moersch Select Sepia VC Carbon-toner according to Bleicher

My carbon toner has an even stronger effect than selenium toner, which This toning has a completely different effect on Select Sepia: is why it should be used in high dilution in most cases. Here the highlights were bleached and then toned with 1+20 for 30 seconds. 1. lith 1+8 60A+40B+10D+800water

Two-bad development 1. lith 1+8 60A+40B+10D+800water 2. VGT 10A+2B+20C1000water Highlights bleached and "carbonised

The effect of the carbon toner without bleaching can be seen in direct comparison with the untoned original.



A.S.C. Select Sepia VC untone



Carbone toning 1+10 one minute





Carbon toning 1+40 30 seconds

tA.S.C. Fomatone untoned



Wolfgang Moersch Kentmere Kentona Shade selenised, lights gilded

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Kentona liths react magnificently to all kinds of toners. This usually happens very quickly and thoroughly. If the process is to be sufficiently slow to be able to assess the toning progress, the solutions should be diluted as much as possible. Here is an example of a Sele-Gold split toning. First the shadows are fully toned in selenium, after extensive soaking the highlights can be toned blue in gold toner.

# Unit 6 Mistakes and how to avoid them

Error	Cause	Remedy
Oranteest to a bind	Under expegure	Evtend evineaure, dilute developer
	Negative tee herd	Extend exposure, dilute developer
		Extend exposure + two-bath development
(see picture 1)	Negative much too hard	Pre-expose paper, if necessary overtone
Pale highlights with rich blacks	Under-exposure	Extend exposure
no rich blacks	too much sulphite	Reduce sulphite
	Developed too short due to overexposure	shorter exposure or add bromide
	inappropriate developer approach	Note paper table, see also fine tuning
	Exhausted developer	regenerate or fresh developer
	some warm tone emulsions "lithen" brown-black	Selenium tuning sharp and short
Print too black, lith ribbon too wide	overdeveloped	out earlier, or add bromide
Image edge veiled	Duka light too bright/unsuitable spectral range	if not to be changed, add bromide
	Bromide content too low for paper used	Note paper table and add bromide
Black dods Single black dots of various	All papers with high lithability are affected, combined	fatter approaches, increase sulphite quantity
sizes, also at the edge of the picture	with highly diluted developer without regeneration,	significantly, regenerate with fresh working solution
usually only after the 3rd-5th print.	strongly pronounced with Expo R and EMAKS.	or with sulphite after each print
small black dots in the lights	Peppercorn	Increase sulphite content (Lith C)
Spots and patterns of irregular blackening in highlights & midtones	"Chaotic infectious development" may occur with	Do not skimp on developer, paper and time are
	exhausted developer with high semiquinone content,	more expensive, regularly regenerate vulnerable
	Not to be avoided with Fomabrom Variant.	papers, see shelf life and capacity.
irregular black spots (see picture 2 and see picture 3)	Layer lying motionless on the bottom of the shell or	Poduce the amount of developer to avoid
	with layer upwards: print floated up and short-term	
	partial "falling dry".	buoyancy, but in any case keep moving it.
Bright spots with blurred edge in the transparent view	insufficient hardening of the baryta layer, in case of	for affected papers or individual paper emulsions,
	long processing times chemical. Violation of the	shorten the development time with a richer
	barytage starting from the reverse side	preparation (+B solution)
Image colour in the highlights		Change to a more coloured paper or more light
unadjusted	Too little light or unsuitable paper	combined with more bromide
(see picture 1)		

The following picture examples are intended to show the errors listed above by way of example.



Picture 2: More or less large dark spots. Cause: The print was not moved sufficiently, there was only little developer in the tray, the print has bulged up. As soon as the surface partially "dries out", the "infectious development" starts immediately because of the oxidation at this spot.



Picture 3: More or less large dark spots A quick exposure in between and there it is, two islets sticking out, nothing has happened yet, but towards the end the curls appear where the print got air.

