Silverprint Emulsion SE1

Silver gelatin photo emulsion

Light sensitive product • Open under red or orange safelight conditions only • Store below 10°C, do not freeze • Caution — see warning box

With the reduction of variety in manufactured photographic paper, the Silverprint emulsions offer an alternative but straightforward means to printing, not only on paper but on an extremely wide range of materials from fabric to glass. They are high-quality modern black and white photographic emulsions, as normally used by photographic paper manufacturers to coat paper.

The emulsions are supplied in light-tight bottles as solid gelatin, which melts when the bottle is placed in hot water above 40°C (although to give time to coat it is best to heat the material to around 60°C). Once liquified, the emulsion is applied by one of a variety of coating techniques and allowed to dry before being exposed. It is then processed in essentially the same way as a conventional manufactured paper.

These instructions offer a brief account of basic technique. For more extensive discussion and guidance see Silver Gelatin, A User’s Guide to Liquid Photographic Emulsion, available direct from Silverprint.

SE1 Emulsion

A normal contrast bromide emulsion with a high silver content and a good concentration of high bloom gelatin which aids robustness in high silver content and a good concentration of an anti-foggant such as Rayco R42. Each re-melting from the solid state will reduce the viscosity of the gelatin and increase fog level. To minimise this effect, especially if a large quantity is to be used over a fairly long period of time, the emulsion can be melted down and divided into separate small containers which are then used as needed. Opaque black tubs are ideal, but non-opaque containers are usable if the emulsion is first put in opaque plastic bags of the kind used for photographic papers.

It is worthwhile to test fog level in a given darkroom for a given batch of emulsion, to see whether this is likely to be a problem. This may be done by coating a piece of fibre-based black and white paper that has been fixed, carefully, washed and dried. The paper should be left under safelight conditions for five minutes or so before being developed and fixed normally. If fog appears, it may have arisen from two possible sources. The first is the darkroom. This can be tested by coating and processing in complete darkness. The darkroom used must be absolutely light-tight, since the time involved for handling the emulsion is likely to be close to its maximum safelight duration. Likewise, darker red rather than orange safelights will give longer safe handling times. Room and processing solution temperatures should be below 25 degrees.

Having eliminated the effects of the darkroom environment the emulsion itself can be tested, increasing the anti-foggant until fogging is suppressed. If significant additions of anti-foggant are needed the emulsion should be replaced.

Base Selection

It’s a good idea to work initially with a good quality watercolour paper in order to develop competence and later, if desired, move to other surfaces.

Although almost any paper can be coated two factors make watercolour paper a good starting point. First, watercolour paper is designed to take liquids and is thus well-suited to the application of emulsion. Second, it is likely to be of higher quality, notably acid-free, and is therefore better suited to producing a stable, permanent image.

Normally paper will require no special preparation but a particularly absorbent stock, like other absorbent materials, may require gelatin size. A ready-made preparation is the Silverprint Hardening and Subbing solution.

Papers are available in a variety of surfaces. In general, hot-pressed, very smooth papers will show the highest resolution but may be unforgiving of errors in coating — whilst very heavily textured papers can have a tendency to allow pools of emulsion to form on their surface, resulting in blotches. A heavier weight paper (say 300 gsm) will be more robust in processing, and distant less as it dries.

Fabric

Natural fabrics are most suitable since their fibres provide a better texture for the emulsion to adhere to. Muslin, linen, cotton and silk are usually supplied in a form that cannot contaminate the emulsion, but other fabrics should be washed extensively to remove residual chemical content left from manufacture. Pure soap flakes should be used. Some fabrics, e.g. canvas, require the use of an oil-based primer if maximum total range is to be achieved. Korean and sharpness is desired and others may produce a better image if they are primed.

Glass, Ceramics, Stone, Metal, Wood etc.

In general the key considerations are —

Is the material too smooth to accept emulsion readily?

With glass or enamelware, for instance, a gelatin subbing layer may be helpful.

Is the material too porous and therefore likely to soak up both the emulsion and processing chemicals?

Examples: ungazed ceramics, some stone. Again the antiseptic is a subbing layer.

Does the material contain chemical residues that will fog or otherwise interfere with the emulsion?

— e.g. with wood and many metals. In this case a lacquer or primer application is recommended.

All surfaces should be carefully cleaned.

Emulsion Coating

A wide variety of coating methods are possible and the best approach is to establish one that works for you. Only a few methods are mentioned here and ‘Silver Gelatin’ should be consulted for further techniques.

Brush coating

Brush coating is perhaps the most versatile; it will work well on paper as well as a number of other materials. Brushes must not have metal parts that will come into contact with the emulsion. Chinese-made goat’s hair or Japanese brushes are an economical and suitable option, but like any new brush should be washed carefully before use to remove loose hairs. The surface should be brushed smoothly in a sequence of vertical followed by horizontal strokes. If the emulsion continues to be worked to the point where it starts to gel, bubbles will tend to burst or be swept aside. Since vertical brush stroke marks are more obvious than horizontal ones care should be taken to finish with horizontal strokes. A heavy deposit of emulsion at the point where the brush is lifted from the work should be avoided, as this will prove difficult to fix adequately and will be prone to staining.

Spraying

Spraying will work on many surfaces and is especially suitable for three-dimensional objects. It’s a method worth trying with any surface proving difficult via other techniques. It has its own special difficulties and should therefore not be the first choice for coating small flat areas where other effective approaches are available.

The spray nozzle used should not have metal parts that could cause contamination. The emulsion is best diluted with water or a considerable amount of pure alcohol e.g. clear methylated spirit. This produces a finer mist of droplets on spraying and also helps to flow together on the base to form a [burn-out].
Printing & Processing

Printing and processing is in most respects exactly the same as with a fibre-based paper of a fixed medium contrast. After exposure the emulsion is passed through a developer followed by a stop bath and then a fix. It is a good idea to make test coatings on the material chosen and to use these to determine correct exposure. Allowance should be made for considerable dry-down and ideally tests should be carried through to the dry stage to determine to what degree exposure compensation must be made for this. As with a manufactured graded paper, contrast may be reduced by using a soft-working print developer or by changing. Denser lighter light sources may also be used to alter contrast. A condenser head provides higher contrast than one that uses opal acrylic as a diffuser — such as a colour head or a cold-cathode.

Standard developers such as Agfa Neutol, Kodak Dektol or Ilford P.G. Universal work well. Agfa Neutol W.A. is particularly suited for warmer-toned development and to give a result suitable for subsequent toning. Development should be followed by a stop bath and a standard ammonium thiosulphate fix such as Agfa Afexol, Kodak Polymax or Rapid Hypon. The addition of a hardener to the fix is recommended to aid robustness in wet handling.

After fixing, the coated material should be washed with greater care than with a conventional fibre-based print, particularly if the material is likely to have absorbed a lot of processing chemistry. It is generally advisable to use a hypo-clearing bath.

Good washing means two main things; gentle agitation and regular replacement of wash water. Higher temperatures mean the emulsion is more efficient at washing out the fix but must not exceed 25 degrees. Very cold water is extremely inefficient and will lead to an unnecessary doubling of necessary wash time from 20 degrees to 10 degrees. If wash temperature is too low, below hypo-clearing becomes mandatory to avoid staining and to achieve permanence. It is generally acknowledged that cold storage or still water can wash as well as constant flow. This also holds true for the post fixing process, depending upon the surface coated, and the cold water temperature. The emulsion will tone normally after fixing but a special technique need be applied, as though always when the emulsion is wet, care should be taken to avoid mechanical damage.

2. You are very confident of your technique, and as such your handling of the emulsion is tight and clean. It is not exposed to the atmosphere.

3. You can make some sort of contract to the satisfaction of both parties if a problem should appear. This should contain clauses to cover the level of illumination which is the work is subjected and other related criteria including temperature.

Archival storage methods are as for fibre-based papers and appropriate reference works should be consulted. The main relevant points are to keep the work away from potentially damaging materials such as base wood or certain plastics; to keep it out of the light for as much as possible and avoid temperature and humidity extremes.

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Silverprint Emulsion SE1 is well suited to storing drying, or dry, coated paper. Gentle heat from a hair dryer or fan will speed the process. Care should be taken at this stage to ensure that the emulsion is not removed by extended exposure to sunlight. If coated material is to be allowed to dry for an extended period then this should take place in complete darkness. A good supply of photographic paper boxes are well suited to storing drying, or dry, coated paper.

Spillages of emulsion and utensils used for coating must be cleaned up immediately. If unevenness in coating is experienced — or if an emulsion becomes too thin — use an emulsion hardener. A second emulsion is passed through a developer and is therefore a better choice. The emulsion will tone normally after fixing but a hypo-clearing becomes mandatory to avoid staining and to achieve permanence.

Occurring during processing: emulsion has been allowed to dry properly, or the processing solutions / washers is too warm.

9. Image streaks

Occurring during drying: too much heat is being used, or the emulsion is too thick. Overlong development time with developer / fixer has caused a loss of detail in the negative. Solution: air dry under gentle heat.

Occurring during processing: emulsion has been allowed to dry properly, or the processing solutions / washers is too warm.

10. Prints/areas that lighten after process & drying: indicate a high level of developer, or fixer which is bleaching the image. Non-absorbent bases like perspex will not produce this problem so soonest, e.g. the day after processing. Absorbent bases may accept excess thiosulphate and stabilise the material to some extent but fading may appear in the medium/long term. Other possible cause: excessively thick emulsion layer. You can check for residual thiosulphate, but the image can never be reclamed. The first step is to reprim: (i) allow to control emulsion coating thickness, and (ii) extending washing time by 100%.

11. Small white spots as with bubbles indicate small non-coated areas. Often found with rough surfaces in recesses missed by the coating tool.

12. Small black spots: these probably indicate lack of coating from an impure base material, e.g. low quality wool or paper. Treatments: if working with paper, use a sizing agent; otherwise, barrier layers are required.

13. Fingerprints and handling marks

Black fingerprints are due to touching the print material / developer-contaminated fingertips. White fingerprints are usually due to touching with fingers contaminated with fixer or stop bath. Prints may also develop grey or black stains from rough handling, or from an excessively wet print. In the latter area complications may arise — highly visible. Large recesses or corners of centres devoid of emulsion. Usually visible during coating, should be blown away or touched with a red immersed in emulsion.

3. Areas that separate from the base indicate a weak emulsion bond. Insufficient drying — or possibly poor base preparation / subbing. Thickness of emulsion coating being inefficient. Such problems may make themselves manifest through staining and partial or complete separation of the emulsion from its base.

High degrees of light and humidity will greatly accelerate the breakdown of a work and a print that might appear quite stable in moderate conditions, may deteriorate rapidly if displayed in sunlight. It is therefore wise to be very wary of attaching a high commercial value to work that has photographed and is therefore a better choice. The emulsion will tone normally after fixing but a hypo-clearing becomes mandatory to avoid staining and to achieve permanence.

Note: stress marks can be mistaken for fogging. High-speed emulsions are especially vulnerable.

6. No image, cause could be...

(ii) Insufficient exposure (possible if using the slower SE3 emulsion)

(iii) Contaminants in the base layer have desensitised the emulsion; correct by adding or improving barrier layer.

(iv) Processing chemicals are exhausted, or contaminated, or have been used in the wrong order.

7. Thin image, coating marks such as striped appearance do to excessively thick coating. If using dilute emulsion, increase strength and apply two coats, drying in between. If a film is too high, increase amount applied, work it more to give a greater eveness. Other treatments: add wetting or bulking agents.

8. Blushe patches produced some time after processing occur when un-fixed emulsion (perhaps a locally extra thick patch deposited by a coating tool) prints-out to strong light. If you are aware of such areas, try brushing double-strength rapid fller onto them during the fixing stage.

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