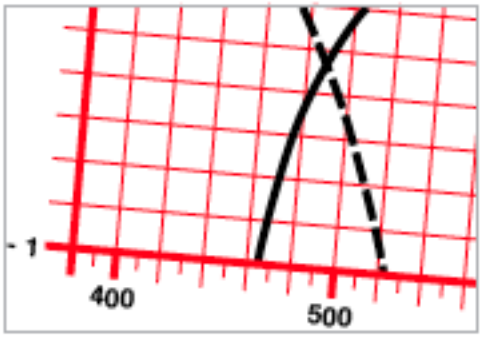
TECHNICAL DATA



ADOX MCC PHOTOPAPER

ADOX MCC is a variable-contrast black-and-white photo paper on fibre base support.

Characteristics

• ADOX MCC is an all-purpose B/W enlarging paper, whose contrast can be varied with colour filters.

• If the standard contrast control filters are used, it is possible to vary the contrast simply, without the trouble of converting the exposure times.

• The contrast range is similar to that of conventional fixed-contrast papers. ADOX MCC can therefore replace all paper grades from extra soft to extra hard.

• The paper can be exposed on any enlarger and processed in trays like conventional B/W fibre paper.

• ADOX MCC provides print quality which matches graded B/W fibre-base photo papers.

The discriminating consumer can now enjoy the advantages and convenience of a variable contrast black and-white paper in all fields of pictorial photography.

The range

ADOX MCC 110 FB
(glossy, double weight)

ADOX MCC 112 FB
(semi-matte, double weight)

ADOX MCC is available as sheets in all the standard formats up to 50.8 x 61 cm. Wide rolls (110 cm wide) are available for professional enlarging.

Special formats can be supplied on request.

Minimal variations in the dimensions/sizes are possible – due to cutting tolerances and expansion effects (to DIN 4506 Part1 and ISO 1008).

Packaging

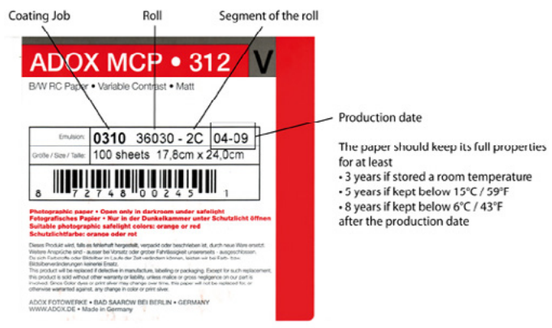
The original packaging protects the paper from light and brief exposure to humidity and fumes.

The inside packaging for sheets and rolls consists of lightproof PE bags or PE foils.

The outside packaging is a white cardboard wallet or a box with a tongued lid for sheets, and a corrugated cardboard tongued box for rolls.The outside packaging alone does not provide adequate protection from light. Use both the inside and outside packaging for storing paper in opened packs.

Emulsion number

A product coding is printed on the label. It consists of the coating job number (4 digits) followed by the roll number (5 digits) followed by a horizontal dash and a 2 digit code in order to locate the the section within the roll.
On the very right hand stands the production date.



Storage

Black-and-white photo papers should be kept cool, dry and protected from harmful fumes. Temperatures under 20 °C and a relative humidity of 50 % to 60 % ensure that the papers will keep well over a very long period. Opened packs should be closed well after use (inside and outside packaging), and if possible not stored in darkrooms or other wet rooms, only in cool and dry areas.The natural ageing process of photopapers is considerably retarded by refrigeration or deep freezing. The paper must however be taken out of cold storage some hours before use, and brought up to room temperature.

Darkroom safelights

Since ADOX MCC is an orthochromatically sensitized black-and-white photo paper (sensitive to blue and green light), special care must be taken in chosing the right darkroom safelights. The following filter screens or lights can be recommended as direct lighting for the working area:

Light with AGFA / METEOR darkroom filter „G 7“ and 15 watt tungsten lamp, minimum distance 1 m, max. period of action 3 minutes.
Light with KODAK filter „OC“ and 15 watt tungsten lamp,minimum distance 1 m, max. period of action 4 minutes.
Light with ILFORD filter „902“ and 15 watt tungsten lamp,minimum distance 1.2 m, max. period of action 2 minutes.
OSRAM „Duka 50“ with red filter, minmum distance 1m, max. period of action 4 minutes.
KINDERMANN „Dukalux Electronic“, minimum distance 1 m, max. period of action 4 minutes.
ILFORD SL 1 lamp, minimum distance 1.2 m, max. period of action 2 minutes.

Other lights can also be used, but a test should always be made before use as a precaution. Since the contrast is affected before any fogging occurs (a shift to „soft“), the test should be carried out as follows:

Two prints are exposed with the same exposure time of a negative with medium contrast or of a stepped grey wedge. One print is processed immediately, and the second after it has been exposed to the safelight for the recommended time. If both prints have the same contrast, the safelight is suitable. If the second print is softer, this must be remedied by dimming the light, increasing the distance from the working area, indirect lighting, shortening the period of action, or using a different filter.

Paper design

Baryta paper, double weight 255 g/m2.
Approx. 230 µm thick.

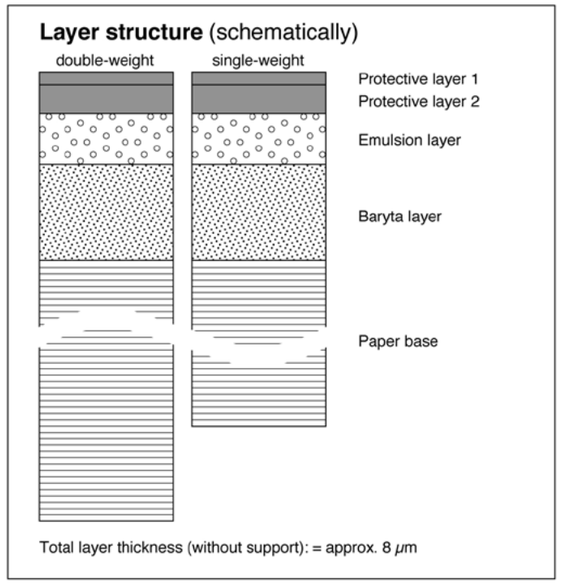
Fibre-base papers contain a layer of barium sulphate (baryta) between the base and emulsion. This baryta layer stops the emulsion soaking into the paper surface, and so enhances the detail definition and print blacks. The baryta coating is 20 – 45 g/m2 depending on the surface.

Emulsion

The light-sensitive layer contains a fine-grain silver chlorobromide emulsion.
Silver content: approx. 1.5 g/m2.

Supercoats

The two supercoats protect the paper from friction fogging and physical damage.



Maximum density (blackness)

Depending on the surface, and assuming correct exposure and development, the following maximum densities can be reached at least:

MCC 110: Dmax = 2.30

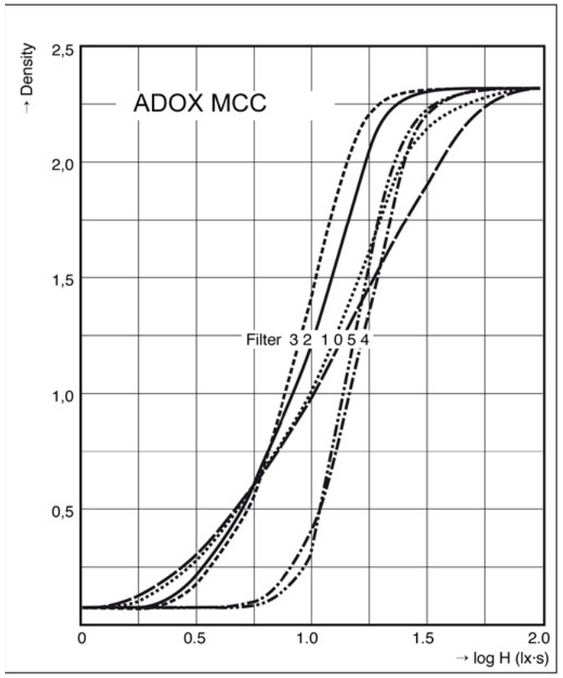
Density curves

Exposure: tungsten light 3000 K, time: 10 sec.
Filters: contrast control filters 0, 1, 2, 3, 4, 5 and UV blocking filter

Development: ADOTOL NE

Densitometry: read with visual filter

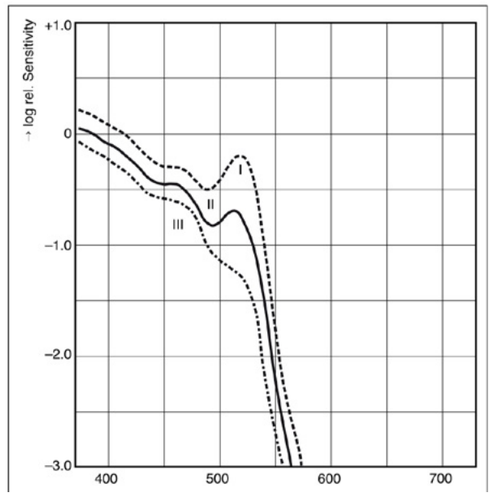
The exposure given in lux seconds applies to the combination of paper and filter.



Spectral sensitivity

(related to equal-energy spectrum)

The graph below shows the densities of 0.5 (I), 1.0 (II) and 1.5 (III) measured in reflection. the sensitivity is the reciprocal of the exposure (in ml/m2) needed to produce the relevant densities.

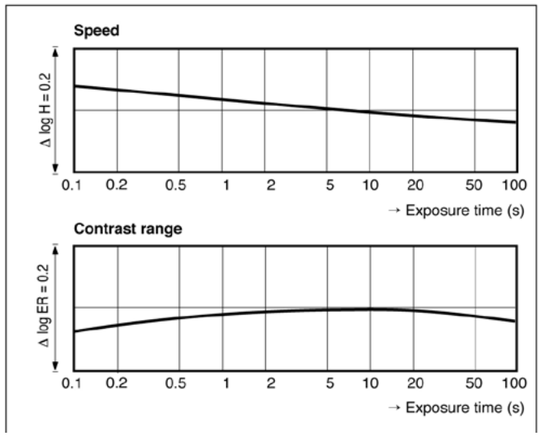


Sensitivity (speed)
(to ISO Standard 6846)

MCC has a speed of ISO P 400 when exposed to white light (without filter). The contrast then reached is about equivalent to the contrast with filter „2“.
If contrast control filters are used, the speed is:
for the „0“ to „3½“ filters = ISO P 160
for the „4“ bis „5“ filters = ISO P 80
Halving the ISO figure corresponds to halving the speed, and doubling it doubles the speed.

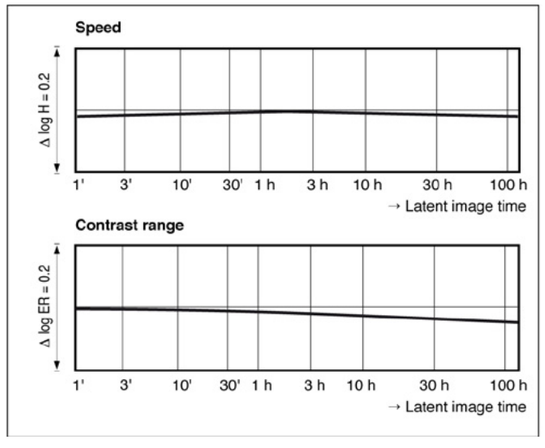
Reciprocity characteristics

The reciprocity characteristics of MCC are virtually unrelated to the filtration. The photographic speed falls slightly as the exposures lengthen, while the contrast remains nearly constant.



Latent image characteristics

MCC has outstanding latent image features. The speed and contrast remain virtually unchanged, regardless of the filtration, for a period of up to three days.



Exposure and contrast control

MCC can be exposed on all standard enlargers (with or without colour mixing heads), and on enlargers with special modules for variable-contrast papers.
As can be seen from the spectral sensitivity curves (see page 4), MCC is sensitized both for the blue and green spectral ranges. The contrast grading is set by selective colour exposure:

Magenta filtration affects only the blue spectral range and produces steep contrast.

Yellow filtration affects the green spectral range and produces soft contrast.

The contrast grading can therefore be varied virtually continuously, from extra-hard to extra-soft, depending on the blue and green light content of the exposure.
The following methods are suitable for varying the contrast:

1. Standard commercial filter sets for variable-contrast black-and-white papers

They are available as:
filter foils for use in the filter drawer of the enlarger (in several formats), or

filter set with adapter for mounting under the enlarger lens, or on the red filter pin of the enlarger.

The „0“ to „5“ filter designations correspond to the grade numbers of conventional black-and-white photo papers. Each filter set includes extra filters with intermediate values, for fine corrrections.
The right grade is found by producing a series of test exposures with different filters:

for contrasty negatives filters „0“ to „1“

for negatives with normal contrast range filters „2“ to „3“

for low-contrast negatives filters „4“ to „5“.

The filters are designed to require the same exposure time, as found by testing, when the „0“ to „3½“ filters are used.
This time has to be doubled for the „4“, „4½“ and „5“ filters.
If the exposure time is found with the „4“, „4½“ or „5“ filters, the time for a softer grade (i.e. filters „3½“ to „0“) has to be halved.

Partial filtration

MCC offers the great advantage that individual areas of negatives which are tricky to enlarge can be exposed with different contrast control filters (e.g. for landscapes the sky areas with the „1“ filter, and the rest of the image with „4“ filter). Partial re-exposure and shading with filters will not only balance differences in brightness within one negative, they will also produce partial variations in contrast.

Exposure without filters

MCC can also be exposed without filters. In this case the resulting contrast grade is „2“, and the speed is more than doubled or the exposure time shortened by more than half (see also the table on page 6).

2. Yellow and magenta filters in colour mixing heads

The manufacturers‘ filter density ratings are not identical.
The exposure time has to be converted or found for each filter. The entire contrast range is not covered by some colour mixing heads.

3. Vario-contrast modules

Vario-contrast modules with filters and computer logic are available as add-ons for enlargers, to find the exposure time required in each case.

4. Colour printing filters (yellow and magenta)

The contrast of MCC can also be varied with the subtractive printing filters in a printing filter set. The disadvantages of this method are a partial reduction in the contrast range, and the necessity to convert the exposure times.

Please refer to page 6 for a filtration chart !

Printing range

The printing range of a photo paper is defined as the ratio of the exposure times necessary to produce a defined maximum and minimum blackness. Normally this ratio is not given arithmetically, e.g. 4:1, 10:1 or 32:1, but logarithmically, that is for the examples given 0.6, 1.0 and 1.5. These figures simultaneously correspond to the maximum difference in density of a suitable negative.
The printing range is therefore the greatest permissible exposure interval in which you can still identify details, both in the shadows and highlights. It provides information on the negative contrast – that is the maximum difference in density– that can be rendered on a photo paper, making use of the complete grey scale from white to black.
Paper with flat contrast has a wide printing range. It can render the great variations in density of a contrasty (hard) negative. Paper with steep contrast has a small printing range, and is therefore suitable for low-contrast (soft) negatives with small variations in density.
To avoid decimal figures for the printing range, the logarithmic figures to the ISO Standard 6846 are multiplied by 100 and suffixed with an „R“ (= range).
The printing ranges in the examples given above are therfore standardised at R 60, R 100 and R 150.
The printing range (ISO range) of MCC is shown in the following table. When exposed to white light (without filters), MCC has an ISO range of R 100.

Printing range of MCC:

Filter	0	1	2	3	4	5
ISO range	R 140	R 120	R 100	R 85	R 70	R 55

These figures are averages in used state. The actual figures include a small production tolerance, and may vary from the rated figures depending on ageing, storage and processing.

Exposure and filtration of MCC

Contrast and grade numbers for graded papers	ES 0		S 1		S* 2		N 3		H 4		EH 5
Real speed of ADOX MCC (ISO 6846) **- without filter -**	ISO P 400										
Contrast control filters	0	½	1	1 ½	2	2 ½	3	3 ½	4	4 ½5	
Effective speed of ADOX MCC (ISO 6846) **- with filter -**	ISO P 160								ISO P 80		

* *Basic grade ("Special") of ADOX MCC which can also be achieved without filtration. The effective speed is then ISO P 400.*

Filtration with colour printing filters or colour mixing heads

Contrast control filter	0	½	1	1 ½	2	2 ½	3	3 ½	4	4 ½5	
Filtering with Kodak CP or CC filters *	80 Y	55 Y	30 Y	15 Y	–	25 M	40 M	65 M	100 M	150 M	200 M
Filtering with Durst colour mixing head * (test with Durst CLS 501)	60 Y	45 Y	30 Y	10 Y	–	20 M	30 M	50 M	70 M	100 M	130 M

* *Exposure factors must be individually found by test exposures. (Y = yellow filter, M = magenta filter)*

All the filtrations are guides only. They depend on the combination of the characteristics and state of the filters, the enlarging lamp (age) and the enlarger (plus mixing head).

Further filter characteristics can be obtained from the equipment manufacturers.

Constant exposure times for grades 0 to 5

(The second filter serves to balance the density)

Contrast control filter	0	1	2	3	4	5
Filtration with Durst colour mixing head *	80 Y 10 M	48 Y 20 M	32 Y 40 M	16 Y 45 M	5 Y 88 M	- 130 M

* *Our tests were made with a Durst CLS 501.*

These figures are guides only, and may vary with the mixing head used.

Print tone

The print tone is primarily a characteristic of the emulsion. It depends on the size and structure of the processed image silver. Large grains of silver produce a colder print tone, and finer grain structures a warmer tone. The tone of black and white photo papers can be varied within narrow limits by the development and special treatment. The print tone of ADOX MCC can be varied within limits. In cold-tone developer (e.g. Moersch Blue) MCC produces a slightly cold tone, in neutral-tone developers (e.g. ADOTOL LIQUID NE) a neutral tone, and in warm-tone developers (e.g. ADOTOL LIQUID WA) a more warm-black tone.
The print tone of black-and-white photo papers can in addition be influenced by the following factors:

• When the paper hardens during lengthy storage, the print tone becomes generally slightly colder.
• The tone may change as the developer becomes exhausted.
• The slightest contamination of the developer with thiosulphate makes the tone initially slightly warmer. Worse contamination on the other hand makes the tone colder, and there is also an increased tendency to fogging.
• If the intermediate wash is insufficient, or the stop bath is very exhausted, the blacks may turn blue.
• Too long fixing times, variations in concentration and contamination of the fixer affect the original tone.
• Too short or much too long final washes (several hours) may change the print tone.
• Drying in the atmosphere or in hot air produce different print tones (hot drying much warmer).

Processing of MCC

MCC is processed in exactly the same way as other photo papers on a baryta base.

Processing in trays

Processing sequence	Process solution	Process times 20 °C	Process times 25 °C
Developer	**NEUTOL / ADOTOL LIQUID NE, WA**		
	Standard dilution 1 + 7	90 ± 10 s	60 ± 10 s
	Economy dilution 1 + 11 *	120 ± 10 s	90 ± 10 s
Stop bath	2 % acetic acid	30 s	
Fixer	**ADOFIX 1 + 4**	60 ± 20 s	
	ADOFIX 1 + 7	120 ± 30 s	
Soda intermediate bath **			
Wash	running water, over 12 °C	20 – 30 min	
	running water, under 12 °C	30 – 40 min	

**Economy dilutions not recomended for optimal contast and DMAX ** See next page*

Stop bath

A 2 % acetic acid stop bath is recommended for MCC and is mixed as follows:
1 part acetic acid (98 %) + 50 parts water or
1 part acetic acid (60 %) + 30 parts water or
1 part acetic acid (30 %) + 15 parts water
Instead of acetic acid a 4 % sodium disulphite stop bath may also be used.
The stop bath stops development. This prevents post-development and the formation of yellow fog. It also neutralises the alkaline parts of the developer in the photographic layer, and so prolongs the fixer‘s life.
It is imperative to include a stop bath when hardener-fixer is used.

Fixer

The fixers recommended are:
ADOFIX (liquid fixer concentrate)
Moersch Alkaline Fixer (liquid fixer concentrate)
A 300 (acid fixer salt, in powder form).
The fixing times listed in the tables depend on the paper type used (emulsion, silver coating), temperature agitation and condition of the fixer solution in use. The shorter fixing times apply to fresh fixers, the longer times to used solutions without replenishment. Excessively long fixing produces bleached highlights and prolongs the final washing time of fibre-base papers. Proper fixing ensures that the prints are durable. Consequently fixer solution in use should be regularly checked for composition, since rises in silver content, dilution, and variations in acidity (pH) impair the solution‘s action.

Soda intermediate bath

A soda bath (1 % sodium carbonate solution) should be included for fibre-base paper, between fixer and final wash (time: 3 minutes). This ensures that the fixer is washed off the paper surface faster and more thoroughly. This not only cuts down the final washing time by about 30 %, and in particular it increases the prints‘ durability.
If a hardener-fixer is used, the soda intermediate bath is not recommended.

Washing

Thorough final washing determines the life of prints. Depending on the temperature, agitation, wash water in- and output, the following washing times are necessary:

- without soda intermediate bath 20 – 40 minutes,
- with soda intermediate bath 15 – 30 minutes.

Toning

Toning processes convert the black image to a different colour.
They deposit coloured metal compounds on the silver grain.
Toned photos keep particularly well (archive proofing), because these silver complex compounds are less liable to break down due to environmental pollution. Toning is the best print silver stabilisation method.
Only prints which are correctly exposed, developed as specified, fixed in as fresh fixer as possible and well washed are suitable for toning. In principle, any black and white paper can be toned. However, warm-tone papers are most suitable.
There are two toning methods, direct and indirect. Direct toning converts the silver image to a different silver compound in one operation. Indirect toning involves bleaching first. A second solution creates a new image, consisting of a silver compound with a different colour.

The simplest method is toning with ADOX Selenium Toner. It has the advantage over other toning solutions that the contrast of the prints is unaffected., the blacks are deepend and the image tone remains unafected.

Direct toning

Moersch „MT4“ 1 + 50: 1 – 5 min (1 part „MT4“ + 50 parts water) (depending on intensity needed).
Stop bath* (10 % sodium sulphite solution) 1 min
* only necessary to prevent post-toning in the wash.
Final wash (see table on page 8)

Indirect toning

Bleaching (in E6 bleach* 1 + 3) 2 – 5 min
(1 part E6 BL concentrate + 3 parts water)
* Process E6 (bleach for colour reversal film processing).

or

Bleach (AGFA 501 formula) 5 min
500 ml 10 % potassium ferricyanide solution
100 ml 10 % potassium bromide solution
400 ml water
Wash (running) 5 min

Moersch „MT4“ 1 + 50: 1-3 min
(possibly stop bath as for direct toning)
Final wash (see table on page 8)
Process temperature 20° C
If the only consideration is a long archive life (image silver stability), the direct toning method should be used, since this changes the print tone less (towards reddish-brown).

Drying

MCC is suitable for high gloss drying in drums and glazing presses due to it´s hardened coating. Drying in heated drying presses with the emulsion side facing the cloth is possible, to prevent a high-gloss surface.
If you use this drying method
• the drying press temperature should not exceed 70 °C,
• the drying cloth must not be too tightly stretched,
• the drying cloth must be permeable to water vapour, i.e. not clogged with gelatine residues
(If the cloth is very dirty, it should be cleaned with an enzyme, e.g. Biolase from Hoechst AG, Frankfurt, or Papain from Ernst Merck Co., Darmstadt).
Drying in the atmosphere lends MCC a silky natural gloss. Depending on the age of the paper and variations in the processing and drying conditions, there may be slight variations in gloss.

Mounting the prints

Standard contact glues or double-sided cold or warm adhesive foils can be used. It is advisable to test the adhesives before use.

Permanence of black and white prints

The durability of black and white prints can be adversely influenced by a number of factors: incorrect processing, unsuitable adhesives or mounting and framing materials, as well as environmental influences such as oxydising pollutants in the surrounding air. In such cases a reddish to yellow-brown discolouration of the image silver or the formation of a silver mirror effect will be observed.
Prints which are exhibited for a longer period of time, especially those framed behind glass or plastic are particularly susceptible.
We have observed that beaverboards present in low cost frames are especially harmfull to photographic prints.
For prints intended for exhibition or archive purposes, a suitable post-treatment designed to avoid oxydation of the image silver is necessary.
A post-treatment of this kind is the use of the print stabilizing agent ADOX ADOSTAB. After the final rinse, prints should be bathed for one minute in a solution of 25 ml ADOSTAB to 975 ml water, front and rear side should be wiped off and then dried. Up to 2 m² of paper can be treated in 1 litre of ADOSTAB solution.
The common toning methods, using selenium or sulphur toning also provide effective protection. The advantage of ADOSTAB, as opposed to toners, is that the image tone is preserved.
It must however be stressed that even the image silver of suitably post-treated prints can still be subject to chemical reactions under unfavourable conditions over a longer period of time. Consequently no responsibility can be accepted for changes in the image silver of black and white prints.
Further information about image silver stability under „Toning“.

Replacements

Complaints should be accompanied by the processed and unprocessed material concerned (if possible in the original packing). The complete emulsion number must be given.
Material with manufacturing defects will be replaced by the same quantity. No further claims will be entertained, except in cases of proven negligence. Since chemical reactions may discolour the image silver in the course of time, no liability is accepted for deterioration of the silver.

Manufacturers Address:
ADOX FOTOWERKE
Pieskower Str. 30A
15526 Bad Saarow, Germany
www.adox.de
info@adox.de

ADOX MCC FIBRE BASE PHOTOPAPER