

## **STUDYNG OF THE POSSIBILITIES OF USING THE HOME MADE FILMS AND CHEMICALS ON THE DEVELOPING DEVICE « PENTAKTA ».**

**By Z. A. Bektimirova and L. B. Andreeva**

**Abstract:** The possibility of using native films and chemicals utilisation at microfilming equipment « Pentakta » was analysed in the process of experiment. The various variants of films and chemicals utilisation have been examined :

1. The films ORWO MA-8, MK-7 1 - the ORWO solutions,
2. The films ORWO MA-8, MK-71 - the solutions in accordance with GOST 13.1.301-86,
- 3 The native films TASMA MFN, MFP - the ORWO solutions,
4. The native films TASMA MFN, MFP - the solution in accordance with GOST 13.1.301-86,

The most important film's sensitometric characteristics regarding considered variants have been estimated accordingly. The recommendations regarding the ORWO and TASMA films developing in the solutions with native chemicals utilisation have been given accordingly.

The problem of studying the possibilities of using the home made films and chemicals when working on the microfilming device « Pentakta » arose in connection with the price rise and then, with the complete ceasing of supply of film sets and chemicals of the « Orwo » firm, on the one hand, and the necessity to revise and correct the typical regulations of making microfiches of the insurance stock and the usage stock that were worked out by the NITsKD SSSR as far as in 1987, on the other hand.

The enterprises of our country that use films of the « Micrat » type possess about 300 sets of the « Pentakta » equipment that should be used with the home made films and chemicals.

In accordance with the « Standard Technological Regulations of Making Microfiches of the Insurance Stock and the Usage Stock », it was envisaged to use side by side with the firm « Orwo »'s films also the home made films. However, at the time, when these « Standard Technological Regulations... » were compiled, our industry only planned production of the format films for making microfiches

of the Micrat MFN and MFP types. During the next years, the PA « Tasma » started production of the MFN and MFP films, and then, appeared a real possibility of using them in the filming, copying processes and in chemical photographic processing at the "Pentakta" cameras XFP E 120 and E 130.

It was advisable to analyse the following variants of using the films and chemicals:

1. Firm « Orwo » films MA-8, MK-71 - Firm « Orwo » solutions,
2. Firm « Orwo » films MA-8, MK-71 - solutions according to GOST 13.1.301.86 « Reprography, micrography. Halogen-silver films. General technological conditions » and « Standard Technological Regulations... », 1987,
3. The PA « Tasma » films MFN and MFP - solutions according to GOST 13.1.301-86 and the « Standard Technological Regulations... », 1987. and also to test these variants in the normal express regimes on the machine « Pentakta » E 130,

The tests were performed by evaluation of the main sensitometric characteristics by GOST 10691.6-88 and their correspondence to the « Standard Technological Regulations of the Insurance Stock and the Usage Stock ».

According to GOST 13.1.301-86, the phenidone-hydroquinone developer UP-2MF is recommended for processing the films MFN and MFP. The high resistance of the emulsion layer of the said films permits their processing at a higher temperature, i.e. in the « Pentakta » regime. The developing formation given at the « Standard Technological Regulations... » is a modification of the formation UP-2MF and differs only by the content of hydroquinone, soda, potash bromide, and higher content of pH of the solution. In Table 1, are given the developing formation by GOST 13.1.301-86 and the « Standard Technological Regulations ».

Table 1			
Name of substance		UP-2MF (GOST)	UP-2MG (STR)
Developing solution		mass in gr.	
1	Phenidone	0.6	0.6
2	Hydroquinone	6.0	6.0
3	Sodium sulphite deh	40.0	55.0
4	Sodium carbon	31.0	55.0
5	Potassium bromide	4.0	10.0
6	Distilled water	to 1 l.	to 1 l.
7	pH of solution	10.2	11.4
Fixing solution		mass in gr.	
1	Sodium thiosulphate crystalline	250.0	200.0
2	Potassium sulphate pyro	30.0	/
3	Sodium sulphite deh.	/	27.0
4	Acetic acid	/	10.0
5	Water	to 1 l.	to 1 l.
6	pH of solution	4.0 - 4.5	3.5

The films were exposed at sensitometer TsS-2M at  $T = 2850^{\circ}\text{K}$  during 0.05 s.

The processing was done in solutions of the original « Orwo » formation and in processing solutions formations given in Table 1, at the normal and express regimes.

The sensitograms were measured at densitometer « Machbeth ». The values of contrast coefficient, light sensitivity, maximum and minimum density ( $\Psi$ ,  $S_{0.2}$ ,  $D_{\text{max}}$ ,  $D_{\text{min}}$ ) received on the sensitometric curves are given in Tables 2-5 in comparison with the NTD norms.

When choosing the processing regimes for the Mirkat type film, the main criteria of the optimal processing are achieving of the recommended contrast coefficient and completeness of fixation and washing of the material. Table 6 gives the contrast coefficients of films MA-8, MK-71 (Orwo) as well as films MFN and MFP at the tested variants of processing.

With the view of testing preservation of the insurance stock microfiches at long storage, we did artificial ageing of microfiches with sensitograms in camera Tabai at  $T = 70^{\circ}\text{C}$  and  $\Psi = 60\%$  during 270 hours with the successive evaluation of the microfiches condition.

The negative microfiches MA-8 and MNF after ageing showed yellow image of various intensity, which means non-sufficient removing of the silver salts at fixation both in the « Orwo » fixation and in the home fixation.

Sensitometric characteristics of Film MA-8 ORWO at processing in the Developing Device « Pentakta E-130 » at the normal and express regimes with various formations of the developing solutions.

Table 2						
Formation of processing solutions		Regime XFO	Contrast coefficient $\Psi$	Light sensitivity SO.2	Maximum density D max.	Minimum density D min.
Norm by NTD			2.5	1.0	2.5	0.12
N° of experiment						
1	ORWO	Normal	3.40	2.2	> 2.5	0.06
2		T = 34°C	3.24	2.2	> 2.5	0.06
3			2.50	2.0	> 2.5	0.06
4			2.80	1.9	> 2.5	0.06
1	ORWO	Express	1.65	2.1	> 2.5	0.08
2		T - 39°C	2.24	2.0	> 2.5	0.08
1	UP-2MF (GOST)	Normal	2.60	2.8	> 2.5	0.05
2		T = 34°C	2.75	3.2	> 2.5	0.05
3			2.65	2.8	> 2.5	0.05
4			2.45	4.0	> 2.5	0.05
1	UP-2MF (GOST)	Express	1.50	3.2	2.0	0.06
2		T = 39°C	1.50	3.6	2.0	0.06
1	UP-2MF (STR)	Normal	3.20	3.9	> 2.5	0.06
2		T = 34°C	3.00	3.0	> 2.5	0.06
3			3.10	3.1	> 2.5	0.06
4			3.15	3.0	> 2.5	0.06
1	UP-2MF (STR)	Express	3.00	2.8	> 2.5	0.06
2		T = 39°C	2.90	208	> 2.5	0.06

Sensitometric characteristics of Film MFN TASMA at processing in the Developing Device « Pentakta E-130 » at the normal and express regimes with various formations of the developing solutions.

Table 3						
Formation of processing solutions		Regime XFO	Contrast coefficient $\Psi$	Light sensitivity SO.2	Maximum density D max.	Minimum density D min.
Norm by NTD			2.7	1.0	3.0	0.12
N° of experiment						
1	ORWO	Normal T = 34°C	3.30	0.50	3.0	0.05
2			3.30	0.50	3.0	0.05
3			2.70	0.70	3.0	0.05
4			2.50	0.40	3.0	0.05
1	ORWO	Express T - 39°C	2.00	0.40	2.45	0.07
2			1.50	0.35	2.40	0.07
1	UP-2MF (GOST)	Normal T = 34°C	2.65	0.65	3.0	0.06
2			3.05	0.45	3.0	0.06
3			2.75	0.60	3.0	0.06
4			3.30	0.45	3.0	0.06
1	UP-2MF (GOST)	Express T = 39°C	1.25	0.55	(*)	0.08
2			1.25	0.60	(*)	0.08
1	UP-2MF (STR)	Normal T = 34°C	2.90	0.55	3.0	0.08
2			3.05	0.55	3.0	0.08
3			3.00	0.60	3.0	0.06
4			3.10	0.60	3.0	0.06
1	UP-2MF (STR)	Express T = 39°C	3.00	0.45	3.0	0.08
2			3.15	0.48	3.0	0.08

(\*) - D max. was not registered as the film was not fully exposed.

Sensitometric characteristics of Film MK-71 ORWO at processing in the Developing Device « Pentakta E-130 » at the normal and express regimes with various formations of the developing solutions.

Table 4						
Formation of processing solutions		Regime XFO	Contrast coefficient $\Psi$	Light sensitivity SO.2	Maximum density D max.	Minimum density D min.
Norm by NTD			1.6	0.2 - 0.6	3.0	0.07
N° of experiment						
1	ORWO	Normal T = 34°C	1.80	0.10	(*)	0.04
2			1.90	0.10	(*)	0.04
3			1.65	0.10	(*)	0.04
4			1.70	0.10	(*)	0.04
1	ORWO	Express T - 39°C	1.20	0.06	(*)	0.04
2			1.10	0.06	(*)	0.05
1	UP-2MF (GOST)	Normal T = 34°C	2.40	0.11	> 2.5	0.04
2			2.15	0.10	> 2.5	0.04
3			1.95	0.10	> 2.5	0.04
4			1.85	0.10	> 2.5	0.04
1	UP-2MF (GOST)	Express T = 39°C	1.00	0.07	(*)	0.05
2			0.95	0.08	(*)	0.05
1	UP-2MF (STR)	Normal T = 34°C	2.10	0.1	> 2.5	0.04
2			2.10	0.1	> 2.5	0.04
3			2.05	0.1	> 2.5	0.04
4			2.05	0.1	> 2.5	0.04
1	UP-2MF (STR)	Express T = 39°C	1.95	0.1	(*)	0.05
2			1.75	0.1	(*)	0.05

(\*) - D max. was not registered as the film was not fully exposed

Sensitometric characteristics of Film MFP TASMA at processing in the Developing Device « Pentakta E-130 » at the normal and express regimes with various formations of the developing solutions.

Table 5						
Formation of processing solutions		Regime XFO	Contrast coefficient $\Psi$	Light sensitivity SO.2	Maximum density D max.	Minimum density D min.
Norm by NTD			1.6	02 - 0.6	3.0	0.07
N° of experiment						
1	ORWO	Normal T = 34°C	3.50	0.1	> 2.5	0.05
2			3.15	0.1	> 2.5	0.05
3			2.80	0.1	> 2.5	0.05
4			3.00	0.1	> 2.5	0.04
1	ORWO	Express T - 39°C	1.80	0.1	> 2.0	0.05
2			2.00	0.1	> 2.0	0.05
1	UP-2MF (GOST)	Normal T = 34°C	3.30	0.1	> 3.0	0.05
2			3.30	0.1	> 3.0	0.04
3			2.90	0.1	(*)	0.04
4			2.75	0.1	(*)	0.04
1	UP-2MF (GOST)	Express T = 39°C	1.50	0.1	(*)	0.04
2			1.50	0.1	(*)	0.04
1	UP-2MF (STR)	Normal T = 34°C	4.30	0.1	> 3.0	0.04
2			4.80	0.1	> 3.0	0.05
3			4.40	0.1	> 3.0	0.04
4			4.50	0.1	> 3.0	0.04
1	UP-2MF (STR)	Express T = 39°C	3.80	0.1	> 3.0	0.04
2			4.0	0.1	> 3.0	0.04

(\*)- D max. was not registered as the film was not fully exposed.

Contrast coefficients of Film MA-8, MNF, MK-71, MFP at processing in the Developing Device "Pentacta E-130" in various developers and temperature regimes.

Table 6						
Formation of processing solutions		Regime XFO	Contrast coefficient $\Psi$	Light sensitivity SO.2	Maximum density D max.	Minimum density D min.
Norm by NTD			2.5	2.7	1.6	3.0
N° of experiment						
1	ORWO	Normal	3.40	3.30	2.40	3.50
2		T = 34°C	3.25	2.50	1.95	3.15
3			2.50	3.30	2.15	2.80
4			2.80	2.70	1.85	3.00
1	ORWO	Express	1.65	2.00	1.00	1.80
2		T - 39°C	2.25	1.50	0.95	2.00
1	UP-2MF (GOST)	Normal	2.60	2.65	1.80	3.30
2		T = 34°C	2.75	3.05	1.90	2.90
3			2.65	2.75	1.65	3.30
4			2.45	3.30	1.70	2.75
1	UP-2MF (GOST)	Express	1.50	1.25	1.20	1.58
2		T = 39°C	1.50	1.25	1.10	1.50
1	UP-2MF (STR)	Normal	3.20	2.90	2.10	4.30
2		T = 34°C	3.00	3.05	2.10	4.80
3			3.10	3.00	2.05	4.40
4			3.15	3.10	2.05	4.50
1	UP-2MF (STR)	Express	3.00	3.00	1.95	3.80
2		T = 39°C	2.90	3.15	1.75	4.00

The analysis of the films tests results given in Tables 2-6 shows that the equipment « Pentakta » can be used for making microfiches while using the home made films and chemicals. The physical and mechanical features of Films MNF, MFP ensure normal passage of the films through the tracts of the shooting, developing, and copying units. However, the lower light sensitivity of Film MNF in comparison with Film MA-8 (approximately in 5-6 times) requires a considerable increase of exposition and decreases the productivity of the shooting process.

Processing of the negative films MA-8, MNF and the positive films MK-71 and MFP in the ORWO and UP-2MF (GOST) developers at the normal regime allows to receive the sensitometric indexes recommended by the NTD. The express regime considerably changes the photographic indexes, and the contrast coefficients do not reach the set values. The said shortcoming is completely absent when working with the developer UP-2MF (STR), and, when passing from the normal regime to the express regime, the contrast coefficients of the films do not practically change. Yet, Film MFP should be processed in this developer as it overdevelops even at the express regime.

If several developing devices are available in the laboratory, it is advisable to process Film MFT separately in the developer UP-2MF (GOST) at the normal regime and to develop all other films at the express regime in solutions UP-2MF (STR).

When making the insurance stock microfiches on the negative films MA- 8 and MFN and when processing them in the device « Pentakta E-130 » at any recommended regime, it is necessary to do additional fixation and washing. These additional operations should be performed in the device « Pentakta » after the main processing according to the following scheme : soaking in water - fixation - washing.

Z. A: Bektimirova  
Russian Space Data Scientific Research Center  
Moscow  
Russia

L. B. Andreeva  
Russian Space Data Scientific Research Center  
Moscow  
Russia