ISO 400/27°	Kodak TRI-X Pro Film	TX

KODAK Developer	Small tanks / Petites Cuves / Entwicklungsdosen / Små tankar / Tanques Pequeños / Svilupatrice a Spirale / Kleine Tanks / Tanques Pequenos				Exposure Index
	18°C	20°C	22°C	24°C	
	minutes / Minuten / minuter / minutos / minuti				
T-Max RS	7	**6**	5½	5	400
T-Max	7	6	5½	**5½**	400
D-76	9	**8**	6½	5½	400
D-76 (1+1)	11	**10**	9	8	400
HC-110 (dil. B)	8½	**7½**	6	5	400
Microdol-X	11	**10**	9	8	400
Microdol-X (1+3)	–	–	14	**13**	400
HC-110 (dil. A)	4½	**3¾**	3	2½	400

Push Processing / Traitement Poussé / Empfindlichkeitssteigernde Entwicklung / Pressad framkallning / Procesado Forzado / Trattamento Spinto / Geforceerd Ontwikkelen / Revelação Forçada

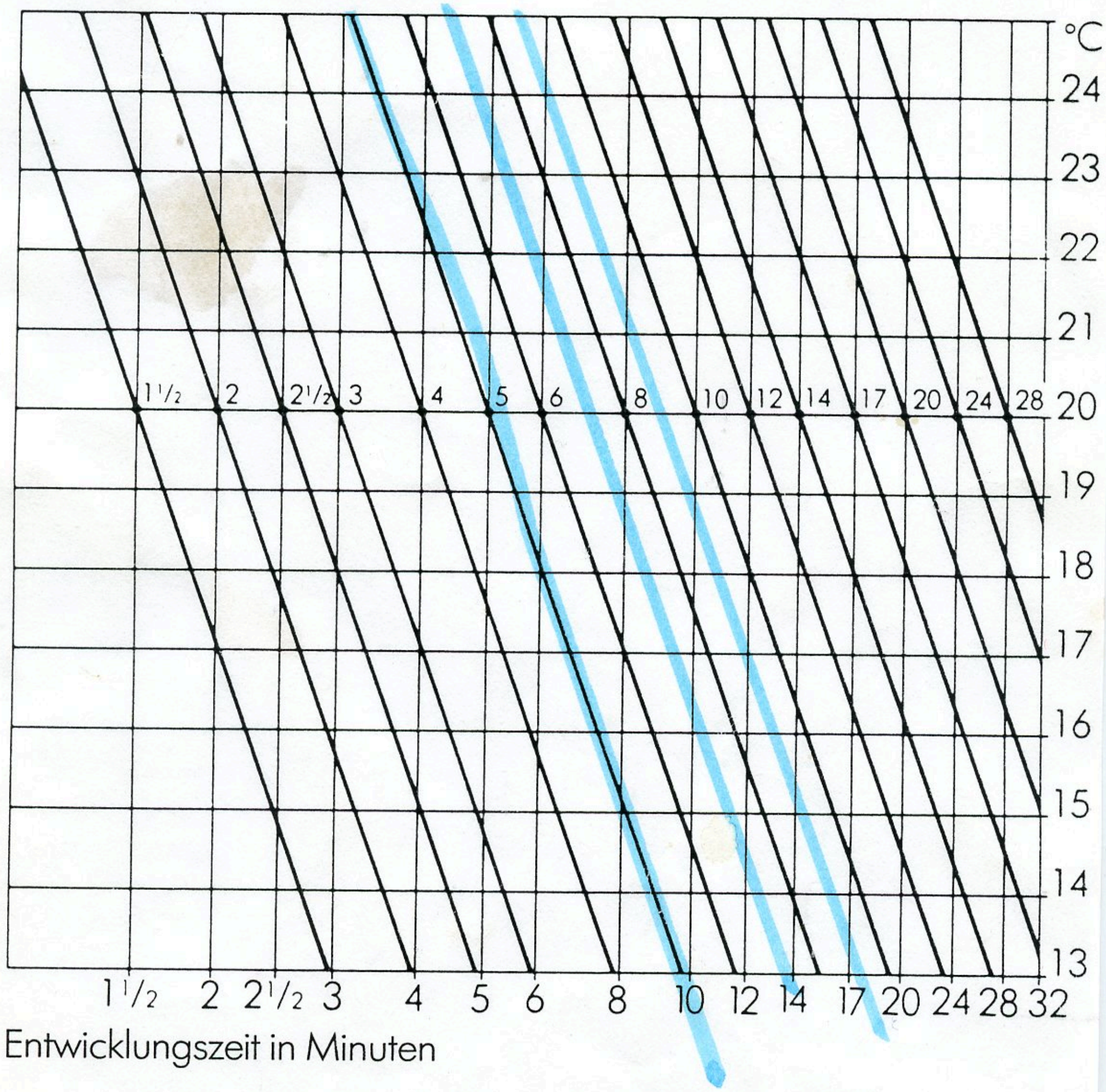
KODAK Developer	E.I. 800		E.I. 1600		E.I. 3200	
	20°C	24°C	20°C	24°C	20°C	24°C
T-Max RS	**6**	5	**9½**	8	**12**	11
T-Max	6	**5½**	10	**8½**	–	**11**
D-76	**8**	5½	**13**	10	–	–
HC-110 (dil. B)	**7½**	5	**16**	12	–	–

Use vigorous agitation at 30-second intervals
Agiter vigoureusement toutes les 30 secondes
Im Abstand von 30 Sek. heftig bewegen
Agitera kraftigt med 30 sekunders intervall
Agitar vigorosamente a intervalos de 30 segundos
Usare un'agitazione vigorosa ad intervalli di 30 secondi
Beweeg de film intensief om de 30 seconden
Agite vigorosamente de 30 em 30 segundos

KL 98225A 3-94

6 Entwicklung bei geänderten Temperaturen

Zur Bestimmung der Entwicklungszeit bei anderer Temperatur als bei 20° C ist die nachstehende »Zeit-Temperatur-Tabelle« anzuwenden.



1. Die bei 20° C empfohlene Entwicklungszeit feststellen.
2. Die dafür erforderliche Zeit auf der 20° C-Linie suchen (Zahlenreihe in der Mitte der Tabelle)
3. Von dort auf der diagonalen Linie bis zu dem Punkt gehen, an dem sie sich mit der horizontalen Linie der neugewählten Entwicklungstemperatur schneidet.
4. Die erforderliche Entwicklungszeit kann dann senkrecht unterhalb des Schnittpunktes abgelesen werden.

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL PAPIRFREMKALDELSE

1. Fremkaldelse: ILFORD MULTIGRADE Papir

Fremk.type: Ilford Multigrade

Blandingsforhold: 1 + 9 150 ml. + 1350 ml vand.

Vandtemperatur: 20 gr. +- 3 gr.

Fremkaldertid: 60 sec.

Max. 50 stk. 18x24

NB: Fremkalder hældes ud efter brug. (Kan stå max. 1 uge)

2. STOPBAD:

Type: Ilford IN-1

Blandingsforhold: 1 + 39 37 ml. + 1470 ml. vand.

Stoptid: lo-15 sec.

Vandtemperatur: 20 gr. +- 3 gr.

NB. Stopbad er genbrug. (Kan stå max 2 mdr.)

3. FIXERING:

Type: Tetenal Superfix

Blandingsforhold: 1 + 3 375 ml. + 1125 ml. vand.

Vandtemperatur: 20 gr. +- 3 gr.

Fixeringstid: 30-60 sec.

NB. Fixeringsbad er genbrug. (max. max. 50 stk. 18x24)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 5 min. i rindende vand.

Multigrade papir må ikke ligge i vandet i mere end 5 min., da det vil bøje når det bliver tørt.

6. TØRRING

Tørres af med en skraber og lægges på aviser

Tørretid: ca. 2-3 timer.

7. ARKIVERING.

Skæres til og sættes i rammer eller mapper med det samme.

HELTBORG FOTO, BJERT   FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: Agfa   Film: APX 100   ASA: 100

Fremk.type: Ilford Ilfotec HC

Blandingsforhold: 1+31   300 ml. = 40 ml.+260 ml.vand

Vandtemperatur: 20° +÷½°

Fremkaldertid: 4 min.

Kip - rytme: 3. sec.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: Ilford IN-1

Blandingsforhold: 1:39   Færdigblandet

Stoptid: 60 sec.

Vandtemperatur: 20°N

NB. Stopbad er genbrug.

3. FIXERING:

Type: Ilford HYPAM

Blandingsforhold: 1+4   Færdigblandet

Vandtemperatur: 20°

Fixeringstid: 3-4 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: Tetenal MIROSOL

Blandingsforhold: 1:400   1-2 dråber pr. tank

Vandtemperatur: 20 °

Skylletid: 60 sec.   NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: 2 - 3 timer.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: AGFA Film: AGFAPAN ASA: APX 100

Fremk.type: ILFORD ILFOSOL S

Blandingsforhold: 1+9

Vandtemperatur: 20°

Fremkaldertid: 5 min.

Kip - rytme: 3 sed.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 10-20 SEC.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYPAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 2 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2 timer.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT   FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: AGFA   Film: AGFAPAN   ASA: 400

Fremk.type: ILFORD ILFOSOL S

Blandingsforhold: 1+9

Vandtemperatur: 20°

Fremkaldertid: 9 min.

Kip - rytme: 3 sed.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 10-20 sed.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYDAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 2 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1÷2 min.   NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: 2 timer.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

FP 4 Plus

4.1
DEVELOPMENT TIMES

	Dilution	Meter setting EI 50/18	EI 125/22	EI 200/24	EI 400/27
Spiral tank, deep tank, dip and dunk machines (min/20°C)					
ILFORD developer					
ILFOSOL S	1+9	3½	4	5	–
	1+14	5	6	7½	–
ILFOTEC HC	1+15	–	3	4	7
	1+31	4½	6	8½	–
ILFOTEC LC29	1+9	–	3	4	7
	1+19	4½	6	8½	–
	1+29	6	8	12	–
ID-11	stock	5	6	8	–
	1+1	7	8	12	–
	1+3	15	18	–	–
MICROPHEN	stock	–	5½	6½	11
	1+1	–	7	9	16
	1+3	–	10	13	–
PERCEPTOL	stock	7½	9	–	–
	1+1	10½	14	–	–
	1+3	14	18	–	–
Non-ILFORD developer					
Kodak D-76	stock	5	5½	7	–
	1+1	7½	8½	11	–
	1+3	12	14	18	–
Kodak HC-110	A	–	3	4	–
	B	4	5	8	–
Kodak T-Max	1+4	–	4½	6	8
Kodak T-Max RS	stock	4	7½	–	–
Kodak Microdol-X	stock	7½	10½	–	–
	1+3	14	17	–	–
Tetenal Ultrafin	1+10	–	4	6	11
	1+20	–	7½	12	–
Tetenal Ultrafin Plus	1+4	–	5½	6	–
Acufine Acufine	stock	–	3	4	10
Agfa Rodinal	1+25	5	6	9	–
	1+50	6	8½	13	–
Agfa Refinal	stock	–	4	6	11
Paterson Acutol	1+10	5	5½	8	–
Dip and dunk machines (min at 24°C)					
ILFOTEC DD	1+4	4½	5½	6½	–
Roller transport, short leader machines (sec)					
ILFOTEC RT RAPID	stock/27°C	–	40	55	–
ILFOTEC HC	1+11/24°C	–	70	–	–

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: ILFORD Film: FP4 ASA: 125

Fremk.type: ILFORD ILFOSOL

Blandingsforhold: 1 + 9 (30 + 270)

Vandtemperatur: 20°

Fremkaldertid: 5 min.

Kip - rytme: 3 SEC.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 10 - 20 SEC.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYPAM

Blandingsforhold: 1 + 4

Vandtemperatur: 20°

Fixeringstid: 2 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2t.

7. ARKIVERING.

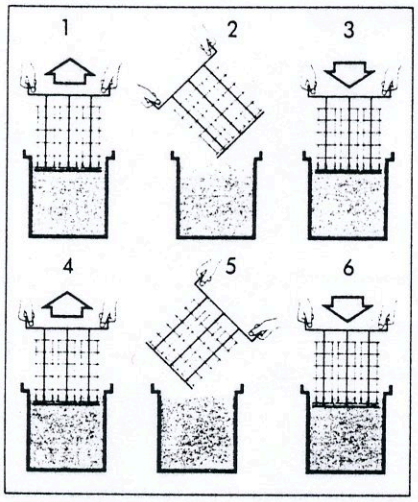
Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

400 DELTA

Dybtank
Sænk filmholderen ned i tanken og giv den et par stød mod kanten for at løsne eventuelle luftbobler.

Løft filmholderen helt op af tanken et par gange og stød den mod kanten.



Ved slutningen af hvert minut under fremkaldelsen løftes filmholderen op og vippes til begge sider. Dette gøres tre gange (se skitse).

Det bedste resultat kan opnås med brug af kvælstof. En indblæsning af 1 sek. varighed hvert andet sekund i de første 11 sekunder af hvert minut, giver de bedste resultater.

Denne bevægelse kan også bruges under fikseringen.

ILFORD 400 DELTA kan fremkaldes i alle typer fremkaldeudstyr: Spiraltank, dybtank og fremkaldermaskiner beregnet til sort/hvid filmfremkaldelse.

Selvom 400 DELTA filmen er en film med helt ny teknologi vil den ikke nedbryde fremkalder eller fikser mere end de almindelige FP4 Plus og HP5 Plus film. De normale angivelser for kemikaliernes kapacitet og efterfyldningsmængder, kan fortsat anvendes.

FREMKALDELSESTIDER

Efter at have valgt den rette type fremkalder kan man i tabellen nedenfor se den anbefalede fremkaldelsestid ved både manuel og maskinfremkaldelse.

De angivne tider vil give negativer med optimal kontrast, velegnet til kopiering i de fleste typer forstørrelsesapparater.

Tiderne er vejledende og bør ændres/tilpasses ens egne arbejdsforhold.

Fremkalder	Fortynding	Eksponeringsindeks 200/24	400/27	800/30
Til spiral- og dybtank		**Tid i minutter ved 20°C**		
ILFORD ID-11	Ufortyndet	5	6	8
	1 + 1	8	9	14
	1 + 3	13	15	-
ILFORD MICROPHEN	Ufortyndet	-	4,5	6
	1 + 1	-	9	13
	1 + 3	-	17	-
ILFORD PERCEPTOL	Ufortyndet	9	11	-
	1 + 1	10,5	13	-
	1 + 3	15	19	-
ILFORD ILFOTEC HC	1 + 15	-	3,5	6
	1 + 31	5	6	8
ILFORD ILFOSOL S	1 + 9	4	6	9
	1 + 14	6,5	10	-
KODAK D76	Ufortyndet	5	6	8
	1 + 1	8	9	14
	1 + 3	13	15	-
HC-110	A	-	3,5	6
	B	5	6	8
T-MAX	1 + 4	4,5	5,5	7
T-MAX RS	Ufortyndet	5	6	8
ULTRAFIN	1 + 10	6,5	8	-
	1 + 20	-	10	-
ACUFINE	Ufortyndet	-	4	5
RODINAL	1 + 25	5	6	9
REFINAL	Ufortyndet	-	4	6
Til maskinfremkaldelse		**Tid i sekunder ved 27°C**		
ILFOTEC RT RAPID	Ufortyndet	-	90	100
KODAK DURAFLO	Ufortyndet	-	90	100

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: ______ Film: ILFORD ASA: DELTA 400

Fremk.type: ILFOSOL

Blandingsforhold: 1+9 (30+270) ml.

Vandtemperatur: 20°

Fremkaldertid: 6 min.

Kip - rytme: 3 SEC.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 60 SEC.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: TETENAL SUPERFIX.

Blandingsforhold: 1:40

Vandtemperatur: 20°

Fixeringstid: 3 - 6 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: Tetenal Mirosol

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2 t.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT   FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: ILFORD Film: DELTA ASA: 800

Fremk.type: ILFORD ILFOSOL

Blandingsforhold: 1+9 (30+270)

Vandtemperatur: 20°

Fremkaldertid: 9 min.

Kip - rytme: 3 sed.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 10-20 SEd.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYPAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 2 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

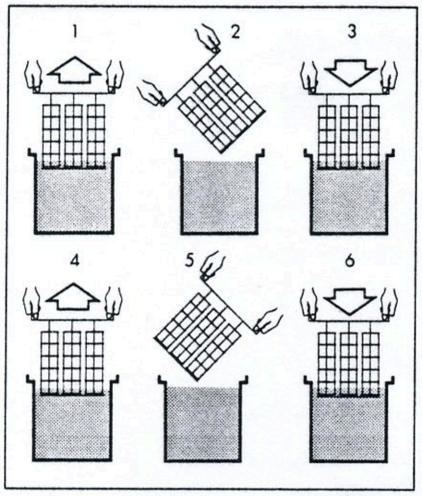
Tørretid: ca. 2 t.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

100 DELTA



FREMKALDELSE I DYBTANK

Sænk filmholderen ned i tanken og giv den et par stød mod kanten for at løsne eventuelle luftbobler.

Løft filmholderen helt op af tanken et par gange og stød den mod kanten.

Ved slutningen af hvert minut under fremkaldelsen løftes filmholderen op og vippes til begge sider. Dette gøres tre gange (se skitse).

Det bedste resultat kan opnås ved brug af kvælstof. En indblæsning af 1 sek. varighed hvert andet sek. i de første 11 sek. af hvert minut giver de bedste resultater. Denne bevægelse kan også bruges under fikseringen. ILFORD 100 DELTA kan fremkaldes i alle typer fremkaldeudstyr: Spiraltank, dybtank og maskiner beregnet til sort/hvid filmfremkaldelse.

Selvom 100 DELTA filmen er en film med helt ny teknologi vil den ikke nedbryde fremkalder eller fikser mere end de almindelige ILFORD Plus-film.

De normale angivelser for kemikaliernes kapacitet og efterfyldningsmængder, kan fortsat anvendes.

Fremkalder	Fortynding	Eksponeringsindeks EI 50/18	EI 100/21	EI 200/24
Til spiral-, dybtank og hænge-dyppe maskine		**Tid i minutter ved 20°C**		
ILFORD ID-11	koncentrat	6	7	11
	1+ 1	8	10	15
	1+ 3	14	15,5	-
ILFORD MICROPHEN	koncentrat	-	8	12
	1+ 1	-	9	15
	1+ 3	-	14	-
ILFORD PERCEPTOL	koncentrat	10	15	-
	1+ 1	12	17	-
ILFORD ILFOSOL S	1+ 9	3,5	5	-
	1+14	5	6,5	-
ILFORD ILFOTEC HC	1+31	4,5	5,5	-
KODAK D76	koncentrat	6	7	11
	1+ 1	8	10	15
	1+ 3	14	15,5	-
KODAK HC-110	B	4,5	5,5	-
KODAK T-MAX	1+ 4	-	6	8
KODAK MICRODOL-X	koncentrat	10	15	-
	1+ 3	15	20	-
TETENAL ULTRAFIN	1+10	-	6	-
	1+20	-	8	-
TETENAL ULTRAFIN PLUS	1+ 4	-	8	11
ACUFINE	koncentrat	-	3,5	5
AGFA RODINAL	1+25	4	7	-
AGFA REFINAL	koncentrat	-	5	9
PATERSON ACUTOL	1+10	-	8	-
FUJI SUPER PRODOL	koncentrat	-	5	8
	1+ 1	-	7	-

Til maskinfremkaldelse	**Fortynding/temperatur**		**Tid i minutter/sekunder**		
ILFOTEC DD	1+ 4	24°C	-	5,5 min	8 min
ILFOTEC RT RAPID	koncentrat	27°C	-	50,0 sek	60 sek
ILFOTEC HC	1+11	24°C	55 sek	70,0 sek	110 sek
KODAK T-MAX RS	koncentrat	24°C	-	4,0 min	-
KODAK DURAFLO	koncentrat		-	50,0 sek	60 sek

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: Film: ORWOpan 100 ASA: 100

Fremk.type: Ilford ILFOTEC HC

Blandingsforhold: 1:7 brugsopløsning. (38ml.+262ml.vand)

Vandtemperatur: 20° +÷½°

Fremkaldertid: 3½ min.

Kip - rytme: hvert 3. sec.

NB: Fremkalder hældes ud efter brug.

1a. Mellemskyldning.

2. STOPBAD:

Type: Ilford IN-1

Blandingsforhold: 1:39 (25ml.+ 1000 ml.)

Stoptid: 60 sec.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

2a. Mellemskyldning.

3. FIXERING:

Type: Ilford HYPAM

Blandingsforhold: 1:4 (200ml. + 800 ml vand)

Vandtemperatur: 20°

Fixeringstid: 2-4 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: Tetenal Mirosol

Blandingsforhold: 1:400 (1-2 dråber pr. tank 400ml.)

Vandtemperatur: ca. 20 °

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2 timer.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT   FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: FUJI Film: NEOPAN ASA: 400

Fremk.type: ILFORD ILFOSOL

Blandingsforhold: 1+9 (30+270)

Vandtemperatur: 20°

Fremkaldertid: 7 1/2 min.

Kip - rytme: 3 sed.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ______

Blandingsforhold: ______

Stoptid: ______

Vandtemperatur: ______

NB. Stopbad er genbrug.

3. FIXERING:

Type: ______

Blandingsforhold: ______

Vandtemperatur: ______

Fixeringstid: ______

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: ______

Blandingsforhold: ______

Vandtemperatur: ______

Skylletid: ______ NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ______

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT   FOTOKURSUS 1992.

SKEMA TIL

1. Fremkaldelse: KODAK T3200 TMAX

Fremk.type: ILFORD ILFOTEC HC

Blandingsforhold: 1:3 FORRÅD => 485 => 120 ml. Fremk. 365 ml. Vand.
ml.

Vandtemperatur: 20°

Fremkaldertid: 7 1/2 - 8 min.

1600 ASA

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN 1

800 ASA - 5 min.

Blandingsforhold: 1:39

Stoptid: 1 min.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HP PAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 5 min. NB!

NB. Fixeringsbad er genbrug. (max.

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: min. i rindende vand.

6. TØRRING

Tørres

Tørretid: 2t.

7. ARKIVERING.

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: KODAK Film: TMAX ASA: 3200

Fremk.type: TMAX

Blandingsforhold: 1+4

Vandtemperatur: 24° NB!

Fremkaldertid: 9½ min.

Kip - rytme: 5×1 sec PR. 30 SEC.

NB: Fremkalder hældes ud efter brug.

1600 ASA => 7 min.

6400 ASA => 11 min.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 10-20 sec.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYPAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 2×2 min. NB!

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2 timer.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: Film: Ilford HP5 ASA: 400

Fremk.type: Tetenal Ultrafin Plus

Blandingsforhold: 1 : 10 (300ml tank = 30 + 270 mlvand)

Vandtemperatur: 20 gr. +-½ gr.

Fremkaldertid: 6,5 min.

Kip - rytme: hvert 3 sec. Beta=0,55

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: Ilford IN-1

Blandingsforhold: 1:39 (25 ml. + 1000 ml. vand)

Stoptid: 60 sec.

Vandtemperatur: ca. 20 gr.

NB. Stopbad er genbrug.

3. FIXERING:

Type: Tetenal Superfix

Blandingsforhold: 1:4 (200 ml. + 800 ml. vand)

Vandtemperatur: ca. 20 gr.

Fixeringstid: 3 - 6 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: Tetenal Mirosol

Blandingsforhold: 1:400 (1-2 dråber pr. tank)

Vandtemperatur: 20 gr.

Skylletid: 1 - 2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2 timer.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: ILFORD Film: HP5 + ASA: 400

Fremk.type: ILFORD ILFOTEC HC.

Blandingsforhold: (1:7)(1:31) - 38+262, 61+424)

Vandtemperatur: 20°

Fremkaldertid: 6 1/2 min.

Kip - rytme: 3 sec.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 20 sec.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYPAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 2 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1:400

Vandtemperatur: 20°

Skylletid: 1 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: 2t.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HP 5 Plus

4.1
DEVELOPMENT TIMES

	Dilution	Meter setting EI 400/27	EI 800/30	EI 1600/33	EI 3200/36
Spiral tank, deep tank, dip and dunk machines (min/20°C)					
ILFORD developer					
ILFOSOL S	1+9	7	8½	14	–
	1+14	9½	14	–	–
ILFOTEC HC	1+15	3½	5	7½	11
	1+31	6½	9½	14	–
ILFOTEC LC29	1+9	3½	5	7½	11
	1+19	6½	9½	14	–
	1+29	9	–	–	–
ID-11	stock	7½	10½	14	–
	1+1	13	16½	–	–
	1+3	20	–	–	–
MICROPHEN	stock	6½	8	11	16
	1+1	12	15	–	–
	1+3	23	–	–	–
PERCEPTOL	stock	11	–	–	–
	1+1	15	–	–	–
	1+3	25	–	–	–
Non-ILFORD developer					
Kodak D76	stock	7½	9½	12½	–
	1+1	11	13	–	–
	1+3	22	–	–	–
Kodak HC-110	A	2½	3¾	5½	9½
	B	5	7½	11	–
Kodak T-Max	1+4	6½	8	9½	11½
Kodak T-Max RS	stock	6½	7½	10	–
Tetenal Ultrafin	1+10	7½	10	–	–
	1+20	16	–	–	–
Acufine Acufine	stock	4½	6½	9½	–
Agfa Rodinal	1+25	6	8	–	–
Agfa Refinal	stock	6	8½	–	–

Dip and dunk machines (min at 24°C)

ILFOTEC DD	1+4	5½	6	7	–

Roller transport, short leader machines (sec)

ILFOTEC RT RAPID	stock/27°C	55	80	120	160
ILFOTEC HC	1+11/24°C	55	70	90	130

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: ILFORD Film: HP5 Plus. ASA: 400

Fremk.type: ILFORD ILFOSOL

Blandingsforhold: 1+9 (30+270)

Vandtemperatur: 20°

Fremkaldertid: 7 min. 800 ASA => 8 1/2

Kip - rytme: 3 sed. 1600 ASA => 14

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: ILFORD IN-1

Blandingsforhold: 1:39

Stoptid: 10 - 20 sec.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD HYPAM

Blandingsforhold: 1+4

Vandtemperatur: 20°

Fixeringstid: 2 min.

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: TETENAL MIROSOL

Blandingsforhold: 1: 400

Vandtemperatur: 20°

Skylletid: 1-2 min. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: ca. 2 t.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

HELTBORG FOTO, BJERT FOTOKURSUS 1992.

SKEMA TIL FILMFREMKALDELSE.

1. Fremkaldelse: ILFORD Film: HP5 + ASA: 800

Fremk.type: ILFORD - ILFOTEX

Blandingsforhold: 1:3 (1:15) 120ml + 365ml.

Vandtemperatur: 20°

Fremkaldertid: 5 min

Kip - rytme: 3 sec.

NB: Fremkalder hældes ud efter brug.

2. STOPBAD:

Type: IN - 1 ILFORD

Blandingsforhold: 1·39

Stoptid: 60 sec.

Vandtemperatur: 20°

NB. Stopbad er genbrug.

3. FIXERING:

Type: ILFORD ILFOFIX

Blandingsforhold: ____

Vandtemperatur: ____

Fixeringstid: ____

NB. Fixeringsbad er genbrug. (max. 15 film)

4. SKYLDNING.

Type: Vand.

Vandtemperatur: 20 ° +÷ 3 °

Skylletid: 15 - 20 min. i rindende vand.

5. SLUTBAD.

Type: ILFORD

Blandingsforhold: 1·400

Vandtemperatur: 20°

Skylletid: 60 sec. NB: Tanken må ikke rystes.

NB. Stopbad hældes ud efter brug.

6. TØRRING

Tørres et mørkt, varmt, tørt og STØVFRIT sted.

Tørretid: 2½ time.

7. ARKIVERING.

Klippes i passende stykker (5-6 billeder)

Arkiveres i negativ lommer permament.

Kapacitet

Utan förnyelselösning kan 10 st 135/36 filmer framkallas per liter bruksfärdig lösning med spädning 15. Med spädning 31 kan 5 filmer framkallas per liter bruksfärdig lösning.

Hållbarhet

Förvaringssätt	Hållbarhet
Koncentrat, full flaska	24 månader
Förrådslösning, fulla flaskor	6 månader
Förrådslösning, halvfulla flaskor	2 månader
Spädning 15, fulla flaskor	6 månader
Spädning 15, halvfulla flaskor	2 månader
Spädning 31, fulla flaskor	3 månader
Spädning 31, halvfulla flaskor	1 månad

Table 1 (Min/20°C)

	1+15	1+31
ILFORD FP4	2½	3½
ILFORD HP5	3½	6½
ILFORD HP5 PLUS	3½	6½
Kodak Plus-X Pan	3	4½
Kodak Tri-X Pan	3½	6½
Agfa-Gevaert Agfapan 100	2	4
Agfa-Gevaert Agfapan 400	3	6

Table 2 (Min/20°C) 1+15

	Recommended meter setting (ISO)		
	400/27°	800/30°	1600/33°
ILFORD HP5	3½	5	11
ILFORD HP5 PLUS	3½	5	7½
Kodak Tri-X Pan	3½	5	7

Warranty
This product will be replaced if defective. In the case of professional and business users, no other liability whatsoever will be accepted and all warranties statutory express or implied are excluded.

Garantie
Ce produit sera remplacé pour défaut de qualité. Dans le cas d'un utilisateur professionnel ou industriel toute autre responsabilité et toutes garanties et conditions réglementaires formelles ou implicites sont exclues.

Garantie
Dieses Produkt wird bei Fehlerhaftigkeit ersetzt. Weitergehende Ansprüche, insbesondere Schadenersatzansprüche einschliesslich der Ansprüche auf Ersatz von Begleit- und Folgeschäden sind ausgeschlossen.

Garanzia
Questo prodotto sarà sostituito in caso di difetti. Qualsiasi altra pretesa, in particolare di risarcimento danni, inclusi quelli concomitanti o conseguenti, viene esclusa.

Garantia
Este producto será sustituido si es defectuoso. En el caso del cliente profesional o industrial, ninguna otra responsabilidad de índole alguna será aceptada, quedando excluidas todas las garantías y condiciones legales expresas o implícitas.

Garanti
Om denna produkt visar sig felaktig, kommer den att utbytas. Med förbehåll för tvingande lagbestämmelser ikläder vi oss inga som helst andra skyldigheter och friskriver oss sålunda från varje ytterligare uttryckligt eller underförstått garantiansvar.

ILFOTEC HC.

FREMKALDELSE. SKEMA

1. FREMKALDELSE.

Type: ____________________

Blandingsforhold: ____________

Vandtemperatur: ______________

Fremkaldertid: _______________

NB: Fremkalder hældes ud efter brug.

2. STOPBAD.

Type: ____________________

Blandingsforhold: ____________

Stoptid: __________________

Vandtemperatur: ______________

NB. Stopvæske er genbrug.

3. FIXERING.

Type: ____________________

Blandingsforhold: ____________

Vandtemperatur: ______________

Fixeringstid: ______________

NB: Fixering er genbrug.

4. SKYLNING.

Type: Vand

Vandtemperatur: 20 °

Skylletid: 15 - 20 min. i rindende vand.

5. STOPBAD.

Type: ____________________

Blandingsforhold: ____________

Vandtemperatur: ______________

Skylletid: ________________ Tank må IKKE rystes!

NB. Stopbad hældes ud efter brug.

6. TØRRING.

Tørres et mørkt og tørt sted.

Tørretid: _________________

NB. Pas på STØV!

TECHNICAL INFORMATION

FILM CHEMICALS— LOW VOLUME

CHEMICALS FORMULATED FOR CONVENIENT, HIGH QUALITY PROCESSING OF BLACK AND WHITE FILMS IN SPIRAL TANKS, TRAYS AND ROTARY PROCESSORS WITHOUT REPLENISHMENT

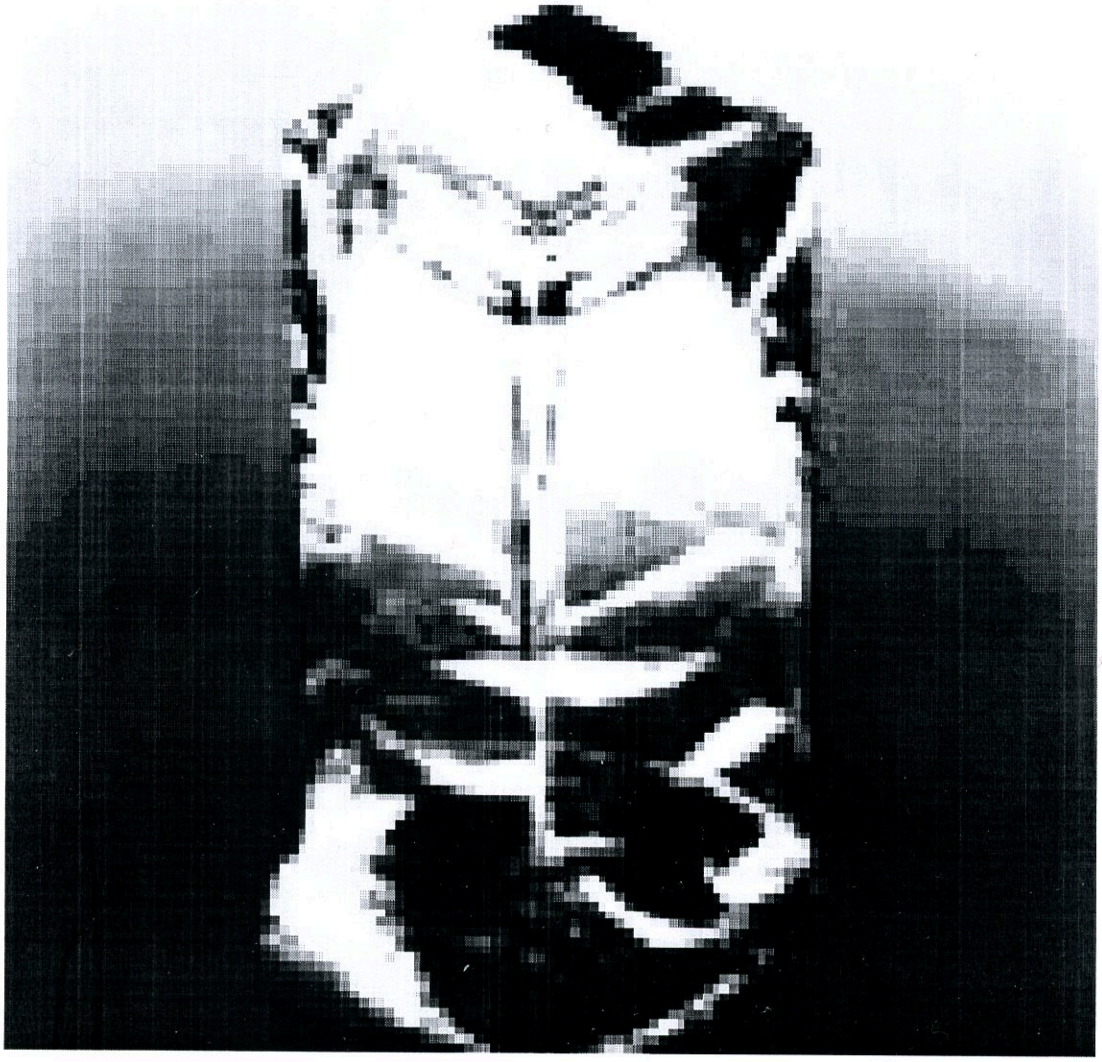


Photo By Jonathan Lovekin

ILFORD

2.2

FILM DEVELOPER FEATURES

	General Purpose	Fine Grain	High Sharp-ness	Push Process	Economy	Ease of Use	Shelf Life
Liquids							
ILFOTEC HC	++	+	+	++	++	+	++
ILFOTEC HC-D	++	+	+	++	++	++	+
ILFOSOL-S	++	+	++	—	+	++	+
Powders							
ID-11	++	+	++	+	++	+	++
MICROPHEN	+	—	++	++	++	+	++
PERCEPTOL	—	++	+	—	++	+	++

+ Good
++ Excellent
— Not recommended

2.3 FILM DEVELOPERS—LIQUID CONCENTRATES

Chemicals supplied as liquid concentrates are the most convenient to use.

ILFOTEC HC

ILFORD ILFOTEC HC is a highly concentrated developer, suitable for use in a wide range of black and white processing applications, including graphic arts films. It is particularly suited for developing fast films such as ILFORD HP5 Plus film, and is especially recommended when working on tight deadlines as in press work, where short development times and maximum ease of use are essential. ILFOTEC HC concentrate is supplied as a thick liquid which is diluted further, depending on the desired final working strength. ILFOTEC HC is clean working and robust—it will tolerate less than ideal processing conditions. The developer gives high quality, sharp results with moderate grain.

ILFOTEC HC is provided in 28 ounce (828 ml) containers. ILFOTEC HC Replenisher is also available. For details on ILFOTEC HC Replenisher, please refer to the ILFORD Film Chemicals—High Volume Technical Information sheet, which can be obtained by contacting ILFORD Technical Service.

ILFOTEC HC-D

ILFORD ILFOTEC HC-D is a highly concentrated black and white film developer which has been designed to process all of today's modern continuous tone films. Based on the professional developer ILFOTEC HC, it has a degree of flexibility not usually found in a liquid concentrate developer, including extremely easy mixing capability. Such flexibility and economy are not gained at the expense of quality, though; ILFOTEC HC-D gives fine grain negatives with good sharpness characteristics, which ensure excellent image quality. With ILFOTEC HC-D, there is a choice of dilutions—1+9, 1+19, and 1+29 (see section 4 for information on dilute development). There is also the option to one-shot process film, or to reuse the diluted developer solution during a single working session for greater economy.

ILFOTEC HC-D is supplied in 16 ounce (473 ml) containers.

ILFOSOL-S DEVELOPER

ILFORD ILFOSOL-S is a general purpose, black and white film developer based on several modern developing agents. It is particularly suited to developing medium and slow speed films, such as FP4 Plus and PAN F Plus. ILFOSOL-S gives fine grain and excellent sharpness with full film speed. It is supplied as a liquid concentrate in 16 ounce (473ml) containers for easy and economical one-shot processing. The recommended dilution is 1+9. For greater economy, and to enable practical development times to be used when processing at higher temperatures, ILFOSOL-S can be used at 1+14.

2.4 FILM DEVELOPERS—POWDERS

Chemicals supplied as powders have an extremely long shelf life, even when stored under adverse temperature and humidity conditions.

ID-11

ILFORD ID-11 developer is for use where fine grain negatives are required without a loss of emulsion speed. ID-11 ensures the best balance of fine grain, sharpness and tonal rendition, and can be used with all formats of film, producing negatives which allow a high degree of enlargement.

ID-11 is supplied as a powder and shows exceptional consistency in performance throughout its working life. ID-11 is a Metol-Hydroquinone borax type of developer. It is made up to a stock solution for normal tank or tray use, and can be further diluted 1+1 or 1+3 for users who prefer longer development times, a higher degree of sharpness, and are willing to use ID-11 on a "one-shot" basis.

MICROPHEN

ILFORD MICROPHEN is a fine grain developer recommended for obtaining the maximum film speed with films that can be push processed. It is optimized for use at the faster end of the exposure range. Grain size is reduced and grain clumping is prevented because of the low alkalinity of the developer.

The majority of developers which give an increase in film speed usually produce a corresponding increase in grain size. MICROPHEN, however, has been specially formulated to overcome this disadvantage, and therefore has a high speed to grain ratio. That is, there is a speed increase while giving the type of grain associated with a standard developer. A speed increase can be achieved with many films—and meter settings up to EI 3200/36 can be used with ILFORD HP5 Plus film.

MICROPHEN is supplied as a powder and shows exceptional consistency in performance throughout its working life. It is made up to a stock solution for normal tank and tray use, and can be further diluted 1+1 or 1+3 for users who prefer to use fresh solution each time.

PERCEPTOL DEVELOPER

ILFORD PERCEPTOL is an extra fine grain developer which gives excellent image quality and very fine grain. It is optimized for use at the slower end of the exposure range. PERCEPTOL has been specially formulated to yield optimum results from high resolution lenses, to exploit the superb grain structure of ILFORD medium and slow speed films and to produce significantly finer grain in ILFORD fast films compared with a standard fine grain developer.

PERCEPTOL gives excellent results with any lens/film combination and is therefore ideal when texture and definition are critical; negatives processed in PERCEPTOL are capable of producing finer grain and better quality enlargements than those produced in a standard fine grain developer.

PERCEPTOL is supplied in powdered form and shows exceptional consistency throughout its working life. It is made up to a stock solution for normal tank and tray use, and can be further diluted 1+1 or 1+3 for users who prefer to use fresh solution each time.

2.5 FILM CHEMICALS—GENERAL

Chemicals supplied in liquid form to complete the photographic process.

UNIVERSAL RAPID FIXER

ILFORD UNIVERSAL Rapid fixer is an ammonium thiosulphate non-hardening rapid fixer. It is ideally suited for use with ILFORD as well as other manufacturer's films. Effective fix times range from two to five minutes. Though hardeners are not generally recommended, UNIVERSAL Rapid fixer can be used with a hardener.

UNIVERSAL Rapid fixer is supplied in liquid form in a variety of sizes ranging from one pint to 30 gallons. For film fixing it is mixed at a 1+3 ratio. UNIVERSAL Rapid fixer can also be used to fix papers. See the ILFORD technical information sheet on ILFORD PAPER CHEMICALS, catalog #12864.

MULTIGRADE FIXER

ILFORD MULTIGRADE fixer is an ammonium thiosulphate non-hardening rapid fixer. It is specially formulated to reduce environmental impact. Normally used to fix black & white papers, MULTIGRADE fixer can be used to fix black & white films as well. Effective fix times range from two to five minutes. MULTIGRADE fixer *CAN NOT* be used with a hardener.

MULTIGRADE fixer is supplied in liquid form in one pint and ½ gallon sizes. For film fixing it is mixed at a 1+4 ratio. To use MULTIGRADE fixer for black & white papers, see the ILFORD technical information sheet on ILFORD PAPER CHEMICALS, catalog #12864.

ILFORD FIX HARDENER

ILFORD Fix Hardener is an alum based fix hardener. It has been formulated for use with ILFORD UNIVERSAL Rapid fixer. The use of a hardener is only recommended at processing temperatures that exceed 86°F (30°C). Using ILFORD fix hardener may require doubling fixing and washing times.

ILFORD Fix Hardener comes in a one quart bottle which makes 30 gallons of hardened fixer. It is mixed with working strength UNIVERSAL Rapid fixer at a 1+40 ratio.

ILFOTOL WETTING AGENT

ILFORD ILFOTOL Wetting Agent is a solution which aids in proper and uniform drying of black and white films. It is used as a final rinse after completely washing films.

ILFOTOL is a liquid supplied in one liter bottles. It is normally mixed at a 1+199 ratio. Depending on the hardness of the water used, ILFOTOL may be used in more dilute mixes but not more than 1+499.

3 MIXING DEVELOPERS

ILFORD chemicals are easy to mix and use, no matter whether starting from liquid concentrates or powders. Always follow the health and safety recommendations given on the packaging and, in addition to any specific precautions, use these common sense rules:

1. Work in a well-ventilated area.
2. Wear safety glasses and gloves when using chemicals.
3. Wash your hands thoroughly after using chemicals.
4. If you feel you have come in contact with the chemicals and do not feel well, seek medical advice and take the chemical container with you. Call 1-800-842-9660 for emergency medical information.
5. Never eat or drink while using chemicals.
6. Never smoke while using chemicals.

3.1 MIXING LIQUID CONCENTRATES (ILFOTEC HC-D AND ILFOSOL-S, OR STOCK SOLUTION MADE FROM POWDER DEVELOPERS)

Determine first which tank size is being used and measure out the appropriate quantity of concentrate. Always use the smallest measuring graduate possible; it is easier to measure 1 ounce accurately in an 8-ounce graduate, than in a 32-ounce graduate. Add the measured concentrate into a larger mixing graduate. Rinse out the small graduate with a small amount of water and pour it into the larger mixing graduate. Finally, add water to make up the desired volume of working strength developer, and stir for complete mixing.

It is a good idea to let the working strength developer sit a few minutes before use to make sure any air bubbles within the water dissipate.

MIXING ILFOTEC HC

Because ILFOTEC HC concentrate is a viscous liquid, it is difficult to accurately measure small quantities of the concentrate. Therefore, we recommend that the entire bottle of concentrate be diluted to form a stock solution, which can then be further diluted for use. The final stock solution contains one part concentrate and three parts water.

1. Pour the contents of the bottle of ILFOTEC HC concentrate into a mixing graduate that holds at least 1 gallon.

2. Rinse out the ILFOTEC HC bottle with water three times and pour the rinse water into the graduate.
3. Add water to make up the final volume. The final volume for a 28 ounce bottle of ILFOTEC HC is 3.5 quarts (3.31 ltr).
4. Mix thoroughly and store the stock solution in a tightly capped, labeled jug if not required immediately.

PREPARING WORKING STRENGTH DEVELOPER

Stock solution developer must be further diluted for use. The degree of dilution will depend on the material to be processed.

Developer dilution (from developer concentrate)	Developer dilution (from stock solution)	Application
1+15	1+3	General purpose films—rapid development
1+31	1+7	General purpose films—economy
1+19, 1+39 & 1+47	1+4, 1+9 & 1+11	Continuous tone graphic arts and copy materials
1+79	1+19	Certain special graphic arts materials

3.2 MIXING POWDER DEVELOPERS

Always make up powder chemicals as packed; do not attempt to prepare smaller quantities by taking fractional parts of the powders.

Slowly stir in the contents of the smaller of the two packets (Part A) into a vessel containing ¾ of the water to be used to make the total chemical volume. The water temperature should be approximately 104°F (40°C). After about 2 minutes of mixing gradually stir in the contents of the larger packet (Part B) until all contents are dissolved. Add cold water to make up the total volume.

It is advised to let the stock solution stand a few minutes before use to allow any air bubbles to disperse.

4 DEVELOPMENT

For best results when processing any film, solutions including wash water, stop (if used), fixers, and wetting agents should always be kept within ±10°F, to avoid mild reticulation. Reticulation is often mistaken for very coarse grain.

4.1 SPIRAL TANKS

Add working strength solution at the correct temperature to the processing tank. It is good habit to tap the tank firmly on the countertop once at the start of development. This will dislodge any air bubbles which may be trapped in the reel.

The recommended agitation for spiral tank processing with ILFORD chemicals is to invert the tank 4 times during the first 10 seconds and again for 10 seconds at the start of each subsequent minute. Use this method of agitation for both developing and fixing. At the end of each agitation, tap the tank firmly again on the countertop, as before.

Some methods of agitation can cause excess foaming in the tank. This can be avoided by agitating at a slower rate.

4.2 TRAYS (SHEETS ONLY)

Use continuous agitation when processing sheet film in trays, and reduce, by about 15%, the recommended development times given in section 5.

To ensure even processing, always use a tray one size larger than the film format being processed.

4.3 ROTARY PROCESSORS

Rotary processors, such as those made by Jobo, have similar processing conditions to spiral tank processing by hand, except that they process with small amounts of solution and can be pre-programmed.

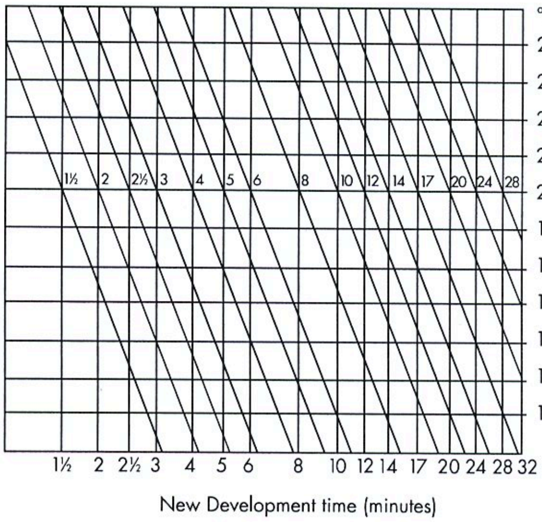
Follow any guidance given by the processor manufacturer when adjusting processing times for these processors. Standard development times given is Section 5 will need to be reduced by up to 15% for rotary processors without a pre-rinse because agitation in these processors is continuous.

Alternatively, if using a pre-wet, use the development times given in Section 5 as a guide. Generally, however, a pre-wet is not recommended as it can lead to uneven processing.

4.4 DEVELOPMENT AT DIFFERENT TEMPERATURES

ILFORD films can be processed over a range of temperatures. For best results, however, all processing solutions should be within 10°F. Development times at temperatures other than 68°F (20°C) may be calculated from the chart below:

1. Look up the development time at 68°F in the table in section 5.
2. Find this time on the 68°F line—see the figures in the middle of the chart.
3. Follow the diagonal line for this time to where it intersects the horizontal line for the new temperature.
4. Draw a line straight down from this point and read off the approximate new development time on the base of the chart.



4.5 PUSH PROCESSING

Most ILFORD films can produce high quality prints even when exposed at meter settings above their ISO rating. ILFOTEC HC, ILFOTEC HC-D, and MICROPHEN are specially designed to allow push processing and therefore are the preferred developers. However, other ILFORD developers can also be used; see Section 5 for further information.

Push processing will give higher contrast negatives than normal, together with more noticeable grain.

4.6 FIXING

After development, rinse the film in water and fix in ILFORD UNIVERSAL Rapid fixer for 2–5 minutes at 68° (20°C). Use the same agitation technique for fixing as with developing; this will make sure short fixing times will be maintained. A hardening fixer is only needed if temperatures are higher than 86°F (30°C). If this is the case, use ILFORD Fix Hardener, and follow the directions on the package for dilution. As a general rule, keep the fixing time constant as the temperature increases. This will still ensure adequate fixing, since there is no harm in over-fixing the film. MULTIGRADE fixer may be used to process films but is not compatible with hardeners.

In general, fix film for twice the time it takes for the emulsion to clear. If working with used fixer, discard if films do not clear within half the recommended fixing time.

4.7 WASHING

When a non-hardening fixer has been used, wash the film in running water for 5–10 minutes, at a temperature within 10°F of the processing temperature.

For spiral tank use, when a non-hardening fixer has been used, such as UNIVERSAL Rapid fixer, the following method of washing is recommended. This method of washing is faster, uses less water and gives negatives archival permanence.

1. Process the film in a spiral tank.
2. Fix the film with ILFORD UNIVERSAL Rapid fixer.
3. After fixing, fill the tank with water at the same temperature, and invert the tank five times.
4. Drain the water and refill. Invert the tank ten times.
5. Drain and refill a third time, and invert the tank twenty times. Drain again.

When a hardening fixer has been used because of processing at higher temperatures, wash film for 15–20 minutes at a temperature within 10°F of the processing temperature.

A final rinse in water to which a few drops of ILFOTOL Wetting Agent (1+199) have been added will aid rapid and uniform drying. Adding an excessive amount of the wetting agent can cause smears and streaks on the film.

4.8 DRYING

To avoid drying marks, use a clean squeegee to wipe the film before hanging it to dry. Dry the film at 85–104°F (30–40°C) in a drying cabinet or at room temperature in a clean, dust-free area.

5 DEVELOPMENT TIMES

The table gives development times for all formats of ILFORD films. These times will produce negatives of average contrast suitable for printing in all enlargers. The times are intended as a guide and may be altered if a different result is needed.

To use the tables, first decide which film and meter setting has been used, then choose the developer and dilution, and finally read the development time.

Note: Development times may need adjusting to suit individual processing systems and working practices. If an established system is producing good results, adjust the recommended development times until the desired contrast level is obtained. Higher or lower than average contrast negatives may be preferred by some individuals to suit their particular darkroom set-up and working methods.

Development times for other manufacturers' films are included for your convenience, and are only a general guide. Adjust these times to suite your processing system. Other manufacturers can and do change their product specifications from time to time, and the development times may change as a result.

SPIRAL TANKS (Min/68°F/20°C)

ILFORD	Meter Setting		
100 DELTA 35mm	EI 50/18	EI 100/21	EI 200/24
ILFOTEC HC (1+15)**	—	—	—
ILFOTEC HC (1+31)**	4.5	5.5	—
ILFOTEC HC-D (1+9)**	—	—	—
ILFOTEC HC-D (1+19)**	4.5	5.5	—
ILFOTEC HC-D (1+29)**	5	7	—
ILFOSOL-S (1+9)**	3.5*	5	—
ILFOSOL-S (1+14)**	5	6.5	—
ID-11 Stock	6	7	11
ID-11 (1+1)	8	10	15
ID-11 (1+3)	14	15.5	—
MICROPHEN Stock	—	8	12
MICROPHEN (1+1)	—	9	15
MICROPHEN (1+3)	—	14	—
PERCEPTOL Stock	10	15	—
PERCEPTOL (1+1)	12	17	—
PERCEPTOL (1+3)	15	20	—

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

SPIRAL TANKS (Min/68°F/20°C)

ILFORD 400 DELTA Professional 35mm (120/sheet)	Meter Setting			
	EI 200/24	EI 400/27	EI 800/30	EI 1600/33
ILFOTEC HC (1+15)**	—	3.5* (4*)	5 (5.5)	8 (9)
ILFOTEC HC (1+31)**	6 (6.5)	7.5 (8.5)	10 (11)	14 (15.5)
ILFOTEC HC-D (1+9)**	—	3.5* (4*)	5 (5.5)	8 (9)
ILFOTEC HC-D (1+19)**	6 (6.5)	7.5 (8.5)	10 (11)	14 (15.5)
ILFOTEC HC-D (1+29)**	—	13 (14.5)	—	—
ILFOSOL-S (1+9)**	7 (7.5)	9 (10)	13 (14.5)	—
ILFOSOL-S (1+14)**	11.5 (12.5)	14 (15.5)	—	—
ID-11 Stock	6 (6.5)	7 (7.5)	9 (10)	12.5 (14)
ID-11 (1+1)	9 (10)	10.5 (11.5)	12.5 (14)	—
ID-11 (1+3)	—	18 (20)	—	—
MICROPHEN Stock	—	7 (7.5)	9 (10)	12.5 (14)
MICROPHEN (1+1)	—	10.5 (11.5)	13 (14.5)	18 (20)
MICROPHEN (1+3)	—	17 (18.5)	—	—
PERCEPTOL Stock	10 (11)	13 (14.5)	—	—
PERCEPTOL (1+1)	14 (15.5)	18 (20)	—	—
PERCEPTOL (1+3)	—	22	—	—

*Not recommended due to the risk of uneven development
**Dilutions from concentrate
( ) 400 DELTA Professional roll and sheet

SPIRAL TANKS (Min/68°F/20°C)

ILFORD PAN F Plus 35mm/120	Meter Setting	
	EI 25/15	EI 50/18
ILFOTEC HC (1+15)**	—	—
ILFOTEC HC (1+31)**	—	4*
ILFOTEC HC-D (1+9)**	—	—
ILFOTEC HC-D (1+19)**	—	4*
ILFOTEC HC-D (1+29)**	—	5.5
ILFOSOL-S (1+9)**	—	4*
ILFOSOL-S (1+14)**	—	6
ID-11 Stock	6.5	6.5
ID-11 (1+1)	8.5	8.5
ID-11 (1+3)	14	15
MICROPHEN Stock	—	4.5*
MICROPHEN (1+1)	—	6
MICROPHEN (1+3)	—	11
PERCEPTOL Stock	9	14
PERCEPTOL (1+1)	10.5	15
PERCEPTOL (1+3)	15	17

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

SPIRAL TANKS (Min/68°F/20°C)

ILFORD FP4 Plus 35mm/120/sheet	Meter Setting			
	EI 50/18	EI 125/22	EI 200/24	EI 400/27
ILFOTEC HC (1+15)**	—	—	4*	7
ILFOTEC HC (1+31)**	4.5*	6	8.5	—
ILFOTEC HC-D (1+9)**	—	—	—	7
ILFOTEC HC-D (1+19)**	4.5*	6	8.5	—
ILFOTEC HC-D (1+29)**	6	8	12	—
ILFOSOL-S (1+9)**	—	4*	5	—
ILFOSOL-S (1+14)**	5	6	7.5	—
ID-11 Stock	5	6	8	—
ID-11 (1+1)	7	8	12	—
ID-11 (1+3)	15	18	—	—
MICROPHEN Stock	—	5.5	6.5	11
MICROPHEN (1+1)	—	7	9	16
MICROPHEN (1+3)	—	10	13	—
PERCEPTOL Stock	7.5	9	—	—
PERCEPTOL (1+1)	10.5	14	—	—
PERCEPTOL (1+3)	14	18	—	—

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

SPIRAL TANKS (Min/68°F/20°C)

ILFORD HP5 Plus 35mm/120/sheet	Meter Setting			
	EI 400/27	EI 800/30	EI 1600/33	EI 3200/36
ILFOTEC HC (1+15)**	3.5*	5	7.5	12.5
ILFOTEC HC (1+31)**	6.5	9.5	14	—
ILFOTEC HC-D (1+9)**	3.5*	5	7.5	12.5
ILFOTEC HC-D (1+19)**	6.5	9.5	14	—
ILFOTEC HC-D (1+29)**	9	—	—	—
ILFOSOL-S (1+9)**	7	8.5	14	—
ILFOSOL-S (1+14)**	9.5	14	—	—
ID-11 Stock	7.5	10.5	14	—
ID-11 (1+1)	13	16.5	—	—
ID-11 (1+3)	20	—	—	—
MICROPHEN Stock	6.5	8	11	16
MICROPHEN (1+1)	12	15	—	—
MICROPHEN (1+3)	23	—	—	—
PERCEPTOL Stock	11	—	—	—
PERCEPTOL (1+1)	15	—	—	—
PERCEPTOL (1+3)	23	—	—	—

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

SPIRAL TANKS (Min/68°F/20°C)

Kodak®	Meter Setting T-Max® 100 EI 100/21	Plus-X® EI 100/21	T-Max® 400 EI 400/27	T-Max® P3200 EI 3200/36
ILFOTEC HC (1+15)**	4*	3*	3.5*	—
ILFOTEC HC (1+31)**	7.5	5.5	6.5	11.5
ILFOTEC HC-D (1+9)**	4*	3.5*	3.5*	—
ILFOTEC HC-D (1+19)**	7.5	5.5	6.5	11.5
ILFOTEC HC-D (1+29)**	11	9	9	—
ILFOSOL-S (1+9)**	8.5	7	7.5	17.5
ILFOSOL-S (1+14)**	16	12.5	14	—
ID-11 Stock	8	7	7	15
ID-11 (1+1)	11	8	10	—
ID-11 (1+3)	16	13	15	—
MICROPHEN Stock	8	6	7	12
MICROPHEN (1+1)	11	8.5	10	—
MICROPHEN (1+3)	16	13.5	15	—
PERCEPTOL Stock	12	8	11	—
PERCEPTOL (1+1)	13.5	9.5	12.5	—
PERCEPTOL (1+3)	19	12	17	—

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

SPIRAL TANKS (Min/68°F/20°C)

Agfa®	Meter Setting APX25 EI 25/15	APX100 EI 100/21	AP 400 EI 400/27
ILFOTEC HC (1+15)**	—	4*	3*
ILFOTEC HC (1+31)**	3*	7.5	6
ILFOTEC HC-D (1+9)**	—	—	—
ILFOTEC HC-D (1+19)**	3*	7.5	6
ILFOTEC HC-D (1+29)**	5	—	—
ILFOSOL-S (1+9)**	6	7	9
ILFOSOL-S (1+14)**	10	11	—
ID-11 Stock	9	9	10.5
ID-11 (1+1)	13	13.5	14.5
ID-11 (1+3)	—	—	25
MICROPHEN Stock	8	9	10.5
MICROPHEN (1+1)	10	—	19
MICROPHEN (1+3)	—	—	27
PERCEPTOL Stock	10	9	14
PERCEPTOL (1+1)	—	—	17
PERCEPTOL (1+3)	—	—	24

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

SPIRAL TANKS (Min/68°F/20°C)

Fuji®	Meter Setting Neopan® 400 Professional EI 400/27	Neopan® 1600 EI 1600/33
ILFOTEC HC (1+15)**	4*	3*
ILFOTEC HC (1+31)**	6	7
ILFOTEC HC-D (1+9)**	4*	3*
ILFOTEC HC-D (1+19)**	6	7
ILFOTEC HC-D (1+29)**	8	10
ILFOSOL-S (1+9)**	6.5	—
ILFOSOL-S (1+14)**	10	—
ID-11 Stock	8	6.5
ID-11 (1+1)	14	10
ID-11 (1+3)	20	15
MICROPHEN Stock	6.5	3.25*
MICROPHEN (1+1)	12	—
MICROPHEN (1+3)	16.5	—
PERCEPTOL Stock	14	—
PERCEPTOL (1+1)	18	—
PERCEPTOL (1+3)	23	—

*Not recommended due to the risk of uneven development
**Dilutions from concentrate

6 CAPACITY

6.1 CAPACITY WITHOUT REPLENISHMENT

One liter of working strength solution will process the following number of films:

Solution	35mm 36 exp	35mm 24 exp	120 Roll Film	220 Roll Film	4x5 Sheet	8x10 Sheet
Developers						
ILFOTEC HC (1+15)**	10	15.0	10	5.0	40	10
ILFOTEC HC (1+31)**	5	7.5	5	2.5	20	5
ILFOTEC HC-D (1+9)**	10	15	10	5.0	40	10
ILFOTEC HC-D (1+19)**	5	7.5	5	2.5	20	5
ID-11 (Stock)	10	15	10	5	40	10
ID-11 (1+1)	5	7.5	5	2.5	20	5
MICROPHEN (Stock)	10	15	10	5	40	10
MICROPHEN (1+1)	5	7.5	5	2.5	20	5
PERCEPTOL (Stock)	5	7.5	5	2.5	20	5
PERCEPTOL (1+1)	2.5	3.75	2.5	1.25	10	2.5
ILFOTEC HC (1+31)	5	7.5	5	2.5	20	5
Other solutions						
IN-1 stop (1+31)**	24	36	24	12	96	24
UNIVERSAL Rapid fixer (1+3)**	19	29	19	10	77	19

**Dilutions from concentrate

6.2 ONE-SHOT PROCESSING

This processing technique is recommended for the user who prefers to use fresh solution for each roll of film or who processes film infrequently. One-shot processing produces the most consistent and predictable results. In most cases, diluted developers should be used only once and then discarded. The exceptions are ILFOTEC HC-D AND ILFOTEC HC developers. Instructions for reusing these and other ILFORD developers can be found in section 6.3 DEVELOPER REUSE.

Development of ILFORD films in one-shot developers may be preferred for convenience. Dilute development with intermittent agitation increases sharpness, but also increases apparent grain when using some developers.

6.3 DEVELOPER REUSE

When several rolls of film are to be processed in a single working session and economy is essential, some developers can be reused. Reusing a developer can increase its capacity while still giving correctly processed negatives.

POWDER DEVELOPERS

Use undiluted stock solutions *ONLY.*

Volume of Developer	Capacity
1 Quart (32 oz.)	10x35mm (36 exp.)*
1 Gallon (128 oz.)	40x35mm (36 exp.)*

* One 35mm (36 exp.) = 1-120, 4-4x5 or 1-8x10

To compensate for loss of activity, increase development time by 10% after 2 rolls have been processed in each quart of developer. After each use, return used developer solution to the container holding the stock solution. Reuse until the recommended capacities are reached.

LIQUID DEVELOPERS

The only liquid developers that can be reused are ILFORD ILFOTEC HC-D (Dilution 1+9 or 1+19) and ILFOTEC HC (Dilution 1+15 or 1+31).

To use, mix the chosen developer as instructed. Process the first batch of film at the recommended development time. The same developer solution can then be used two additional times to develop the same amount of film. To compensate for loss of developer activity after the first use, increase development time for each successive equal amount of film by 10%.

For example: If one 35mmx36 exposure roll of film is developed in 8 ounces of developer for 7 minutes, a second roll of 35mmx36 film can be processed in the same developer solution with the re-computed time of 7.7 minutes. Again using the same 8 ounces of developer solution, a third and final 35mmx36 roll can be processed with the new development time being 8.5 minutes.

ILFOTEC developers can only be reused the same day of mixing.

6.4 FIXERS

Compensating for loss of fixer activity is less precise. Film should remain in the fixer for twice the time it takes the emulsion to clear. Discard the fixer when the clearing time in used fixer is more than twice the clearing time in fresh fixer.

The clearing time of a film can be found by allowing a drop of fixer to act on a small piece of unprocessed film for about 30 seconds. Immerse the film in fixer, and the time it takes for the spot to disappear is the clearing time.

7 STORAGE

Always store chemicals away from unsupervised children or from pets, and preferably in a cool 50–68°F (10–20°C) place. The liquid concentrates and powders must be stored in their original packaging. Stock solutions and diluted solutions should be stored in tightly capped bottles, labeled with the product name and the date the solution was made. Any method of reducing the air inside solution containers (for example, collapsible bottles) extends their life over solutions stored in half full bottles.

The following table gives a guide to storage times for chemicals as supplied and for unreplenished solutions.

Chemicals	Storage time (months)	
	Unopened Full	Half full
Highly concentrated liquid		
ILFOTEC HC	Indefinite	
Liquid concentrate developers		
ILFOTEC HC-D	18	3
ILFOSOL-S	18	3
Stock solutions		
ILFOTEC HC	6	2
Other developers (stock solutions)		
ID-11	6	1
MICROPHEN	6	1
PERCEPTOL	6	1
Diluted solutions		
ILFOTEC HC 1+11, 1+15	6	2
ILFOTEC HC 1+31	3	1
ILFOTEC HC 1+47	2	1
ILFOTEC HC-D 1+9	6	2
ILFOTEC HC-D 1+19	3	1
ILFOTEC HC-D 1+29	2	1
Other developers (working strength)		
ID-11	Do not store	
ILFOSOL-S	Do not store	
MICROPHEN	Do not store	
PERCEPTOL	Do not store	

Unmixed powder chemicals can be stored in a dry place indefinitely.

8 ENVIRONMENTAL AND SAFETY CONSIDERATIONS

Photographic chemicals are not hazardous when used correctly and when basic rules of common sense are observed. On each container of ILFORD chemicals, one will always find health and safety recommendations, as a guide to safe handling and use. Further details are available on all ILFORD photo chemicals by obtaining Material Safety Data Sheets (MSDS), which give full details for their safe handling, disposal, and transportation.

MSDS can be obtained by contacting the distributor from which your ILFORD photographic chemicals were purchased, or by contacting ILFORD Technical Service directly at 201-265-6000. Emergency medical information can be obtained by calling 1-800-842-9660 (24 hours).

TECHNICAL INFORMATION

PAPER CHEMICALS

CHEMICALS FOR TRAY AND MACHINE PROCESSING

Photo by Henri Silberman

ILFORD

TRAY PROCESS CHEMICALS

BROMOPHEN

1 DESCRIPTION

BROMOPHEN is a premium quality powder developer that produces superb results with all types of photographic printing papers. Use BROMOPHEN when the utmost in exhibition quality is desired.

BROMOPHEN is a phenidone-hydroquinone developer specifically designed for use with fiber papers such as ILFORD MULTIGRADE FB and ILFOBROM GALERIE FB, but may be used successfully with resin coated papers as well.

BROMOPHEN is supplied as a powder from which a solution is made by dissolving two separately packaged ingredients. BROMOPHEN is made up as a stock solution and then further diluted for use.

2 PREPARATION AND USE

To mix the stock solution, dissolve the contents of Part A in three quarters of the total volume of warm water at about 120°F (50°C). When most of the powder from Part A has dissolved, add the contents of Part B and stir until all of the powder has dissolved. Add cold water to make up the total volume. Dilute one part of the stock solution with three parts water. A development time of 1½–2 minutes at 68°F (20°C) is recommended.

3 STORAGE

Unopened packages of BROMOPHEN paper developer will keep for approximately three years.

Tightly capped full bottles of stock solution will keep for 4 to 6 months. Tightly capped half-full bottles of stock solution will keep for about 2 months.

4 CAPACITY

One liter of BROMOPHEN paper developer diluted 1+3 will process about 40 8x10 inch fiber base prints and 70–80 8x10 inch resin coated prints.

MULTIGRADE CHEMICALS

MULTIGRADE DEVELOPER

1 DESCRIPTION

MULTIGRADE developer is an economical developer primarily recommended for use with MULTIGRADE papers. Use this versatile developer to process both resin coated and fiber base enlarging papers.

2 PREPARATION AND USE

MULTIGRADE developer is supplied as a liquid concentrate and is economical to use. The recommended dilution is 1 part developer mixed with 9 parts water. Mix only as much developer as is needed for that particular printing session.

For MULTIGRADE IV RC DELUXE and MULTIGRADE III RC RAPID papers, the image appears after 10 seconds and development, at 68°F (20°C), is complete in 1 minute. This development time produces prints identical in contrast and maximum density to prints processed for two minutes in a conventional tray developer.

For MULTIGRADE FB papers, the image appears after 35 seconds with a development range of 1½–3 minutes at 68°F (20°C). Development may be extended to 6 minutes without any noticeable change in contrast or fog.

For greater development control and added economy, MULTIGRADE developer can also be diluted at 1+14. Diluted MULTIGRADE developer will stay in good condition in an open tray for two working days, at dilution 1+9 and for one working day, at dilution 1+14.

3 STORAGE

Unopened bottles of MULTIGRADE developer will keep approximately 24 months. Tightly capped half-full bottles will keep for up to 6 months.

4 CAPACITY

One liter of working strength developer will process up to 50 8x10 inch fiber base prints and 100 resin coated prints.

MULTIGRADE FIXER

1 DESCRIPTION

MULTIGRADE fixer is a non-hardening ammonium thiosulfate fixer recommended for use with resin coated and fiber base papers.

2 PREPARATION AND USE

MULTIGRADE fixer is diluted 1 part concentrate with 4 parts water to make a working strength solution.

Rinse prints in a stop bath, then transfer to MULTIGRADE fixer. Agitate prints initially then fix resin coated papers for 30 seconds and fiber base papers for 60 seconds at 68°F (20°C).

3 STORAGE

Unopened bottles of MULTIGRADE fixer will keep for 24 months. A tightly capped half-full bottle will keep for 6 months.

4 CAPACITY

Fixer capacity varies depending on Life Expectancy (LE) requirements. Listed below are the recommended numbers of 8x10 inch prints that may be processed in one liter of working strength fixer.

Paper	Commercial (LE <25 Yrs.)	Archival (LE >100 Yrs.)
Resin Coated	80	40*
Fiber Base	40	10
Fiber Base (ILFORD Archival Sequence)	—	40+

+Print capacity increases when following the ILFORD Archival Processing Sequence using UNIVERSAL wash aid.

*Information based on accelerated aging tests and does not reflect real time testing.

UNIVERSAL CHEMICALS

UNIVERSAL PAPER DEVELOPER

1 DESCRIPTION

UNIVERSAL paper developer is a phenidone based developer supplied as a liquid concentrate. It is for use with graded and variable contrast papers on both a resin coated or fiber base. The 16 oz. bottle makes five quarts of working strength solution and a developing time of 1½ minutes is recommended for all papers. This can be adjusted up or down depending on the required results.

2 PREPARATION AND USE

This economical liquid concentrate should be diluted 1 part developer mixed with 9 parts water for working strength solution. Mix only as much developer as is needed for that particular printing session. Development times can range from 35 seconds to two minutes at 68°F (20°C). UNIVERSAL paper developer will produce a neutral image color with all ILFORD papers.

3 STORAGE

Unopened bottles of UNIVERSAL paper developer concentrate will keep for about 18 months. A tightly capped half-full bottle will keep for at least three months.

4 CAPACITY

One liter of working strength developer will process about 45 8x10 inch fiber base prints and 70–80 resin coated prints.

IN-1 STOP BATH

1 DESCRIPTION

After development, prints should be rinsed in IN-1 stop bath. The use of a stop bath terminates development immediately and helps maintain the fixer bath in good condition. IN-1 contains an indicator color which changes from bright orange to purple when the stop bath should be discarded.

2 PREPARATION AND USE

IN-1 stop bath is a specially formulated acid stop bath which is diluted 1+31 for use. It is available in a 16 oz. bottle which makes 4 gallons of working strength solution. For greater economy, mix IN-1 stop bath 1+63. This dilution is useful for short printing sessions where the solution will be discarded immediately after use.

3 STORAGE

Unopened bottles of IN-1 stop bath concentrate will keep for about 36 months. A tightly capped half-full bottle will keep for at least three months.

4 CAPACITY

Discard IN-1 stop bath when the indicator turns from bright orange to purple. Alternatively, discard the solution if the prints still feel slimy after 10 seconds in the bath.

UNIVERSAL RAPID FIXER

1 DESCRIPTION

ILFORD has always recommended the use of non-hardening fixers as they allow for the use of shorter wash times. ILFORD papers will process satisfactorily without hardener to around 83°F. The higher the temperature, the more care is needed to avoid damaging the emulsion when handling wet paper.

2 PREPARATION AND USE

UNIVERSAL Rapid fixer is a rapid acting ammonium thiosulfate fixer which does not contain a hardener. It is ideally suited for use with ILFORD films and papers. Supplied as a liquid concentrate, it is diluted with three parts of water for use. Fix resin coated papers for just 30 seconds and fiber base papers for only 60 seconds at 68°F (20°C). Films can be effectively fixed in 2–5 minutes at 68°F (20°C).

3 STORAGE

Unopened full bottles of UNIVERSAL Rapid fixer concentrate will keep for about 12 months and a tightly capped half-full bottle of concentrate will keep for at least six months.

TECHNICAL INFORMATION

100 DELTA PROFESSIONAL

ISO 100/21°, FINE GRAIN, BLACK AND WHITE PROFESSIONAL FILM
FOR SUPERB PRINT QUALITY

Photo by Wendy Erickson ©1994

ILFORD

100 DELTA PROFESSIONAL Fine Grain Black and White Film

1 DESCRIPTION & USE

ILFORD 100 DELTA PROFESSIONAL is a medium speed, black and white film, ideal for pictorial and fine art photography. The new, professional version of 100 DELTA, in 35mm, can be processed in a wider variety of developers. It is also less sensitive to changes in development, offering greater process control. When given standard development it has a speed rating of ISO 100/21° to daylight.

Prints made from 100 DELTA PROFESSIONAL film exposed at EI 100/21 have extremely fine grain and outstanding sharpness. In fact, in the hands of a skilled specialist, who will pay careful attention to exposure and processing, prints from 100 DELTA PROFESSIONAL negatives can be exceptional.

100 DELTA PROFESSIONAL though, is not just for specialists and is more than an ISO 100/21° film. Its exposure latitude allows good quality results to be obtained over the exposure range EI 50/18 to EI 200/24.

100 DELTA PROFESSIONAL is compatible with all major processing systems and can be processed in all popular developers.

1.1 35mm FILM

100 DELTA PROFESSIONAL 35mm film is supplied in DX coded cassettes, so the film speed of ISO 100/21° is set automatically on most cameras. These cassettes are very strong and have the end caps firmly fixed to the body. This ensures the caps remain in position during rough handling.

The combination of the tangential style cassette and the low friction characteristics of the film is much appreciated by motor drive or autowind users, as the film is easily advanced, thus saving battery wear.

100 DELTA PROFESSIONAL 35mm film has a neutral base tint which enables easy print contrast assessment on the light box.

100 DELTA PROFESSIONAL 35mm film is available in 24 or 36 exposure DX coded cassettes or in bulk film lengths of 100 feet. 100 DELTA PROFESSIONAL 35mm film is coated on 0.125mm (5/1000 inch) acetate base.

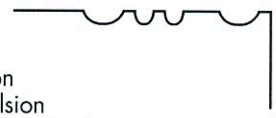
1.2 ROLL FILM

100 DELTA PROFESSIONAL roll film is coated on 0.110mm (4/1000 inch) clear acetate base which has an antihalation backing that clears during development. 100 DELTA PROFESSIONAL roll film is available in 120 length and is edge numbered 1 to 19 to ensure all formats can be identified, whatever camera format is being used.

The backing paper has a white outer surface for easy frame identification. The portion of the backing paper visible after exposure is black with white printing for quick identification of exposed films.

1.3 SHEET FILM

100 DELTA PROFESSIONAL sheet film is available in a wide range of standard sizes. It is coated on 0.180mm (7/1000 inch) polyester base, offering rigidity and dimensional stability. This makes it ideally suitable for machine processing in automatic processors without the need for leaders. The base has an antihalation backing which clears during processing.



The short side of 100 DELTA PROFESSIONAL sheet film is notched to indicate the emulsion surface and film type. The emulsion faces the user when the film is held in the position shown. The notch code above indicates that the film is 100 DELTA PROFESSIONAL.

Both surfaces of 100 DELTA PROFESSIONAL accept commonly used retouching media and are designed to resist surface roller marks when machine processing.

In addition to general purpose photography, 100 DELTA PROFESSIONAL sheet film is ideal for copying and internegative work.

2. EXPOSURE DETAILS

2.1 EXPOSURE RATING

100 DELTA PROFESSIONAL has a speed rating of ISO 100/21° (100ASA, 21 DIN, EI 100/21) to daylight and is recommended for pictorial and fine art photography in all types of lighting. While a meter setting of EI 100/21 is recommended for optimum results, high quality results are also obtained when 100 DELTA PROFESSIONAL is exposed over the range EI 50/18 to EI 200/24.

It should be noted that the exposure index (EI) recommended for 100 DELTA PROFESSIONAL is based on a practical evaluation of film speed and is not based on foot speed, as is the ISO standard.

2.2 FILTER FACTORS

100 DELTA PROFESSIONAL film can be used with all types of filters (e.g., color, polarizing and neutral density filters) in the usual way.

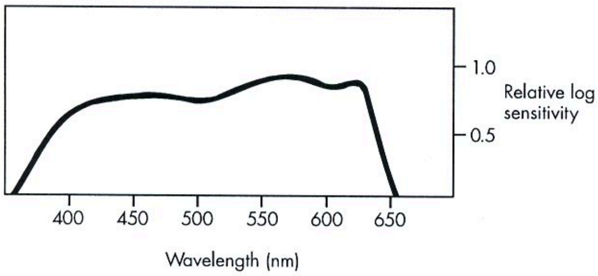
The table gives a practical GUIDE to the increase in exposure needed when using the filters listed. The exposure increase in daylight may vary with the angle of the sun and the time of day. In the late afternoon or the winter months, when the daylight contains more red light, green and blue filters may need slightly more exposure than usual. The exposure increases for tungsten light are based on an average tungsten source which has a color temperature of 3200K.

Cameras with through-the-lens metering will usually adjust the exposure automatically when using filters. With some automatic exposure cameras, the correction given for deep red and orange filters can produce negatives under exposed by as much as 1½ stops. To check for this, take two readings of the same subject, one with and one without a filter on the lens. Compare the difference between the two with the filter manufacturer's recommended increase in the exposure. Where a meter is causing under exposure, either adjust the speed rating or, if possible, switch to manual operation.

The factors are intensity scale factors, but in most cases exposures can be increased by using either a larger aperture or a slower shutter speed. Multiply a metered exposure by the filter factor to approximate the new setting.

Kodak Wratten Filter	Daylight Factor	Tungsten Factor
Yellow (#8)	1.5	1.2
Deep Yellow (#15)	2.0	1.5
Yellowish Green (#11)	3.0	3.0
Orange (#21)	2.3	2.0
Deep Orange (#22)	5.0	2.5
Tricolor Red (#25)	8.0	4.0
Tricolor Blue (#47)	8.0	25.0
Tricolor Green (#58)	6.0	6.0
Neutral Density (.30)	2.0	2.0

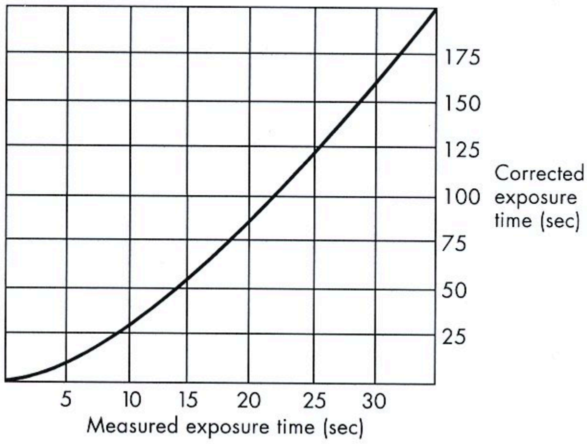
2.3 SPECTRAL SENSITIVITY



2.4 RECIPROCITY CHARACTERISTICS

Most films, including 100 DELTA PROFESSIONAL, are designed to be used over a wide range of exposures. This range covers most normal photography, including exposure by electronic flash. Thus, for exposures between ½ and 1/10,000 second, no corrections are needed for reciprocity law failure.

For exposures longer than ½ second, 100 DELTA PROFESSIONAL, along with other films, needs to be given more exposure than indicated by a meter. Use the graph to calculate the increased exposure time which should be given once the measured time is known.



3 PROCESSING OPTIONS

100 DELTA PROFESSIONAL is a versatile film and may be exposed and developed to suit a wide range of requirements. This section outlines how this can best be done.

3.1 DEVELOPERS

The versatility of 100 DELTA PROFESSIONAL can be exploited by selecting the best ILFORD developer for the job. The table is a guide to choosing the ILFORD developer for 100 DELTA PROFESSIONAL that is most suited to individual requirements.

MANUAL PROCESSING (e.g., Spiral Tank, Tray, Deep Tank)

Requirement	Liquid	Powder
Best Overall Image Quality	ILFOTEC HC (1+31)	ID-11 (Stock)
Finest Grain (EI 50/18)	ILFOSOL-S (1+9)	PERCEPTOL (Stock)
Finest Grain (EI 100/21)	ILFOSOL-S (1+14)	PERCEPTOL (1+1)
Maximum Sharpness	ILFOTEC HC (1+31)	ID-11 (1+3)
Maximum Film Speed (EI 200/24)	—	MICROPHEN (Stock)
One-Shot Convenience	ILFOSOL-S (1+14)	ID-11 (1+3) MICROPHEN (1+3)
Economy	ILFOTEC HC (1+31)	ID-11 (1+3) MICROPHEN (1+3)

MACHINE PROCESSING

Dip and Dunk	ILFOTEC DD	Best overall image quality (liquid)
	ILFOTEC HC	Flexible process time, range of dilutions and economy
Leader Card	ILFOTEC RT RAPID	Rapid processing, best overall image quality and long tank life
	ILFOTEC HC	Range of dilutions, flexibility and economy
Roller Transport	ILFOTEC RT RAPID	Rapid processing, best overall image quality
	ILFOTEC HC (1+11)	Economy

4 PROCESSING METHODS

100 DELTA PROFESSIONAL can be processed in all types of processing equipment including spiral tanks, deep tanks and automatic processors. This new technology film will not cause premature exhaustion of the developer, so standard capacity figures and replenishment rates can be maintained. When fixing 100 DELTA PROFESSIONAL, however, slightly longer times than usual are recommended for best results.

4.1 SAFELIGHT RECOMMENDATIONS

Handle 100 DELTA PROFESSIONAL film in total darkness. For very brief inspections during processing, use the ILFORD 908 (very dark green) or Kodak 3 safelight filter, with a 15W bulb, fitted in a darkroom lamp. Do not allow direct lighting from the safelight to fall on the film.

When processing 100 DELTA PROFESSIONAL film by inspection, the safest way is to use infrared illumination in the darkroom, with infrared goggles to see the film. This method ensures the film cannot be fogged and makes it easy to see the image.

4.2 SPIRAL TANK PROCESSING

The recommended agitation for spiral tank processing with ILFORD chemicals is to invert the tank four times during the first 10 seconds and again for 10 seconds (four inversions) at the start of every further minute. Use this method of agitation for both developing and fixing. At the end of each agitation sequence, tap the tank firmly to dislodge any air bubbles.

4.3 ROTARY PROCESSORS

Rotary processors, such as those made by Jobo, have very similar processing conditions to spiral tank processing by hand, except they process with small amounts of solution and can be pre-programmed. Follow any guidance given by the processor manufacturer when adjusting processing times for these types of processors. Standard development times are given in section 5.2 Development Times; these may need reducing by up to 15% for use in rotary processors without a pre-rinse because of the continuous agitation given in these processors. Alternatively, if using a pre-rinse, use the development times for spiral tank processing as a guide.

4.4 MACHINE PROCESSING

100 DELTA PROFESSIONAL can be processed in all types of general purpose film processors, including dip and dunk, short leader and roller transport processors—see the developer recommendations in section 3.1 Developers.

After development, fix 100 DELTA PROFESSIONAL in ILFORD UNIVERSAL Rapid fixer (1+3). When roller transport processing, add one part ILFORD FIX HARDENER to every 40 parts working strength UNIVERSAL Rapid fixer. Hardener protects the film during the remainder of the roller transport processing sequence.

5 DEVELOPMENT TIMES

The tables give development times for both manual and machine processing 100 DELTA PROFESSIONAL film. These times will produce negatives of average contrast suitable for printing in all enlargers. The development times are intended as a GUIDE ONLY and may be altered if a different result is required.

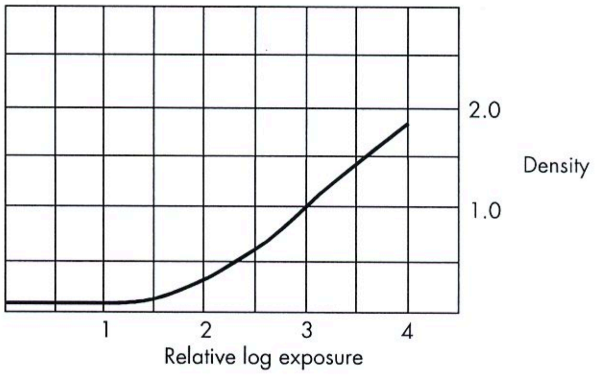
To use the tables, determine the meter setting used, then choose the developer and dilution, and read off the development time. This time has been found to give the best quality with that meter setting in that developer. This simplified approach to development times with 100 DELTA PROFESSIONAL means there is no need to adjust the meter setting to suit the choice of developer.

For manual processing, these times are based on intermittent agitation (see section 4.2). When continuous agitation is used for manual processing—as in a tray or with some types of developing tanks—reduce these times by up to 15%.

Note: The contrast level obtained using these development times is between the "normal" and "high" contrast levels that used to be recommended for use with condenser or diffuser enlargers respectively. This approach is no longer necessary, considering the enlarger types that are popular today.

5.1 CHARACTERISTIC CURVE

100 DELTA PROFESSIONAL developed in ILFORD ID-11 stock for 8½ minutes at 68°F (20°C) with intermittent agitation.



5.2 DEVELOPMENT TIMES

35mm, ROLL AND SHEET FILM
SPIRAL TANK, DEEP TANK, AND ROTARY PROCESSORS (MIN/68°F/20°C)

ILFORD Developer	Dilution	Meter Setting EI 50/80	EI 100/21	EI 200/24
ILFOSOL-S	1+9	4.5**	6	—
	1+14	6.5	10	—
ILFOTEC HC	1+31	5	6	8
	1+47	5.5	7.5	10
ID-11	Stock	7	8.5	10.5
	1+1	10	11	13
	1+3	15	20	—
MICROPHEN	Stock	—	6.5	8
	1+1	—	10	14
	1+3	—	14	20
PERCEPTOL	Stock	12	15	—
	1+1	13	17	—
	1+3	16	22	—

Non-ILFORD Developer	Dilution	Meter Setting EI 50/18	EI 100/21	EI 200/24
Kodak D76	Stock	7	9	11
	1+1	9.5	12	14
	1+3	14	22	—
Kodak HC-110	B	5	6	8
	E	5.5	7.5	10
Kodak T-Max	1+4	6	7	8
Kodak Microdol-X	Stock	12	15	—
	1+3	16	22	—
Acufine	Stock	—	—	5.5
Agfa Rodinal	1+25	7	9	—
	1+50	10	14	—

DIP AND DUNK MACHINES (Min./75.2°F/24°C)

Developer	Dilution	Meter Setting EI 50/18	EI 100/21	EI 200/24
ILFOTEC DD	1+4	5.5	7	7
ILFOTEC HC	1+31 (68°F)	5	6	8
Kodak T-Max RS	Stock	5	6	8

**Not recommended due to the risk of uneven development.

ROLLER TRANSPORT, LEADER CARD MACHINES (Sec.)

Developer	Dilution	Meter Setting EI 50/18	EI 100/21	EI 200/24
ILFOTEC RT RAPID	Standard (78.8°F)	—	50	50
	Modified		50	55
ILFOTEC HC	1+11 (75.2°F)	60	76	119
Kodak Duraflo	Stock (80.6°F)	—	45	50

5.3 METER SETTINGS BELOW EI 25/15 OR ABOVE EI 400/27

If 100 DELTA PROFESSIONAL has been exposed at a meter setting slower than EI 25/15 or faster than EI 400/27, the following guide will ensure that usable negatives are obtained. Obviously, the quality of negatives processed in this way will not be as high as conventionally processed ones.

MANUAL PROCESSING (Min./68°F/20°C)

ILFORD Developer	Dilution	Meter Setting EI 25/15	EI 400/27
PERCEPTOL	Stock	9	*
MICROPHEN	Stock	*	10

*Not Recommended

For users who regularly like to shoot films slower than ISO 100/21°, the recommended ILFORD film is ILFORD PAN F Plus (ISO 50/18°).

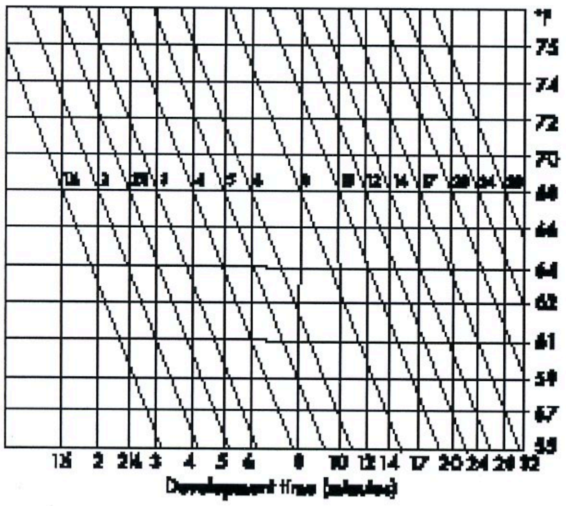
Also available is ILFORD XP2 (ISO 400/27°), a unique black and white film which can be exposed over meter settings from EI 100/21 to EI 800/30 on the same roll of film. It has very fine grain and must be processed through standard C-41 type color negative chemicals.

5.4 PROCESSING AT DIFFERENT TEMPERATURES

100 DELTA PROFESSIONAL film can be processed over a range of temperatures. Development times at temperatures other than 68°F may be calculated from the chart on the next page.

1. Look up the development time at 68°F in the tables in section 5.2.
2. Find this time on the 68°F line—see the figures in the middle of the chart.
3. Follow the diagonal line for this time to where it cuts the horizontal line for the new temperature.
4. Draw a line straight down from this point and read off the approximate new development time on the base of the chart.

For example, if 4 minutes at 68°F is recommended, the time at 74°F will be about 3 minutes and the time at 61°F will be 6 minutes.



5.5 FIXING

Use the standard ILFORD recommendations for agitation when fixing 100 DELTA PROFESSIONAL—see sections 4.2 and 4.3. For best results, it is advisable to give 100 DELTA PROFESSIONAL slightly longer fixing times than usual.

After development, rinse the film in water and fix in ILFORD UNIVERSAL Rapid fixer (1+3) 3–5 minutes at 68°F. If ILFORD FIX HARDENER* is added to the fixer, fix for 5 minutes at 68°F. A hardener is recommended only when processing at high temperatures (above 86°F) or in a roller transport processor.

*ILFORD FIX HARDENER *CAN NOT* be used with ILFORD MULTIGRADE or 2000 RT Fixers.

5.6 WASHING

When a non-hardening fixer such as UNIVERSAL Rapid has been used, wash the film in running water for 5–10 minutes at a temperature within ±10°F of the processing temperature.

For spiral tank use when a non-hardening fixer has been used, the following method of washing is faster, uses less water yet still gives negatives of archival permanence.

1. Process the film in a spiral tank.
2. Fix it using ILFORD UNIVERSAL Rapid fixer.
3. After fixing, fill the tank with water at the same temperature as the processing solutions, and invert it five times.
4. Drain the water away and refill. Invert the tank ten times.
5. Drain and refill it for the third time and invert the tank twenty times. Drain the water away.

When a hardening fixer has been used, wash the film in running water for 15–20 minutes at a temperature within ±10°F of the processing temperature. Use of a hardening fixer makes the film more difficult to wash and is therefore not recommended.

A final rinse in water to which ILFOTOL Wetting Agent (1+200) has been added will aid rapid and uniform drying.

5.7 DRYING

To avoid drying marks, use a squeegee or chamois cloth to wipe 100 DELTA PROFESSIONAL film before hanging it to dry. Dry 100 DELTA PROFESSIONAL at 86–104°F in a drying cabinet or at room temperature in a clean, dust free area.

6 CONTRAST-TIME CURVES

For normal use at EI 100/21, develop 100 DELTA PROFESSIONAL film according to the development times given in the table in section 5.2 Development Times. The development times for a meter setting of EI 100/21 correspond to zero contrast change on the contrast-time curves.

For subjects with an unusually large or small brightness range, and also to fine tune contrast to suit individual requirements, it is possible to vary the development time to obtain the type of negatives required. As a guide, try changing contrast in steps of 5%.

Note: In general, the best image quality is always obtained when the film is processed according to the recommendations given in sections 4 and 5, and printed on the appropriate grade of paper for the resulting negatives.

The scale on the right hand side of the contrast-time curves gives the contrast changes in ILFORD printing paper contrast grades.

For example, if your negatives normally lie between paper grades 2 and 3, you may wish to increase the film development time, and so increase the contrast of the negatives, so they print on grade 2.

In such a case with ILFOTEC HC (1+31) developer, for example, instead of giving a development time of 6 minutes, read off the new development time of approximately 7 minutes where the –½ paper grade meets the contrast-time curve. Alternatively, use one of the ILFORD MULTIGRADE papers which gives ½ steps of contrast.

TECHNICAL INFORMATION

MULTIGRADE IV RC DELUXE AND PORTFOLIO

ILFORD

MULTIGRADE IV RC DELUXE AND PORTFOLIO

1 DESCRIPTION AND USE

ILFORD MULTIGRADE IV RC DELUXE is a variable contrast, black and white, non-developer incorporated photographic paper on a resin coated base. It is a premium quality paper which produces prints with deep rich blacks and a neutral image color on a bright white base.

ILFORD MULTIGRADE IV RC DELUXE black and white paper has been improved to give an even higher level of performance and quality. Compared with MULTIGRADE III, it has better tonal rendition throughout the contrast range, especially in the highlights. It also has excellent stability when stored for long periods before use and fast development to ensure the paper is fully developed in the recommended time, even in marginal processing conditions.

MULTIGRADE IV RC PORTFOLIO is a resin coated variable contrast black and white paper with identical image properties to MULTIGRADE IV RC DELUXE, but coated on a double-weight (250g/m²) RC base.

MULTIGRADE IV RC DELUXE and MULTIGRADE IV RC PORTFOLIO can be processed in trays or in automatic paper processors. However, because it is not developer incorporated it is not recommended for activation/stabilization type processors.

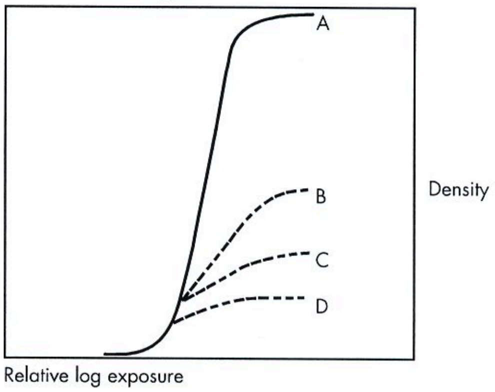
ILFORD variable contrast papers are a blend of emulsion components of differing spectral sensitization.

When the paper is exposed to blue light, all parts of the emulsion react and contribute equally to the final image. This image is of high contrast because of the additive effect produced by three emulsions with the same speed and contrast.

When the paper is exposed to green light, only the parts of the emulsion with the larger amounts of green sensitizing dye react initially. This is because the three emulsions have very different sensitivities to green light. The resultant curve has a very much wider exposure range and is thus of low contrast.

By varying the proportion of blue to green light, a contrast range between these two extremes can be obtained. The simplest way of controlling the color of the light reaching the emulsion during exposure is by the use of filters: A magenta filter absorbs green light and transmits blue; a yellow filter absorbs blue light and transmits green. In this way, high and low contrast images can be made.

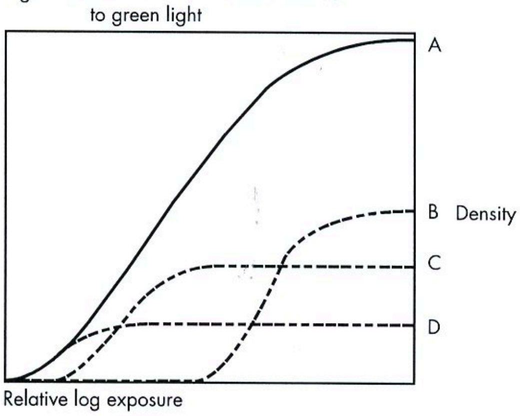
Figure 1. Combined sensitometric curve to blue light



A Combined curve
B Dyed emulsion I
C Dyed emulsion II
D Dyed emulsion III

By varying the levels and types of sensitizing dyes, the spectral characteristic of the individual components provide low, medium and high blue/green sensitivity which produces marked speed differences.

Figure 2. Combined sensitometric curve to green light



A Combined curve
B Dyed emulsion I
C Dyed emulsion II
D Dyed emulsion III

The limitation in most variable contrast systems is that the contrast at the foot of the curve (the highlight region of the print) is determined by a somewhat high contrast component. ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO incorporate an entirely new component which actually is itself a variable contrast emulsion. This, coupled with improved sensitizing technology, gives highlights whose contrast changes across the entire filter range without compromising maximum contrast.

There are three MULTIGRADE IV RC DELUXE surfaces: (MGD.1M) glossy, (MGD.25M) satin and (MGD.44M) pearl. There are two MULTIGRADE IV RC PORTFOLIO surfaces: (MGS.1K) glossy and (MGS.44K) pearl.

2 EXPOSURE

2.1 ANSI PAPER SPEEDS

(Tray or ILFORD 2650 machine processed)

ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO – Unfiltered

Paper Speed	500

ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO with MULTIGRADE Filters

Filter Number	00	0	½	1	1½	2	2½	3	3½	4	4½	5
Paper Speed	200								200	100		100

2.2 CONTRAST RANGE

Seven full grades of contrast are available with MULTIGRADE IV RC papers when used with MULTIGRADE filters or the ILFORD MULTIGRADE 100 System; six when used with the ILFORD MULTIGRADE 500 Exposure System. Each of these systems allows half grades in addition to full grades, making 12 contrast steps in all, from 00–5. MULTIGRADE IV RC papers unfiltered, have an ISO range of R100.

ISO Range
MULTIGRADE IV RC DELUXE and PORTFOLIO with MULTIGRADE Filters

Filter	00	0	1	2	3	4	5
Range (R)	180	160	130	110	90	60	40

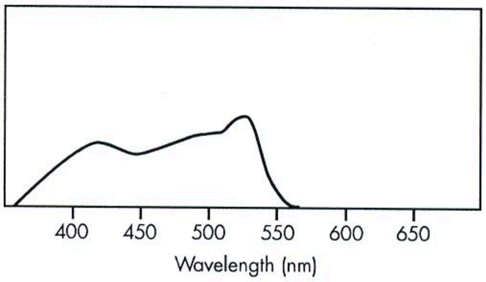
The above values refer to tray processing using ILFORD MULTIGRADE Developer and to machine processing in an ILFORD 2650 RC paper processor.

2.3 SAFELIGHT RECOMMENDATIONS

MULTIGRADE IV RC papers can be used with an ILFORD 902 safelight filter (light brown) or a Kodak OC or equivalent, in a safelight lamp fitted with a 15W bulb. For direct lighting, do not expose the paper to the safelight for more than 4 minutes and the distance between the paper and the safelight should be a minimum of three feet.

2.4 SPECTRAL SENSITIVITY

The wedge spectrogram of MULTIGRADE IV RC papers, unfiltered, to tungsten light (2850K) is given below.



2.5 LIGHT SOURCE

MULTIGRADE IV RC papers are designed for use with most enlargers fitted with either a tungsten or tungsten halogen light source.

Enlargers with a cold cathode or cold light enlarger head can be used, but the contrast range will vary, and is dependent on the spectral characteristics of the light source used. The only way to determine the contrast range available with each model of enlarger is to carry out a practical test. Some additional yellow filtration, up to 70Y, may be helpful in these circumstances.

3 ILFORD MULTIGRADE FILTERS

ILFORD MULTIGRADE filters have been specifically designed for use with MULTIGRADE papers to achieve a contrast range equivalent to 00–5 on the ILFORD graded paper contrast scale. The whole number filters correspond approximately to the grades on the graded paper scale, where the lowest number corresponds to the softest grade of paper. The half number filters offer the additional flexibility of half grades when required.

As all MULTIGRADE filters are made to a very high optical standard, negatives may be finely focused prior to exposure without a filter in place. This feature is especially useful when a high contrast filter is to be used and when dense negatives have to be printed.

The set, comprised of 12 filters, is solvent coated on a polyester base. Filter sets are available in sizes of 3½"x3½", 6"x6", and individually in 12"x12". These may be used above or below the lens and may be cut to fit the filter drawer on a particular enlarger. Filters are also available in a kit for below the lens use. This kit is comprised of 12 mounted filters, a filter holder and a filter holder adaptor.

MULTIGRADE filters are easy to use; no complicated calculations are needed when changing from one filter to another. The filters require the following relative exposures:

Filters	00–3½	1X
Filters	4–5	2X

For example, if a print made from filter 3 requires an exposure of 10 seconds at f5.6, a print of similar overall density made from the same negative would require 20 seconds at f5.6 when using filter 4½.

Clean MULTIGRADE filters with a soft cloth or camel hair brush. Always store the filters in their original packaging as this protects them and allows an individual filter to be selected quickly and easily. If a filter used below the lens does get badly scratched, it should be replaced as it will reduce image quality.

3.1 USING ILFORD MULTIGRADE IV RC DELUXE AND PORTFOLIO PAPERS WITH DICHROIC ENLARGERS

Color enlargers fitted with dichroic filter heads can be used to vary the contrast of MULTIGRADE RC and FB papers. Although it seems easy to just dial in a filter value to achieve the desired contrast level, ILFORD MULTIGRADE filters offer much more convenience. The operator just switches the dichroic enlarger to the white light mode, inserts the proper filter below the lens and starts making prints.

The advantages of MULTIGRADE filters are as follows:

- Simple and fast to use.
- No reference chart for filter settings and contrast value is needed.
- No need for exposure compensations when going from grade to grade.
- Wider contrast range than dichroics can usually achieve.
- Optimum grade spacing between all 12 half grades from 00 to 5.

However, for those who insist, dichroic filters may be used. By adjusting the yellow and magenta filters in dichroic color heads, it is possible to achieve a wide range of contrast with MULTIGRADE RC and FB papers. The majority of enlarger manufacturers use Durst or Kodak filtration values.

From the following table, select the type of filtration needed according to the enlarger type.

Durst	Kodak
Dunco	Beseler
Durst	Chromega
Kaiser	De Vere
Kienzle	Fujimoto
Leitz	IFF
Lupo	Jobo
	LPL
	Omega
	Paterson
	Simmard
	Vivitar

Two methods can be used to vary contrast when using dichroic filters. The first table titled "SINGLE FILTER METHOD" requires technicians to modify exposure when changing filtration. Exposure can be relatively maintained by using the "TWO FILTER METHOD".

From the following tables, read off the approximate filtration needed for each contrast step. While these figures are a useful guide, the actual filtration needed for a particular enlarger can only be determined by trial.

Filter Settings — **SINGLE FILTER METHOD**

ILFORD MULTIGRADE Filters	Durst (max 130M) CC Filters	Durst (max 170M) CC Filters	Kodak Color CC Filters
00	120Y	150Y	199Y
0	70Y	90Y	90Y
½	50Y	70Y	70Y
1	40Y	55Y	50Y
1½	25Y	30Y	30Y
2	0	0	0
2½	10M	20M	5M
3	30M	45M	25M
3½	50M	65M	50M
4	75M	100M	80M
4½	120M	140M	140M
5	130M	170M	199M

Filter Settings — **TWO FILTER METHOD**

ILFORD MULTIGRADE Filters	Durst (max 130) CC Filters		Durst (max 170) CC Filters		Kodak Color CC Filters	
00	120Y	0M	115Y	0M	162Y	0M
0	88Y	6M	100Y	5M	90Y	0M
½	78Y	8M	88Y	7M	78Y	5M
1	64Y	12M	75Y	10M	68Y	10M
1½	53Y	17M	65Y	15M	49Y	23M
2	45Y	24M	52Y	20M	41Y	32M
2½	35Y	31M	42Y	28M	32Y	42M
3	24Y	42M	34Y	45M	23Y	56M
3½	17Y	53M	27Y	60M	15Y	75M
4	10Y	69M	17Y	76M	6Y	102M
4½	6Y	89M	10Y	105M	0Y	150M
5	0Y	130M	0Y	170M	*	*

*GRADE 5 Equivalent NOT Available

3.2 MULTIGRADE 500 EXPOSURE SYSTEM

MULTIGRADE IV RC papers are fully compatible with the ILFORD MULTIGRADE Enlarging Systems. Compared with MULTIGRADE III, MULTIGRADE IV RC DELUXE and PORTFOLIO have a different balance of sensitivity to blue and green light. For this reason, it might be necessary to rebalance the lamps on the MULTIGRADE 500 equipment. Refer to the "Program Selector Switch" section in the operating manual. For shortest exposures, put the brighter lamp(s) for the blue (or magenta) light.

3.3 LATENT IMAGE STABILITY

MULTIGRADE IV RC papers have excellent latent image stability. They are especially recommended for all applications that require paper to be left for a reasonable time between exposure and processing. For periods up to 24 hours after exposure, no perceptible change in image quality will be seen.

4 PROCESSING

4.1 DEVELOPING

To maintain the tradition of short development times, ILFORD MULTIGRADE Developer is recommended for use with MULTIGRADE RC and FB papers. For MULTIGRADE IV RC DELUXE and PORTFOLIO the image appears after 10 seconds and development is complete in 1 minute. When processed in standard tray developers, MULTIGRADE IV RC papers require about 30 seconds before image appearance and about 2 minutes before complete development takes place.

4.2 PREPARATION

ILFORD MULTIGRADE Developer is supplied as a liquid concentrate and is economical to use. The recommended dilution is one part developer mixed with nine parts water. For greater economy ILFORD MULTIGRADE Developer can also be diluted one part developer mixed with fourteen parts water.

4.3 USE

The recommended development time of 1 minute at 68°F (20°C) for MULTIGRADE IV RC papers produces prints identical in contrast and maximum density to prints processed for 2 minutes in a conventional tray developer.

The minimum recommended development time using ILFORD MULTIGRADE Developer is 45 seconds. Overexposed prints processed for a minimum of 35 seconds are acceptable for those applications where the highest quality is not required. To maintain print to print consistency when batch processing a large number of prints, it may be advantageous to reduce exposure slightly and extend development time.

For optimum results, mix only enough developer for a maximum of two consecutive printing sessions.

4.4 STOP BATH

After development, rinse prints in an acid stop bath. ILFORD IN-1 Stop Bath is recommended, diluted 1+31. The use of a stop bath terminates development immediately and helps to maintain the fixer bath in good condition. Where a stop bath is not available, a plain water rinse may be used, provided care is taken to change it completely at regular intervals.

4.5 FIXING

Transfer prints from the stop bath to MULTIGRADE Fixer diluted 1+4. Prints should be agitated initially and fixed for 30 seconds at 68°F (20°C). A hardener CAN NOT be used with MULTIGRADE Fixer. The use of a hardening fixer is not recommended as wash times must then be increased.

4.6 WASHING

The polyethylene coating on each side of the MULTIGRADE IV RC paper base prevents absorption and wash times are therefore, short. To ensure prints are completely free of chemicals, wash for 2 minutes in a good supply of running water at a temperature not below 41°F (5°C).

When speed is important, vigorous washing for only 30 seconds at 68°F (20°C) will still result in prints having a high degree of permanence. Prolonged immersion in water can cause edge penetration and print curl with resin coated papers. For this reason, avoid wet times longer than 15 minutes.

4.7 DRYING

Optimum results will be obtained with the ILFORD 1250 RC dryer.

Note: MULTIGRADE IV RC DELUXE and PORTFOLIO, like other RC papers, should not be ferrotyped or dried on a drum or flatbed ferrotyper as these can cause softening of the polyethylene. When a dryer for polyethylene laminated papers is not available, remove excess water from the prints and leave them to dry naturally. At room temperature, prints will dry in 10 to 20 minutes.

5 MACHINE PROCESSING

MULTIGRADE IV RC papers can be processed in all conventional machines designed to process black and white resin coated papers. The ILFORD 2650 with ILFORD 2000 RT chemicals and the ILFORD ILFOLAB 2150 with ILFORD 2150 XL chemicals are recommended.

The replenishment rate of ILFORD 2000 RT chemicals for MULTIGRADE IV RC DELUXE and PORTFOLIO is:
For every 8x10 inch sheet processed, replenish with 7.5ml of ILFORD 2000 RT developer and 12.5ml of ILFORD 2000 RT fixer.

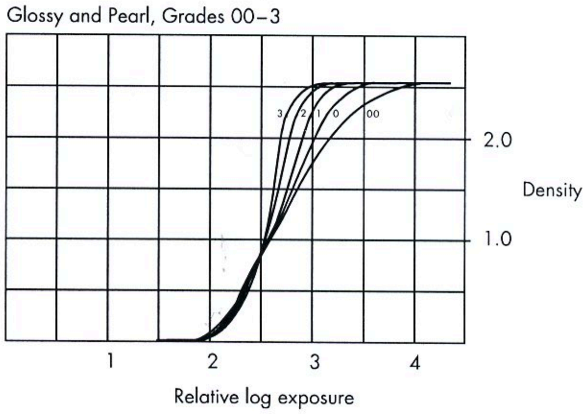
MULTIGRADE IV RC papers have an increased rate of drying. In most machines (and dryers) the drying temperature can be reduced to lower energy consumption and thus lower machine heat output into the working environment.

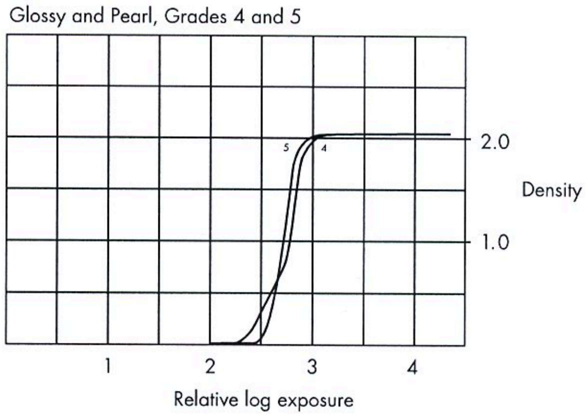
MULTIGRADE IV RC papers CAN NOT be processed in the Kodak Royalprint processor, in activation/stabilization processors (i.e., Kodak Ektamatic processor) or four bath activation processors.

The recommended ILFORD paper for this type of processing is MULTIGRADE III RC RAPID.

5.1 CHARACTERISTIC CURVES

MULTIGRADE IV RC DELUXE and PORTFOLIO glossy or pearl paper exposed through MULTIGRADE filters 00, 0, 1, 2, 3, 4 and 5. Processed in ILFORD MULTIGRADE Developer diluted 1+9 for 1 minute at 68°F.





6 FINISHING

6.1 TONING

ILFORD MULTIGRADE IV RC DELUXE and PORTFOLIO can be used with most toners. Modern photographic paper emulsions, however, are more resistant to image color changes and can vary between manufacturers. The following table is a guide to determine which toner to use to produce a given color change. Use of a hardening fixer is not recommended as it will impede toning.

Toner	Color
*Polysulfide	Light Brown/Yellow
*Sepia (Sulfide)	Brown (Slightly Red)
Thiorea	Rich Brown (Variable to Cool Brown)
*Gold	Light Brown/Yellow
*Selenium	Neutral (Slightly Cool or Purple)
Copper	Red
Iron	Blue

*Recommended for archival permanence

6.2 MOUNTING

MULTIGRADE IV RC DELUXE and PORTFOLIO prints can be mounted, using either dry mounting tissue or double-sided adhesive tapes and tissues.

6.3 RETOUCHING

MULTIGRADE IV RC DELUXE and PORTFOLIO prints can be spotted and airbrushed using dye or watercolor. Knifing should be done with care, using a sharp pointed blade in a stippling action.

6.4 STORAGE

MULTIGRADE IV RC papers have good keeping properties and can be stored in a cool dry place without any significant change in photographic properties.

6.5 PRINT DISPLAY

Properly processed MULTIGRADE IV RC DELUXE or PORTFOLIO prints will have a more than adequate storage life for most purposes. Print life will be shortened, however, in adverse storage conditions, or if the print is exposed to oxidizing gases.

It is recommended that prints made for display are toned to protect them from the oxidizing gases that are found in many environments. Selenium toner is recommended as it has little effect on the image color of MULTIGRADE IV RC papers, but other protection methods including sulfide toning and laminating may be used.

ILFORD may modify its products from time to time and consequently the information given in this publication is subject to change without notice.

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KODAK T-MAX Professional Films

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KODAK T-MAX **P3200 PROFESSIONAL FILM**

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KODAK T-MAX 100 Professional Film is a continuous-tone panchromatic black-and-white negative film for general outdoor and indoor photography. It is especially useful for detailed subjects when you need maximum image quality. It is also excellent for copying black-and-white photographs, for making black-and-white copies from color transparencies, and for photomicrography. This film features medium speed (EI 100), extremely high sharpness, extremely fine grain, and very high resolving power. It allows a very high degree of enlargement.

You can also use T-MAX 100 Professional Film to produce high-quality black-and-white slides from camera-original exposures, continuous-tone photographs, drawings, artwork, and radiographs when you process it with the KODAK T-MAX 100 Direct Positive Film Developing Outfit. The T-MAX Outfit also lets you use this film to produce copy negatives from black-and-white or color negatives, to make duplicate black-and-white slides, or to make black-and-white slides from color slides.

KODAK T-MAX 400 Professional Film is a continuous-tone panchromatic black-and-white negative film especially useful for photographing dimly lighted subjects or fast action, for extending flash distance range, and for photographing subjects that require good depth of field and fast shutter speeds with maximum image quality for the film speed. It is also useful for scientific and biomedical work, especially when fluorescence photography is required. It has high speed (EI 400), very high sharpness, extremely fine grain, and high resolving power; it allows a high degree of enlargement.

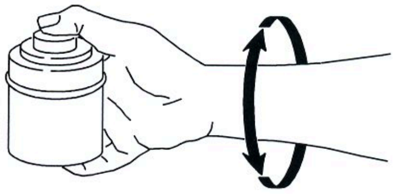
KODAK T-MAX P3200 Professional Film is a multi-speed continuous-tone panchromatic black-and-white negative film that combines high to ultra-high film speeds with finer grain than that of other fast black-and-white films. It is especially useful for very fast action; for dimly lighted scenes where you can't use flash; for subjects that require good depth of field combined with fast shutter speeds; and for handholding telephoto lenses for fast action or in dim light. It is an excellent choice for indoor or nighttime sports events and available-light press photography, as well as law-enforcement and general surveillance applications that require exposure indexes of 3200 to 25,000.

MANUAL PROCESSING

Small-Tank Processing (8- or 16-ounce tank)—Rolls

With small single- or double-reel tanks, drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge any air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds, i.e., extend your arm and vigorously twist your wrist 180 degrees.

Then repeat this agitation procedure at 30-second intervals for the rest of the development time.



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Small-Tank Processing (8- or 16-ounce tank)—Rolls

KODAK Developer or Developer and Replenisher		KODAK T-MAX 100 Professional Film					KODAK T-MAX 400 Professional Film				
		Development Time in Minutes					Development Time in Minutes				
		65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	65°F (18°C)	68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)
T-MAX (1:4)*		NR	8	7 ½	7	6 ½	NR	7	6 ½	6 ½	6
T-MAX (1:7)†		—	—	—	—	10	—	—	—	—	10
T-MAX (1:9)†		—	—	—	—	14	—	—	—	—	15
T-MAX RS*		NR	8	7	7	6	NR	7	6	6	5
T-MAX RS (1:7)†		—	—	—	—	8	—	—	—	—	7
T-MAX RS (1:9)†		—	—	—	—	12	—	—	—	—	13
XTOL		8	6 ¾	6	5 ½	4 ½‡	7 ½	6 ½	5 ¾	5 ¼	4 ½‡
XTOL (1:1)†	Size 135:	—	9 ¼	8 ½	8	7	—	8 ¾	8	7 ½	7
	Size 120:	—	10	9	8	6 ¾	—	9 ¼	8 ½	8	7
XTOL (1:2)†§	Size 135:	—	12 ½	11 ½	10 ¾	9 ½	—	10 ½	10	9 ½	8 ½
	Size 120:	—	13	12	11 ¼	10	—	12 ½	11 ½	10 ½	9
XTOL (1:3)†§	Size 135:	—	16	15	14	12 ½	—	13 ½	13	12 ¼	11
	Size 120:	—	16 ¾	15 ½	14 ½	12 ¾	—	15 ½	14	12 ¾	11
D-76		10 ½	9	8	7	6	9	8	7	6 ½	5 ½
D-76 (1:1)		14 ½	12	11	10	8 ½	14 ½	12 ½	11	10	9
HC-110 (Dil B)		8	7	6 ½	6	5	6 ½	6	5 ½	5	4 ½‡
MICRODOL-X		16	13 ½	12	10 ½	8 ½	12	10 ½	9	8 ½	7 ½
MICRODOL-X (1:3)		NR	NR	20	18 ½	16	NR	NR	20	18 ½	16

* The recommended standard dilution is 1:4.

† We do not recommend using more dilute solutions of these developers than indicated in the table. Dilute developers require longer development times; they give slightly higher film speed and a slight increase in graininess.

‡ Development times shorter than 5 minutes may produce unsatisfactory uniformity.

§ For recommended minimum volumes of diluted KODAK XTOL Developer, see "Capacity" in *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

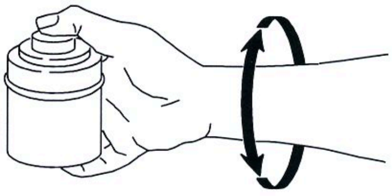
Note: The development times in the table are suggested starting points.

MANUAL PROCESSING

Small-Tank Processing (8- or 16-ounce tank)

With small single- or double-reel tanks, drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge any air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds, i.e., extend your arm and vigorously twist your wrist 180 degrees.

Then repeat this agitation procedure at 30-second intervals for the rest or the development time.



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Small-Tank Processing (8- or 16-ounce tank)

KODAK T-MAX P3200 Professional Film

KODAK Developer or Developer and Replenisher	Exposed at EI	Development Time in Minutes					
		68°F (20°C)	70°F (21°C)	72°F (22°C)	75°F (24°C)	80°F (27°C)	85°F (29°C)
T-MAX	400/27°	7 ½	7	6 ½	6	5	4*
	800/30°	8	7 ½	7	6 ½	5 ½	4 ½*
	1600/33°	8 ½	8	7 ½	7	6	5
	3200/36°	11 ½	11	10 ½	9 ½	8	6 ½
	6400/39°	14	13	12	11	9 ½	8
	12,500/42°†	16	15 ½	14 ½	12 ½	10 ½	9
	25,000/45°†	NR	17 ½	16	14	12	10
T-MAX (1:7)	800/30°	—	—	—	12 ½	—	
T-MAX (1:9)	800/30°	—	—	—	17	—	—
T-MAX RS	400/27°	8	7	6 ½	6	5 ½	5
	800/30°	9	8 ½	7 ½	6 ½	6	5 ½
	1600/33°	10 ½	9 ½	8 ½	7 ½	7	6
	3200/36°	13	12	11	10	9	8
	6400/39°	15	14	13	11	10	9
	12,500/42°†	18	16	14	12	11	10
	25,000/45°†	NR	NR	16	14	13	11
XTOL‡	400/27°	7 ½	6 ¾	6 ¼	5 ½	4*	3*
	800/30°	8 ¼	7 ½	7	6	4 ¾*	3 ¾*
	1600/33°	9 ¼	8 ½	8	7	5 ¼	4 ¼*
	3200/36°	11	10	9 ¼	8	6 ¼	4 ¾ ‡
	6400/39°	12 ½	11 ½	10 ½	9 ¼	7	5 ½
D-76	400/27°	10 ½	9 ½	8 ½	7 ½	6	4 ½*
	800/30°	11	10	9	8	6 ½	5
	1600/33°	11 ½	10 ½	9 ½	8 ½	7	5 ½
	3200/36°	15	13 ½	12 ½	11	8 ½	7 ½
	6400/39°	17 ½	16	14 ½	12 ½	10 ½	9
HC-110 (Dil B)	400/27°	7 ½	6 ½	5 ½	5	4 ½*	3 ½*
	800/30°	8	7	6	5 ½	4 ¾*	4*
	1600/33°	9	7 ½	6 ½	6	5	4 ½*
	3200/36°	11 ½	10	8 ½	7 ½	6 ½	5 ¾
	6400/39°	14	12	10 ½	9 ½	8	6 ¾

* Development times shorter than 5 minutes may produce unsatisfactory uniformity.
† Make tests to determine if results at these speeds are acceptable for your needs.
‡ For instructions on using 1:1, 1:2, and 1:3 dilutions of KODAK XTOL Developer in a small tank, see *KODAK XTOL Developer*, KODAK Publication No. J-109.

NR = Not recommended

Note: These development times are suggested starting points. Make tests to determine the best development time for your application.

QUICK REFERENCE TO PROCESSING *KODAK T-MAX* PROFESSIONAL FILMS

Before Processing

- Make sure all hangers and reels are clean and dry before loading film.
- Handle unprocessed film in total darkness.
- Make sure all solution temperatures are close to the temperature of the developer (within ± 3°F [±1.7°C]).

Step	Time	Agitation and Notes
1. Developer	See development tables.	**Small Tank** (closed, cylindrical container that holds a single stack of spiral reels)—Drop the loaded film reel into the developer and attach the top to the tank. Firmly tap the tank on the top of the work surface to dislodge air bubbles. Provide initial agitation of 5 to 7 inversion cycles in 5 seconds, i.e., extend your arm and vigorously twist your wrist 180 degrees. If you can't invert the tank without spilling the developer, slide it back and forth in about a 10-inch arc for the same length of time. **Large Tank** (open rectangular container usually used for sheet or roll films)—Tap the basket, rack, or spindle against the top of the tank to dislodge air bubbles. Then agitate continuously for the first 15 to 30 seconds by raising and lower the basket, rack, or spindle ½ inch. Do not agitiate for the remainder of the first minute. Then agitate once per minute by lifting the basket, rack, or spindle out of the developer, tilting it approximately 30 degrees, draining it for 5 to 10 seconds, and reimmersing it. Alternate the direction of tilting the basket, rack, or spindle.
2. Stop Bath	30 seconds	Agitate continuously.
3. Fixer	Fix for 3 to 5 minutes in KODAK Rapid Fixer. If you use another fixer, such as KODAK Fixer or KODAFIX Solution, fix for 5 to 10 minutes or twice the time it takes for the film to clear (lose its milky appearance). You can check the film for clearing after 3 minutes with KODAK Rapid Fixer or 5þminutes with KODAK Fixer or KODAFIX Solution.	Agitate continuously for the first 30 seconds and at 30-second intervals after that.
4. Rinse	30 seconds	Rinse the film in the tank under running water.
5. Hypo Clearing Agent	1 to 2 minutes	Agitate continuously for the first 30 seconds and then at 30-second intervals.
6. Wash	5 minutes	Run the wash water at least fast enough to provide a complete change of water in the container in 5 minutes. For rapid washing in a small tank, fill the tank to overflowing with fresh water and then dump it all out. Repeat this cycle 10 times.
7. Wetting Agent	30 seconds	Provide gentle agitation for 5 seconds of the total time. To reduce drying scum, mix KODAK PHOTO-FLO Solution with distilled water in areas that have hard water.
8. Dry	As necessary	Hang film in a clean, dust-free place.
9. After Processing	Wash and dry all the equipment that came in contact with chemical solutions.	When thoroughly dry, store negatives in sleeves or envelopes away from dust and extreme temperature and humidity. For more information, see *Storage and Care of KODAK Photographic Materials—Before and After Processing,* KODAK Publication No. E–30.

QUICK REFERENCE TO FILM SPEEDS

KODAK T-MAX Film	Exposure Index (EI)								
	100/21°	200/24°	400/27°	800/30°	1600/33°	3200/36°	6400/39°	12,500/42°	25,000/45°
100	X	X	X	X					
400	X	X	X	X	X	X			
P3200	X	X	X	X	X	X	X	X	X

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TABELLE 1 ENTWICKLUNGSZEITEN IN MINUTEN / 20 °C / VERDÜNNUNG 1 + 4

Developing times in minutes / 20 °C (68 °F) / Dilution 1 + 4
Durées de développement en minutes / 20 °C / Dilution 1 + 4
Tiempos de revelado en minutos / 20 °C / Dilución 1 + 4
Ontwikkeltijden in minuten / 20 °C / Verdunning 1 + 4
Fremkaldetider i minutter / 20 °C / Fortynding 1 + 4
Framkallningstider i minuter / 20 °C / Spädning 1 + 4

Film	**Kipprhythmus**, inversion agitation rhythm, rythme d'agitation par retournement, ritmo de volcar, kiepritme, kiprytme, vändningsrytm			
	3 s		**1 min**	
	Beta 0,55 **	0,70 **	0,55 **	0,70 **
Agfa-Gevaert				
Agfapan APX 25	5	10	7,5	16
Agfapan APX 100	4	7	8	12
Agfapan 400	5,5	8	10	18
Fuji				
Neopan 400	5	8	7,5	12
Neopan 1600	3,5	5	5	7,5
Ilford				
Pan F	3	5	5,5	9
FP 4 Plus	4,5	9	7	12
HP 5 Plus	4,5	7,5	7,5	12
400 Delta	4,5	6,5	6	9
Kodak				
Panatomic X *	3,5	5	6	9
Plus-X Pan *	5	7	8	14
Tri-X Pan	4,5	6	7	10
T-Max 100	7	13	10	18
T-Max 400	5,5	7	7,5	11
T-Max P 3200	6	9	10	15
Tura				
Tura P 150	3,5	6	6	10
Tura P 400	5	8	7,5	12
Filmfabrik Wolfen				
Orwo NP 15	4	7	6	10
Orwo NP 22	3	5	4	8
Orwo NP 27	4	6,5	5,5	9

* **Anmerkung:** **Diese Filme können um 1 Blende knapper belichtet werden.**
Remark: These films can be exposed 1 stop less.
Remarque: L'exposition de ces films peut être réduite d'un diaphragme.
Nota: Estas películas pueden ser expuestas un diafragma de menos.
Opmerking: Deze films kunnen slechts 1 stop krapper worden belicht.
Bemærk: Disse film kan belyses 1 blænde lavere.
Obs.: Dessa filmer kan exponeras efter 1 bländarsteg lägre känslighet.

** **Beta 0,55 (normaler Kontrast) = für Vergrößerungsgeräte mit Kondensorbeleuchtung.**
(normal contrast) = for enlargers with condensor.
(contraste normal) = pour agrandisseurs munis d'un condenseur.
(contraste normal) = para ampliadoras con condensador.
(normaal contrast) = voor vergrotingsapparaten met gericht licht (condensor).
(normal kontrast) = for forstørrelsesapparater med kondensator.
(normal kontrast) = för förstoringsapparater med kondensorbelysning.

** **Beta 0,70 (höherer Kontrast) = für Vergrößerungsgeräte mit diffuser Beleuchtung (z.B. Farbmischkopf).**
(higher contrast) = for enlargers with diffusor (e.g. colour head).
(contraste plus élevé) = pour agrandisseurs munis d'un diffuseur (tête couleur, par exemple).
(contraste más alto) = para ampliadoras con dispersador (p.e. colour head).
(hoog contrast) = voor vergrotingsapparaten met diffuus licht (bijv. kleurenkop).
(højere kontrast) = for forstørrelsesapparater med diffust lys (f. eks. farvehoved).
(hög kontrast) = för förstoringsapparater med diffus ljuskälla (t ex färghuvud).

TABELLE 2 VERLÄNGERUNGSFAKTOREN FÜR ABWEICHENDE TEMPERATUREN

Prolongation factors for different temperatures
Facteurs de prolongation en cas de températures autres que 20 °C
Factores de prolongación en caso de temperaturas diferentes
Verlengingsfactoren voor afwijkende temperaturen
Forlængelsesfaktor ved afvigende temperatur
Förlängningsfaktorer vid avvikande temperatur

18 °C (64 °F)	20 °C (68 °F)	22 °C (72 °F)	24 °C (75 °F)	26 °C (79 °F)
1,2	**1,0**	**0,85**	**0,75**	**0,6**

Mit diesen Faktoren müssen die Entwicklungszeiten bei abweichenden Temperaturen multipliziert werden.
The development times are multiplied by these factors in case of different temperatures.
En cas de températures différentes multiplier les durées de développement par les facteurs ci-dessus.
En caso de temperaturas diferentes, multiplicar los tiempos de revelado por los factores indicados.
Met deze factoren moeten bij afwijkende temperatuur de ontwikkeltijden worden vermenigvuldigd.
Ved afvigende temperatur skal fremkaldetiden ganges med denne faktor.
Vid avvikande temperatur multipliceras framkallningstiden med denna faktor.

TABELLE 3 VERLÄNGERUNGSFAKTOREN FÜR GLEICHZEITIG ODER NACHEINANDER ZU ENTWICKELNDE FILME

Prolongation factors for films to be developed at the same time or one after the other
Facteurs de prolongation pour le développement simultané ou consécutif des films
Factores de prolongación para el revelado de las películas una tras otra o todas a la vez
Verlengingsfactoren voor gelijktijdig of na elkaar te ontwikkelen films
Forlængelsesfaktor for film fremkaldt samtidigt eller lige efter hinanden i den samme fremkalder
Förlängningsfaktorer vid samtidig framkallning av filmer eller direkt efter varandra

Volumen der Arbeitslösung (Dosenfüllvolumen) Volume of working solution (to be filled into the tank) Volume de la solution d'emploi (à verser dans la cuve) Volumenes de las soluciones de empleo (cantidad a llenar en el tanque) Volume v. d. gebruiksoplossing (tankinhoud) Mængde af brugsopløsning (dåse-påfyldningsmængde) Volym arbetslösning (mängd kemi, som fylls i dosan)	**Die Zeiten der Tabelle 1 sind mit folgenden Verlängerungsfaktoren zu multiplizieren.** Times indicated in table 1 are to be multiplied by the following prolongation factors. Les durées indiquées dans le tableau 1 sont à multiplier par les facteurs de prolongation ci-après. Multiplicar las duraciones que figuran en tabla 1 por los coeficientes de prolongación siguientes. De regels van tabel 1 moeten met volgende verlengingsfaktoren vermenigvuldigd worden Tiden i tabel 1 skal ganges med følgende forlængelsesfaktorer. Tiderna i tabell 1 skall multipliceras med följande förlängningsfaktorer.									
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10. Film
1000 ml	1,0	1,0	1,1	1,2	1,3	1,4	1,5	1,6	1,7	1,8
500 ml	1,0	1,2	1,4	1,6	1,8	-	-	-	-	-
250 ml	1,2	1,6	1,9	-	-	-	-	-	-	-
125 ml	1,5	-	-	-	-	-	-	-	-	-

Die in der Tabelle 1 angegebenen Zeiten sind Richtwerte! Es können sich in der Praxis Abweichungen von ± 15 % ergeben, bedingt durch entwicklungstechnische (Bewegung, Temperatur- und Zeitmessung), belichtungstechnische (Kontrast, Belichtungsmesser, Blende und Verschlußzeit) und emulsionstechnische Faktoren.

The times indicated in the table 1 are only approximate! They may differ by ± 15 % depending on the developing conditions (agitation, temperature and time), on the exposure (contrast, exposure meter, diaphragm opening and shutter time), and on the film emulsion used.

Les valeurs spécifiées dans le tableau 1 ne sont données qu'à titre indicatif. Dans la pratique, des écarts de ± 15 % peuvent se produire sous l'influence de facteurs qui dépendent de la technique de développement (agitation, mesure de la température et de la durée), de la technique d'exposition (contraste, posemètre, ouverture de diaphragme et durée d'exposition) ainsi que de l'émulsion.

Los tiempos indicados en la tabla 1 son aproximados solamente! Pueden variar por más o menos 15 % sujeto al revelado (agitación, temperatura y tiempo), a la exposición (contraste, fotómetro, diafragma y obturador) y a la emulsión del film usado.

De in de tabel 1 aangegeven tijden zijn richtwaarden. In de praktijk kunnen afwijkingen van ± 15 % voorkomen, afhankelijk van ontwikkeltechnische (beweging, temperatuur- en tijdmeting), belichtingstechnische (kontrast, belichtingsmeter, diafragma en sluitertijd) en emulsietechnische faktoren.

Tiderne angivet i tabellen 1 er cirkatider! De kan i praksis afvige ca. ± 15 %, p.g.a. fremkaldetekniske afvigelser (agitation, temperatur- og tidsmåling), belysningsteknik (kontrast, lysmåling, blænde og lukkertid), samt emulsionstekniske faktorer.

De i tabellen 1 angivna tiderna är riktvärden! De kan vid praktiskt arbete avvika upp till ± 15 % beroende på framkallningstekniska orsaker (agitering, temperatur, tid), belysningstekniska orsaker (kontrast, exponeringsmätare, tid och bländare) och emulsionstekniska faktorer.

NEOPAN400 Professional

ISO 400/27°
High-Speed, Fine Grain Black-and-White Film

❖ Characteristics
A snapshot and general photography film of high speed and image quality that retains a wide variety of uses. Push processing derived sensitivity increases provide film speed equivalency ratings of between EI* 800 and 3200. This allows motion stopping exposures under such low illumination conditions as found with twilight and night scenes, night games, and stage productions, or the capturing of ultra-rapid action subjects with the use of fast shutter speeds.

❖ Exposure Guide
● Standard Exposure at ISO 400

Light Conditions	Seashore Snow Scenes under Bright Sun	Bright Sunlight	Fine Weather Daylight Scenes	Cloudy Bright	Cloudy Day or Open Shade
Lens Aperture	f/22	f/16	f/16	f/11	f/8
Shutter Speed (sec.)	1/500	1/500	1/250	1/250	1/250

● High-speed Exposure at EI* 1600

Light Conditions	Nighttime indoor Scenes	Evening Scenes	Night Scenes	Stage Scenes		Indoor Sports Scenes	Night Game Scenes
				Normally Illuminated	Highly Illuminated		
Lens Aperture	f/2.8 to 4	f/4 to 5.6	f/2.8 to 4	f/4	f/8	f/2.8	f/4 to 5.6
Shutter Speed (sec.)	1/60	1/125	1/60	1/125	1/125	1/250	1/250

* EI (Exposure Index) is the exposure determination designator and the camera or exposure meter ISO speed should be set to this value.

❖ Development Conditions with Small Tanks
See overleaf.

ISO 400/27°
Hochempfindlicher, feinkörniger Schwarzweißfilm

❖ Eigenschaften
Ein Film für Schnappschüsse und allgemeine Fotografie, der dank seiner hohen Filmempfindlichkeit und Bildqualität vielseitig einsetzbar ist. Durch forcierte Entwicklung läßt sich die Empfindlichkeit bis zu Werten anheben, die zwischen EI* 800 und 3200 liegen. Dementsprechend sind Momentaufnahmen bei schlechten Lichtverhältnissen möglich, wie sie zum Beispiel bei Dämmerlicht und nächtlichen Szenen, Spielen unter Flutlicht und Bühnenaufführungen anzutreffen sind. Außerdem eignet sich der Film natürlich bestens zum Einfangen sich schnell bewegender Objekte mit kurzen Verschlußzeiten.

❖ Belichtungstabelle
● Normale Belichtung bei ISO 400

Lichtverhältnisse	Strand und Schnee bei hellem Sonnenlicht	Helles Sonnenlicht	Klarer Himmel, Tageslicht	Bewölkt, aber hell	Stark bewölkt oder offene Schatten
Blende	f/22	f/16	f/16	f/11	f/8
Verschlußzeit (sek.)	1/500	1/500	1/250	1/250	1/250

● Hochempfindliche Belichtung bei EI* 1600

Lichtverhältnisse	Innenmotiv bei Nacht	Abendaufnahmen	Nachtaufnahmen	Theater und Bühne		Hallensport	Flutlicht
				Normale Beleuchtung	Starke Beleuchtung		
Blende	f/2,8—4	f/4—5,6	f/2,8—4	f/4	f/8	f/2,8	f/4—5,6
Verschlußzeit (sek.)	1/60	1/125	1/60	1/125	1/125	1/250	1/250

* EI (Exposure Index = Belichtungsindex) ist die Belichtungs-Kennzahl, und die ISO-Empfindlichkeit der Kamera bzw. des Belichtungsmessers sollte auf diesen Wert eingestellt werden.

❖ Entwicklungsbedingungen bei kleinen Tanks
Siehe umseitig.

ISO 400/27°
Film noir et blanc très sensible, grain fin

❖ Caractéristiques
Film pour instantané et usage général, très sensible avec une image de grande qualité pour une grande variété d'usages. L'augmentation de la sensibilité permise par un développement "poussé" lui assure des caractéristiques équivalentes aux films compris entre EI* 800 et 3200. Ceci permet d'immobiliser les mouvements dans des conditions de faible illumination telles que pour des scènes de nuit ou au crépuscule, des jeux nocturnes et des représentations sur scène ou encore la capture de sujets en mouvement très rapide en utilisant des vitesses d'obturation rapides.

❖ Guide d'exposition
● Exposition standard à ISO 400

Conditions de lumière	Soleil brillant au bord de le mer ou dans la neige	Soleil brillant	Scènes ensoleillées	Ciel nuageux	Temps nuageux ou à l'ombre
Ouverture de l'objectif	f/22	f/16	f/16	f/11	f/8
Vitesse d'obturation (sec.)	1/500	1/500	1/250	1/250	1/250

● Exposition à grande vitesse à EI* 1600

Conditions de lumière	Scènes de nuit, en intérieur	Soir	Scènes de nuit	Scènes de théatre		Scènes sportives en intérieur	Jeux de nuit
				Normalement illuminées	Très illuminées		
Ouverture de l'objectif	f/2,8—4	f/4—5,6	f/2,8—4	f/4	f/8	f/2,8	f/4—5,6
Vitesse d'obturation (sec.)	1/60	1/125	1/60	1/125	1/125	1/250	1/250

*EI (Exposure Index = indice d'exposition) est le désignateur de détermination d'exposition et l'appareil ou la sensibilité ISO de la cellule d'exposition doit être réglé sur cette valeur.

❖ Conditions de développement en petites cuves
Voir au verso.

ISO 400/27°
Película en blanco y negro de alta sensibilidad y grano fino

❖ Características
Una película de alta sensibilidad y calidad de imagen que puede usarse para la fotografía en general. El aumento de sensibilidad que se deriva del revelado forzado proporciona una sensibilidad de película equivalente a entre EI* 800 y 3200, lo cual permite tomar exposiciones sin que el sujeto salga movido en condiciones de poca iluminación, como escenas en crepúsculo y nocturnas, partidos nocturnos y obras de teatro, o captar a sujetos el movimiento ultrarrápido usando velocidades de obturación rápidas.

❖ Guía de exposición
● Exposiciones normales a ISO 400

Condiciones de iluminación	Escenas en la playa y nieve con sol brillante	Sol brillante	Escenas diurnas en tiempo soleado	Sol nublado	Día nublado o sombra descubierta
Abertura del objetivo	f/22	f/16	f/16	f/11	f/8
Velocidad del obturador (seg.)	1/500	1/500	1/250	1/250	1/250

● Exposiciones de alta sensibilidad a EI* 1600

Condiciones de iluminación	Escenas interiores por la noche	Escenas por la tarde	Escenas nocturnas	Obras en escenarios		Escenas deportivas en interiores	Eventos deportivos por la noche
				Iluminación normal	Muy iluminadas		
Abertura del objetivo	f/2,8 a 4	f/4 a 5,6	f/2,8 a 4	f/4	f/8	f/2,8	f/4 a 5,6
Velocidad del obturador (seg.)	1/60	1/125	1/60	1/125	1/125	1/250	1/250

* EI (Exposure Index = índice de exposición) es el número índice para la determinación de la exposición y la sensibilidad ISO de la cámara o exposímetro debe ajustarse al valor indicado.

❖ Condiciones de revelado en baño pequeño
Véase al dorso.

Development Conditions (Small Tank Processing)

Agitation: Agitate continuously for the first minute and for five seconds every minute thereafter.

Entwicklungsbedingungen bei kleinen Tanks

Schütteln: Die erste Minute ununterbrochen, danach jede Minute fünf Sekunden lang schütteln.

Conditions de développement en petites cuves

Agitation: Agitez continuellement pendant la première minute et cinq secondes toutes les minutes par après.

Condiciones de revelado en baño pequeño

Agitación: Agitar continuamente durante el primer minuto y durante cinco segundos en cada minuto siguiente.

Developer / Entwickler / Révélateur / Revelador	EI	Processing Time / Entwicklungszeit / Durée de développement / Tiempo de revelado (Unit: minutes) 18°C	20°C	22°C	24°C	26°C
SPD (Super Prodol)	3200	20	16	12½	10	8
	1600	11	9	7½	6¼	5¼
	800	7¾	5¾	4¾	4	3½
	400	5	4¼	3½	3	—
SPD (Super Prodol) (1:1)	400	8¼	7	6	5	4¼
FUJIDOL	400	7¾	6½	5½	4½	3¾
MICROFINE	400	10	8½	7¼	6	5¼
T-MAX Developer	1600	11¼	10	9	8	7
	800	8¾	7½	6½	5¼	4¾
	400	7	6	5	4½	3¾
T-MAX RS Developer	1600	11	9½	8	7	6
	800	7¾	6½	5½	4¾	4
	400	6½	5½	4½	3¾	3¼
D-76	1600	16½	13½	11	9¼	7¾
	800	10¾	8¾	7¼	5¾	4¾
	400	9¼	7½	6¼	5	4¼
D-76 (1:1)	800	15	13	11	9¾	8½
	400	10¾	9½	8½	7½	6½
HC-110 (Dilution B / Verdünnung B Dilution B / Dilución B)	1600	12½	10	8	6¼	5
	800	7¾	6	4¾	3¾	3
	400	5	4	3	—	—
Microdol-X	400	11¼	10	9	8	7
	200	9½	8½	7¾	7	6¼
Microphen	1600	10	8½	7¼	6¼	5¼
	800	7	5¾	5	4¼	3½
	400	5	4¼	3½	3	—
Acufine	1600	8¼	7	6	5	4¼
	800	5½	4½	3¾	3¼	—

- When deep tanks are used, development times should be extended by 5 to 10% over those required for small tank development.

PRECAUTIONS:

- Product quality cannot be guaranteed for film that has exceeded the expiration date printed on the box and for more than the designated number of exposures.
- Camera loaded film should be exposed and processed as quickly as possible.

- Für tiefe Tanks sollte die Entwicklungszeit 5 bis 10% mehr betragen als bei der Entwicklung in kleinen Tanks.

ZUR BEACHTUNG:

- Für die Qualität von Filmen, deren Verfallsdatum (auf der Verpackung aufgedruckt) bereits überschritten ist, oder mit denen mehr als die vorgeschriebene Zahl an Aufnahmen gemacht wurde, kann nicht garantiert werden.
- In die Kamera eingelegte Filme sollten so schnell wie möglich belichtet und entwickelt werden.

- Lorsque des cuves profondes sont utilisées, les durées de développement doivent être prolongées de 5 à 10% par rapport à celles nécessaires pour un développement en petite cuve.

PRECAUTIONS:

- La qualité du produit ne peut être garantie pour un film dont la date d'expiration imprimée sur la boîte est dépassée ou comportant un nombre d'expositions supérieur au nombre prévu.
- Une fois chargé dans l'appareil, le film doit être exposé et traité aussi rapidement que possible.

- Cuando se emplee un baño profundo, los tiempos de revelado se aumentarán en 5 al 10% sobre los requeridos en baño pequeño.

PRECAUCIONES:

- No se puede garantizar la calidad de las películas que hayan superado la fecha de expiración impresa en la caja o en las que se ha hecho un número de exposiciones superior al designado.
- La película, una vez cargada en la cámara, debe exponerse y revelarse tan pronto como sea posible.

FUJI PHOTO FILM CO., LTD.

26-30, Nishiazabu 2-chome, Minato-ku, Tokyo 106, Japan.

Printed in Japan

エテ-90.6-FC·250-1①EC

However, for those who insist, dichroic filters may be used. By adjusting the yellow and magenta filters in dichroic color heads, it is possible to achieve a wide range of contrast with MULTIGRADE RC and FB papers. The majority of enlarger manufacturers use Durst or Kodak filtration values.

From the following table, select the type of filtration needed according to the enlarger type.

Durst	Kodak
Dunco	Beseler
Durst	Chromega
Kaiser	De Vere
Kienzle	Fujimoto
Leitz	IFF
Lupo	Jobo
	LPL
	Omega
	Paterson
	Simmard
	Vivitar

Two methods can be used to vary contrast when using dichroic filters. The first table titled "SINGLE FILTER METHOD" requires technicians to modify exposure when changing filtration. Exposure can be relatively maintained by using the "TWO FILTER METHOD".

From the following tables, read off the approximate filtration needed for each contrast step. While these figures are a useful guide, the actual filtration needed for a particular enlarger can only be determined by trial.

Filter Settings **SINGLE FILTER METHOD**

ILFORD MULTIGRADE Filters	Durst (max 130M) CC Filters	Durst (max 170M) CC Filters	Kodak Color CC Filters
00	120Y	150Y	199Y
0	70Y	90Y	90Y
½	50Y	70Y	70Y
1	40Y	55Y	50Y
1½	25Y	30Y	30Y
2	0	0	0
2½	10M	20M	5M
3	30M	45M	25M
3½	50M	65M	50M
4	75M	100M	80M
4½	120M	140M	140M
5	130M	170M	199M

Filter Settings **TWO FILTER METHOD**

ILFORD MULTIGRADE Filters	Durst (max 130) CC Filters		Durst (max 170) CC Filters		Kodak Color CC Filters	
00	120Y	0M	115Y	0M	162Y	0M
0	88Y	6M	100Y	5M	90Y	0M
½	78Y	8M	88Y	7M	78Y	5M
1	64Y	12M	75Y	10M	68Y	10M
1½	53Y	17M	65Y	15M	49Y	23M
2	45Y	24M	52Y	20M	41Y	32M
2½	35Y	31M	42Y	28M	32Y	42M
3	24Y	42M	34Y	45M	23Y	56M
3½	17Y	53M	27Y	60M	15Y	75M
4	10Y	69M	17Y	76M	6Y	102M
4½	6Y	89M	10Y	105M	0Y	150M
5	0Y	130M	0Y	170M	*	*

*GRADE 5 Equivalent NOT Available

USA USERS ONLY

MULTIGRADE III RC DE LUXE is a new variable contrast, resin coated paper from ILFORD: it is a premium quality paper that has the high quality associated with graded papers and is designed for use in conventional processing systems.
MULTIGRADE III RC DE LUXE prints have a neutral black image tone on a pure white base. MULTIGRADE III RC DE LUXE has a very wide contrast range, similar to a full six grades on the ILFORD graded paper contrast scale (ISO 140-50).

Contrast control

The contrast range is achieved by the use of MULTIGRADE filters or, at the touch of a button, with the MULTIGRADE 500 enlarger head and control unit. Using any of these methods, contrast may be changed in ½ grade steps. Dedicated variable contrast exposing equipment made by other manufacturers may also be used.

Exposure guide

MULTIGRADE filters are very easy to use: no complicated calculations are needed when changing from one filter to another: filters 4, 4½ and 5 require double the exposure of the other filters 0-3½.
These filters have been designed to exploit the full benefits of ILFORD MULTIGRADE papers, including a wide contrast range and a high maximum contrast, and are thus recommended for best results.
ISO speeds of the paper are given below.

Filters 0-3½	ISO 160
Filters 4-5	ISO 80
No filter	ISO 400

MULTIGRADE III RC DE LUXE paper is designed to be used in enlargers fitted with a tungsten light source. When an enlarger with a strong blue light source is used, ie a cold cathode, the paper contrast range may be reduced.

Use of color enlargers

The majority of enlarger manufacturers use either Agfa, Durst or Kodak filtration values. Tables 1 and 2 are intended as a guide to making prints with ILFORD MULTIGRADE III RC DE LUXE paper when using a color enlarger.
In table 1, select the type of filtration you need according to the enlarger you are

Table 1

Agfa	Durst	Kodak
Agfa	Durst	Beseler
Meopta	Dunco	Chromega
Krokus	Kaiser	De Vere
	Kienzle	IFF
	Leitz	Jobo
	Lupo	LPL
		Omega
		Paterson
		Simmard
		Vivitar

Table 2

ILFORD MULTIGRADE	Agfa	Durst	Kodak
0	90Y	110Y	80Y
½	70Y	90Y	55Y
1	50Y	70Y	30Y
1½	30Y	30Y	15Y
2	0	0	0
2½	30M	30M	25M
3	40M	45M	40M
3½	50M	55M	65M
4	60M	95M	100M
4½	100M	130M	150M
5	200M	170M	200M