CHT
SMART CHEMISTRY
WITH CHARACTER.

BEZAKTIV FX

SELECTED REACTIVE GARMENT
DYESTUFF RANGE

BEZAKTIV FX
Dyes

A **ADVANCED**
Improved and adapted ranges for versatile and economical use which meet high requirements.

			Solubility in g/l 25 °C	Dischargeability to organIQ	Light		Perspiration – light alkaline	Washing 60 °C	Multiple washing 60 °C	Perspiration fastness alkaline	Chlorinated water	Ozone fading	Nitrogen oxide 3 cycles	Dyeing methods	
					ISO	AATCC								Exhaust °C	Pad dry thermofix
			Neutral	1/1 1/6	1/1 1/6 1/25		1/1 1/6	CC CO PA	CC	CC CO PA	20 ppm 50 ppm	30' dry 2' wet	CC		
0.83 % / 5.00 %	**BEZAKTIV**	Yellow FX-7G	70	– +	5 4-5 4	4-5 4 n.s.	4-5 4	4-5 4-5 5	3	5 5 5	4 3-4	4-5 4	4-5	(50)/ 60/80	(+)
0.33 % / 2.00 %	**BEZAKTIV**	Yellow FX-NF	100	+ +	5-6 4-5 3-4	4-5 3-4 n.s.	4 3-4	4-5 5 5	3-4	4-5 5 5	1-2 1	4 2	3	40/60	+
0.50 % / 3.00 %	**BEZAKTIV**	Yellow FX-RR	100	(+) +	5 4-5 4	3 3 n.s.	3 2-3	4-5 4-5 5	3	5 5 5	3-4 2-3	5 3-4	1	50/60	(+)
0.40 % / 2.40 %	**BEZAKTIV**	Yellow FX-DL	100	+ (+)	6-7 5-6 5-6	5 5 n.s.	4-5 4	4-5 4-5 5	4-5	4-5 5 5	4 4	3-4 3	4	(50)/ 60/80	+
0.42 % / 2.50 %	**BEZAKTIV**	Yellow FX-CO	100	– +	5-6 5 4-5	4-5 4-5 n.s.	3-4 2-3	4-5 4-5 5	5	5 5 5	4-5 4-5	4-5 3-4	4-5	60/80	+
0.33 % / 2.00 %	**BEZAKTIV**	Yellow FX-MX	80	(+) –	4 4 3-4	4-5 4 n.s.	3-4 2-3	4-5 4-5 5	4-5	5 5 5	3-4 3	4-5 4	4-5	(50)/ 60/(80)	+
0.33 % / 2.00 %	**BEZAKTIV**	Orange FX-TH	100	++ ++	4-5 4-5 4	4-5 4 n.s.	4-5 4	4-5 5 5	3-4	4-5 5 5	3 2	4 3	4-5	40/60	+
0.20 % / 1.20 %	**BEZAKTIV**	Orange FX-RS	100	+ ++	4-5 4 3-4	4-5 4 n.s.	4 3	4-5 4-5 5	4	4-5 5 5	3-4 3	4 3	4-5	40/60	+

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					ISO	AATCC									
			Neutral	1/1 1/6	1/1 1/6 1/25		1/1 1/6	CC CO PA	CC	CC CO PA	20 ppm 50 ppm	30' dry 2' wet	CC	Exhaust °C	Pad dry thermofix
0.58 % 3.50 %	**BEZAKTIV**	Scarlet FX-SB	100	++ ++	4-5 4 3-4	4-5 4-5 n.s.	4-5 3	4-5 4-5 5	4-5	4-5 5 5	4-5 4	4-5 3	4-5	60	+
0.30 % 1.80 %	**BEZAKTIV**	Scarlet FX-2D	100	(+) +	5-6 4-5 4	4-5 4-5 n.s.	2-3 2	4 5 5	4	3-4 5 5	3-4 3-4	4-5 3	4-5	40/60	+
0.15 % 0.90 %	**BEZAKTIV**	Red FX-DC	100	(+) +	4-5 4 3-4	4-5 4 n.s.	2-3 2	5 4 4-5	4-5	4-5 5 5	4-5 4	4-5 3-4	4-5	50/60/ 80	+
0.65 % 3.90 %	**BEZAKTIV**	Red FX-PL	50	(+) –	4-5 3-4 3-4	4-5 4-5 n.s.	2-3 1-2	4-5 4-5 5	4	5 4-5 4-5	4-5 4	4-5 4-5	4-5	60/80	+
0.40 % 2.40 %	**BEZAKTIV**	Red FX-B	100	– +	4 4 3-4	3-4 3 n.s.	1-2 1-2	4-5 5 5	3-4	4-5 5 5	3-4 3	4-5 4	4-5	40/60/ (80)	+
0.47 % 2.80 %	**BEZAKTIV**	Red FX-3B	100	(+) –	4-5 3-4 3	4-5 4 n.s.	1-2 1	4-5 4-5 5	4-5	5 4 4-5	4-5 4-5	5 4	4-5	60/80	+
0.75 % 4.50 %	**BEZAKTIV**	Red FX-3D	100	(+) (++)	5-6 5-6 5	4-5 4-5 n.s.	4-5 4	5 5 5	5	4-5 5 5	2-3 1-2	4 2	2-3	50/60/ 80	+
0.58 % 3.50 %	**BEZAKTIV**	Bordeaux FX-2B	80	++ ++	6-7 6 5	4-5 4-5 n.s.	2-3 2	4-5 4-5 5	4-5	4 5 5	4-5 4	4-5 3	4-5	50/60	+

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					ISO	AATCC									
			Neutral	1/1 1/6	1/1 1/6 1/25		1/1 1/6	CC CO PA	CC	CC CO PA	20 ppm 50 ppm	30' dry 2' wet	CC	Exhaust °C	Pad dry thermofix
0.57 %	3.40 %	**BEZAKTIV**	Blue FX-RD	100	(++) (++)	6-7 6 6	5 5 n.s.	3 3	4-5 5 5	4-5	4-5 5 5	3 2	4-5 2-3	3-4	50/60/80	+
0.52 %	3.10 %	**BEZAKTIV**	Blue FX-ON	100	(+) (++)	4-5 4 3	4 3-4 n.s.	2 1-2	5 5 5	4-5	5 5 5	3-4 2-3	4-5 3	4	(50)/60 80	+
0.33 %	2.00 %	**BEZAKTIV**	Blue FX-NN 01	100	(+) (++)	4-5 4 3-4	3-4 3 n.s.	2 1-2	4-5 4-5 5	3-4	5 5 5	3 2	4-5 2-3	4-5	(50)/60 (80)	+
0.83 %	5.00 %	**BEZAKTIV**	Blue FX-GG	100	++ ++	4-5 4-5 4-5	4 4 n.s.	4-5 4	4-5 4-5 5	4	4 4-5 5	1 1	4 1-2	2-3	50/60/80	+
0.83 %	5.00 %	**BEZAKTIV**	Turquoise FX-2G	100	++ ++	5 4-5 3	4 4 n.s.	2 2-3	4-5 4 5	4	5 5 5	3-4 1	3-4 1-2	4-5	(60)/80	+
0.83 %	5.00 %	**BEZAKTIV**	Green FX-4B	100	++ ++	7 6 5-6	4-5 4 n.s.	2-3 2	4-5 4-5 5	4	4-5 5 5	3-4 2-3	4 2	4-5	(60)/80	+

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					ISO	AATCC								Exhaust °C	Pad dry thermofix
			Neutral	2/1 1/1	2/1 1/1 1/6		2/1 1/1	CC CO PA	CC	CC CO PA	20 ppm 50 ppm	30' dry 2' wet	CC		
2.70 % 5.40 %	**BEZAKTIV**	Dark Blue FX-5L	100	(+) (+)	5-6 4-5 4	4-5 4 –	2-3 2	4-5 5 5	4	4-5 5 5	4 2-3	4-5 3-4	4-5	40/60	+
2.20 % 4.40 %	**BEZAKTIV**	Dark Blue FX-WF	100	(+) (++)	5 4-5 4	4-5 4 –	2-3 2	4-5 4-5 5	4-5	4-5 4-5 4-5	3 1-2	4 2-3	4	50/60	+
1.50 % 3.00 %	**BEZAKTIV**	Navy FX-DN	100	(+) +	4-5 3-4 3	4-5 4 –	3 2	4-5 5 5	3-4	4-5 5 5	3-4 3	4 3-4	4-5	40/60	+
3.70 % 7.40 %	**BEZAKTIV**	Navy FX-BR	100	++ ++	6-7 6 5-6	5 4-5 –	4-5 3-4	4 4 5	2-3	4-5 5 5	4 3	3-4 1-2	4	50/60	+
1.50 % 3.00 %	**BEZAKTIV**	Navy FX-PS	100	(+) (+)	4-5 3-4 3	4 3-4 –	2-3 1-2	4-5 4-5 5	3-4	4-5 5 5	2-3 1	4-5 4	4	50/60	(+)

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			Solubility in g/l 25 °C	Dischargeability to organIQ	Light		Perspiration – light alkaline	Washing 60 °C	Multiple washing 60 °C	Perspiration fastness alkaline	Chlorinated water	Ozone fading	Nitrogen oxide 3 cycles	Dyeing methods	
					ISO	AATCC									
			Neutral	3/1 1/1 1/6	3/1 1/1 1/6 1/25		3/1 1/1 1/6	CC CO PA	CC	CC CO PA	20 ppm 50 ppm	30' dry 2' wet	CC	Exhaust °C	Pad dry thermofix
0.53 % 3.20 %	**BEZAKTIV**	Brown FX-R 01	100	n.s. ++ ++	n.s. 6 5 4-5	n.s. 4 3-4 n.s.	n.s. 3 2	4 4-5 5	2-3	4 5 5	1-2 1	4-5 2-3	4-5	50/60	+
0.57 % 3.40 %	**BEZAKTIV**	Brown FX-4R	80	n.s. + +	n.s. 5-6 5-6 5	n.s. 4-5 4-5 n.s.	n.s. 4 3-4	4-5 4-5 5	3-4	5 4-5 4-5	4-5 3	4-5 2	4-5	60/80	+
0.60 % 3.60 %	**BEZAKTIV**	Grey FX-N 150	100	n.s. ++ ++	n.s. 5-6 5 4	n.s. 4-5 4-5 n.s.	n.s. 3-4 2-3	4-5 4 5	2	5 5 5	2-3 2	2 1-2	4-5	50/60	–
1.90 % 5.70 %	**BEZAKTIV**	Black FX-5F	100	– (+) n.s.	5 3-4 n.s. n.s.	4-5 3-4 n.s. n.s.	3 2 n.s.	4-5 5 5	4-5	5 5 5	4 3	4-5 2	3	40/60	+
2.40 % 7.20 %	**BEZAKTIV**	Black FX-SM	100	+ ++ n.s.	3-4 3 n.s. n.s.	4 3-4 n.s. n.s.	3 2 n.s.	4-5 4-5 4-5	4-5	4-5 5 5	4-5 3-4	4-5 3-4	4-5	50/60	(+)
1.70 % 5.10 %	**BEZAKTIV**	Black FX-ND	100	(+) + n.s.	4-5 4 n.s. n.s.	4-5 3-4 n.s. n.s.	3-4 1-2 n.s.	4-5 5 5	4	4-5 5 5	4 3	4-5 4	4-5	40/60	+
1.70 % 5.10 %	**BEZAKTIV**	Black FX-UB	100	– (+) n.s.	3-4 3 n.s. n.s.	4 3-4 n.s. n.s.	3 2 n.s.	4-5 4-5 5	4	4-5 5 5	4-5 2-3	4-5 4-5	4-5	50/60	(+)
1.80 % 5.40 %	**BEZAKTIV**	Black FX-IT	100	– (+) n.s.	4 3-4 n.s. n.s.	4-5 4 n.s. n.s.	2 1 n.s.	5 5 5	4-5	5 5 5	4-5 3-4	4-5 4-5	5	50/60	(+)

BEZAKTIV FX
Dyes
Ecological Information

Data about fastness properties:

The fastness properties indicated in this shade card were determined on 1/1 standard depth dyeings on bleached cotton. Exceptions are the navy and black dyes, which are tested 2/1 and 3/1 respectively.

Fastness to light (ISO)	DIN EN ISO 105-B02
Fastness to light (AATCC)	AATCC 16E/98 20 AFU
Perspiration – light fastness (alkaline)	DIN EN ISO 105-B07
Fastness to washing at 60 °C	DIN EN ISO 105-C06/C2S
Fastness to multiple washing at 60 °C	DIN EN ISO 105-C09
Fastness to perspiration (alkaline)	DIN EN ISO 105-E04
Fastness to chlorinated water (swimming pool water)	DIN EN ISO 105-E03
Ozone fading fastness	CHT CH Norm 111F (O_3)
Nitrogen oxide fastness	DIN EN ISO 105-G01

Dyeing methods
( ) limited suitability

n.s. not specified

Dischargeability to organIQ:

The rating shows the reachable discharge or bleach effect (lightening-up) by applying 27 % organIQ BLEACH T with a spray gun.

++	Suitable for white or at least a very strong tone-in-tone bleach
(++)	Suitable for a very strong bleach with small color change
+	Suitable for a medium to strong bleach with none to small color change
(+)	Only light bleach obtainable or medium-strong bleach with noticeable color change
–	None or very light bleaching effect obtainable or strong color change

The colors illustrated in the shade card were dyed in various standard depths on bleached cotton.
Color brands: 1/6 and 1/1 SD
Navy and Dark Blue: 1/1 and 2/1 SD
Black: 1/1 and 3/1 SD

The data contained in this shade card is given to the best of our knowledge and belief.
It does not guarantee specific product properties.
All information is subject to change without notice.

INTELLIGENT BLEACHING organIQ

Member of ETAD Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers

bluesign® APPROVED

Ecological Information

Name of the dye	AOX* %	PCA	Content of heavy metal***	
			Metal	%
BEZAKTIV Yellow FX-7G	free	n.d.	free	
BEZAKTIV Yellow FX-NF	free	< 100 ppm	free	
BEZAKTIV Yellow FX-RR	free	< 100 ppm	free	
BEZAKTIV Yellow FX-DL	2.0**	n.d.	free	
BEZAKTIV Yellow FX-CO	1.6**	n.d.	free	
BEZAKTIV Yellow FX-MX	1.9**	< 50 ppm	free	
BEZAKTIV Orange FX-TH	free	n.d.	free	
BEZAKTIV Orange FX-RS	free	< 100 ppm	free	
BEZAKTIV Scarlet FX-SB	1.6**	n.d.	free	
BEZAKTIV Scarlet FX-2D	free	n.d.	free	
BEZAKTIV Red FX-DC	free	n.d.	free	
BEZAKTIV Red FX-PL	1.1**	n.d.	free	
BEZAKTIV Red FX-B	1.8**	< 50 ppm	free	
BEZAKTIV Red FX-3B	1.6**	n.d.	free	
BEZAKTIV Red FX-3D	free	n.d.	free	
BEZAKTIV Bordeaux FX-2B	free	n.d.	Cu	4.6
BEZAKTIV Blue FX-RD	free	n.d.	Cu	3.7
BEZAKTIV Blue FX-ON	0.5**	n.d.	Cu	1.7
BEZAKTIV Blue FX-NN 01	0.6**	< 100 ppm	Cu	1.4
BEZAKTIV Blue FX-GG	1.4	n.d.	free	
BEZAKTIV Turquoise FX-2G	free	n.d.	Cu	3.0
BEZAKTIV Green FX-4B	free	n.d.	Ni	2.3
BEZAKTIV Dark Blue FX-5L	free	< 50 ppm	Cu	2.7
BEZAKTIV Dark Blue FX-WF	free	< 50 ppm	Cu	1.1
BEZAKTIV Navy FX-DN	free	< 50 ppm	free	
BEZAKTIV Navy FX-BR	free	n.d.	Cu	4.0
BEZAKTIV Navy FX-PS	free	< 100 ppm	free	
BEZAKTIV Brown FX-R 01	free	n.d.	Cu	2.5
BEZAKTIV Brown FX-4R	1.3**	n.d.	free	
BEZAKTIV Grey FX-N 150	free	n.d.	Cu	1.4
BEZAKTIV Black FX-5F	free	n.d.	free	
BEZAKTIV Black FX-SM	free	< 100 ppm	free	
BEZAKTIV Black FX-ND	free	< 100 ppm	free	
BEZAKTIV Black FX-UB	free	< 100 ppm	free	
BEZAKTIV Black FX-IT	free	< 50 ppm	free	

PCA = para chloroaniline

n.d. = not detectable

* Determination method: DIN 38414-18, limit value: 0.1 %

** The organic bonded halogen is a part of the reactive group of the dye molecule. During the dyeing process it is hydrolysed to inorganic halogenide (salt).

*** The heavy metal is complexly bonded and thus an integral part of the dyestuff molecule.

The BEZAKTIV FX range fully complies with the requirements on the limits for impurities or by-products as specified in the ZDHC Manufacturing Restricted Substances List (ZDHC MRSL, current version 3.1, March 2023, refer to www.roadmaptozero.com).

These data about our products' properties are given to the best of our knowledge for your information but they are not binding.

Staining of adjacent fibres (exhaust process 60 °C)

BEZAKTIV Yellow FX-7G

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Yellow FX-NF

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Yellow FX-RR

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV YELLOW FX-DL

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Yellow FX-CO

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV YELLOW FX-MX

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

Staining of adjacent fibres (exhaust process 60 °C)

BEZAKTIV Orange FX-TH

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Orange FX-RS

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Scarlet FX-SB

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Scarlet FX-2D

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Red FX-DC

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

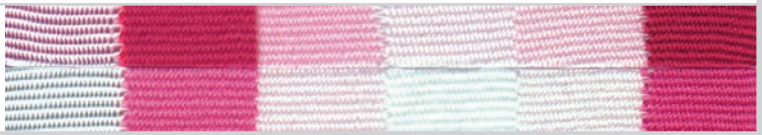
BEZAKTIV Red FX-PL

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

Staining of adjacent fibres (exhaust process 60 °C)

BEZAKTIV Red FX-B

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						



BEZAKTIV Red FX-3B

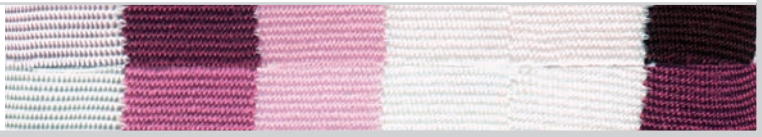
Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Red FX-3D

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

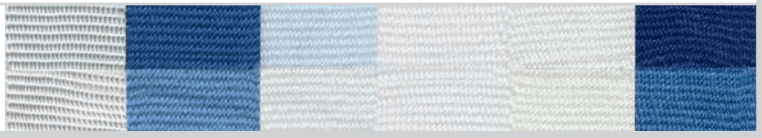
BEZAKTIV Bordeaux FX-2B

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						



BEZAKTIV Blue FX-RD

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						



BEZAKTIV Blue FX-ON

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

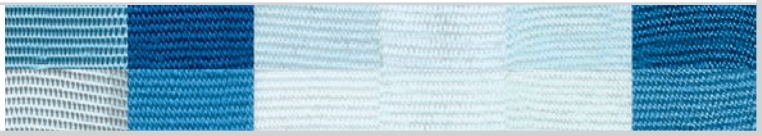
Staining of adjacent fibres (exhaust process 60 °C)

BEZAKTIV Blue FX-NN 01

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Blue FX-GG

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						



BEZAKTIV Turquoise FX-2G (exhaust process 80 °C)

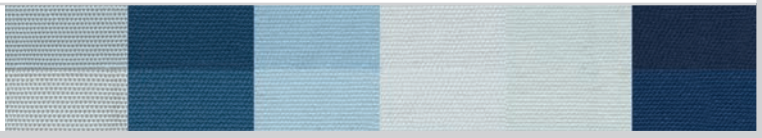
Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Green FX-4B

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Dark Blue FX-5L

Multifibre	CTA	CO	PA	PES	PAN	CV
2/1 SD						
1/1 SD						



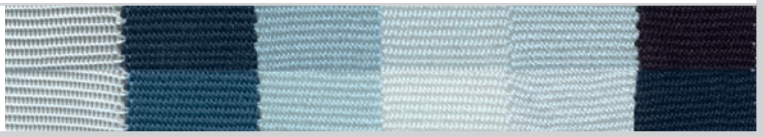
BEZAKTIV Dark Blue FX-WF

Multifibre	CTA	CO	PA	PES	PAN	CV
2/1 SD						
1/1 SD						

Staining of adjacent fibres (exhaust process 60 °C)

BEZAKTIV Navy FX-DN

Multifibre	CTA	CO	PA	PES	PAN	CV
2/1 SD						
1/1 SD						



BEZAKTIV Navy FX-BR

Multifibre	CTA	CO	PA	PES	PAN	CV
2/1 SD						
1/1 SD						

BEZAKTIV Navy FX-PS

Multifibre	CTA	CO	PA	PES	PAN	CV
2/1 SD						
1/1 SD						

BEZAKTIV Brown FX-R 01

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Brown FX-4R

Multifibre	CTA	CO	PA	PES	PAN	CV
1/1 SD						
1/6 SD						

BEZAKTIV Grey FX-N 150

Multifibre	CTA	CO	PA	PES	PAN	CV
3/1 SD						
1/1 SD						

Staining of adjacent fibres (exhaust process 60 °C)

BEZAKTIV Black FX-5F

Multifibre	CTA	CO	PA	PES	PAN	CV
3/1 SD						
1/1 SD						

BEZAKTIV Black FX-SM

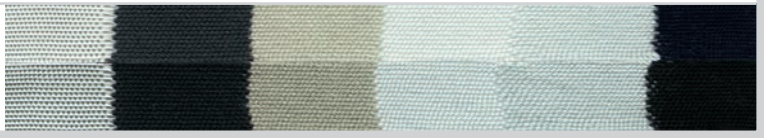
Multifibre	CTA	CO	PA	PES	PAN	CV
3/1 SD						
1/1 SD						

BEZAKTIV Black FX-ND

Multifibre	CTA	CO	PA	PES	PAN	CV
3/1 SD						
1/1 SD						

BEZAKTIV Black FX-UB

Multifibre	CTA	CO	PA	PES	PAN	CV
3/1 SD						
1/1 SD						



BEZAKTIV Black FX-IT

Multifibre	CTA	CO	PA	PES	PAN	CV
3/1 SD						
1/1 SD						

BEZAKTIV FX
Dyes

1. Introduction

BEZAKTIV FX dyes are selected reactive dyes for RFD (ready for dyeing) garments made of cellulose, cellulose regenerated fibres and their blends. The principle of dye bonding to the cellulose is based on a reaction between the OH groups of the cellulose and the reactive groups of the dyestuffs. The BEZAKTIV FX dyestuff is chemically bound to the fiber by this reaction.
BEZAKTIV FX dyes are distinguished in particular by the positive wear fastness properties, the varied application range and the wide variety of shades. These properties make reactive dyes one of the most often used dyes for cellulosic fibres in general.
Furthermore, BEZAKTIV FX dyes show special properties in garment dyeing application such as high robustness and reproducibility of the ternaries, low cross-staining to labels and synthetic fibres, high fixation rates and low consumption of water and energy.
Most of the BEZAKTIV FX elements can be used for subsequent fashionable bleach treatments. Treatments such as spray-, blanket-, random- or fog-bleach with a solution of organIQ BLEACH T or potassium permanganate lead to authentic used- and old-looks of the garments.

BEZAKTIV FX dyes can be applied as well in reactive continuous or semi continuous dyeing processes. If garments are sewed from BEZAKTIV FX dyed material, they may be treated with local or superficial bleaching processes to obtain the favoured used look.

2. General information

2.1 Commercial form
BEZAKTIV FX dyes are powder dyes which are easily soluble in this form and permit use in all conventional dyeing processes. BEZAKTIV FX dyes are finished in a manner that dust-free handling is guaranteed.

2.2 Dissolving the dyes
BEZAKTIV FX dyes are dissolved by sprinkling in pH-neutral, soft or softened water at 60 – 80 °C while stirring. The solubility specifications of the BEZAKTIV FX dyes can be found in the fastness / pattern table at the beginning of this brochure. To prevent insufficiently dissolved dye becoming deposited on the dyed fabric during the dyeing process, we recommend pouring the concentrated dye solution through a fine-mesh sieve into prepared cold water.

2.3 Safety instructions
If the safety instructions are observed and complied with, use of BEZAKTIV FX dyes does not constitute a health risk. In general, however, inhaling or swallowing and contact with the eyes and skin should be prevented. Detailed information on the ecological and toxicological properties of the BEZAKTIV FX dyes are contained in the safety data sheets.

3. Important dyeing information

Pretreatment
To ensure perfect and reproducible dyeing results, correct pretreatment is necessary in addition to a correctly performed dyeing process. Pretreatment can have a considerable influence on the dyeing results. The key factors are described below. RFD material is pretreated using a continuous process. Therefore the material sometimes shows problems during the garment dye process. Reasons can be uncomplete or uneven removal of fats, waxes, pectin and oils. The elastane fiber used in stretch materials is usually covered with silicon-oil. If this silicon-oil is not removed well and even during RFD pretreatment, the garments should be washed again prior to dyeing.

Pre-washing of RFD material
1.0 – 2.0 g/l DENIMCOL MIP
0.0 – 1.5 g/l DENIMCOL WASH-FX

Treatment for 15 min at 70 °C, followed by hot and cold rinsing

The usage of DENIMCOL WASH-FX is highly recommended if the material contains:
– elastane fiber
– spots of sewing machine oil
– high residual amounts of oils/fats/waxes

Liquor ratio
Maintaining the liquor ratio is one of the most important parameters for good reproducibility. If its variation is too big, the salt content of the liquor and also the alkalinity is shifted upwards or downwards. Dyes with a lower substantivity react particularly sensitively to variations. The liquor retained in the garments must be taken into account to detect the real liquor ratio.

Salt content in the dyeing liquor
Salt improves the substantive uptake of the dye by the fibre. If different liquor ratios are used, the balance of the dye-fibre ratio can be regained by adapting the salt and alkali quantities which prevents shade variations. The necessary quantity of salt and alkali can be taken from the requirement tables. The correct salt content in the liquor can be easily determined by means of its density with an hydrometer or refractometer. Conversely the liquor ratio can also be checked if the salt quantity is known. If BEZAKTIV Turquoise FX-2G is used, the use of Glauber's salt is required. The risk of precipitation during dyeing is lower.

To improve penetration in seams, for example in light shades and/or on mercerised cotton or viscose, we recommend to dose the salt after dyestuff addition instead of feeding it from start. The COMBI DOS process is a time saving process that includes controlled salt dosing.

Dyeing temperature
Observance of the temperature is very important due to the specific dye characteristics. During production, temperature differences of 5 °C caused by inaccurate or defective sensors can already result in clearly visible variations in the shade. Controlled temperature monitoring should be ensured.

Fixing alkalis
The correct amount and optimal dosing of the fixing alkali are decisive parameters for dyeing. The correct alkali quantities are given in the table. It is very important that the application amounts are adapted to the respective liquor ratio. If this is not observed, based on a liquor ratio of 1:10, the amount of alkali in the dye bath is too low with a liquor ratio of 1:5 and too high with a liquor ratio of 1:20. Insufficient alkali results in a lower fixing yield and therefore a lower reproducibility. Too much alkali means a higher hydrolysis or also unevenness. Dosing should preferably be performed with a dosing device which permits progressive dosing. With many BEZAKTIV FX dyes the alkali is not only responsible for fixation, but also increases the affinity. For this reason the dosing time should not be less than 20 minutes but can also be 45 minutes. The bicarbonate content of the processing water should also be taken into account. From a content of 0.3 g/l bicarbonate, the application amount of fixing alkali should be corrected as follows: for 0.1 g/l sodium bicarbonate, 0.1 ml/l caustic soda 38 °Bé is necessary in addition to the normal calculation. To avoid unevenness and spots the sodium carbonate and caustic soda solution must be added well diluted.

4. Dye selection

4.1 Standard ternaries

4.1.1 Light shades
BEZAKTIV Yellow FX-7G
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-DL
BEZAKTIV Yellow FX-CO
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-PL
BEZAKTIV Red FX-B*
BEZAKTIV Red FX-3D
BEZAKTIV Bordeaux FX-2B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-ON*
BEZAKTIV Blue FX-NN 01
BEZAKTIV Green FX-4B
BEZAKTIV Brown FX-4R

4.1.2 Medium shades
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-CO
BEZAKTIV Yellow FX-MX
BEZAKTIV Orange FX-TH*
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-DC*
BEZAKTIV Red FX-B*
BEZAKTIV Red FX-3B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-ON*
BEZAKTIV Blue FX-NN 01
BEZAKTIV Dark Blue FX-5L* (above 0.50 %)
BEZAKTIV Dark Blue FX-WF (above 0.50 %)
BEZAKTIV Navy FX-BR* (above 0.50 %)

4.1.3 Dark shades
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-CO
BEZAKTIV Yellow FX-MX
BEZAKTIV Orange FX-TH*
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-DC
BEZAKTIV Red FX-B*
BEZAKTIV Red FX-3B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-NN 01
BEZAKTIV Dark Blue FX-5L* (above 0.50 %)
BEZAKTIV Dark Blue FX-WF (above 0.50 %)
BEZAKTIV Navy FX-DN* (above 1.50 %)
BEZAKTIV Navy FX-BR (above 0.50 %)
BEZAKTIV Navy FX-PS (above 1.50 %)
BEZAKTIV Black FX-ND* (above 2.00 %)
BEZAKTIV Black FX-UB (above 1.70 %)
BEZAKTIV Black FX-IT (above 1.80 %)

4.2 Standard ternaries for bleach effects

DISCHARGEABLE SELECTION

4.2.1 Light to medium shades for bleach effects
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-RR
BEZAKTIV Orange FX-TH*
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-SB
BEZAKTIV Red FX-3D
BEZAKTIV Bordeaux FX-2B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-GG
BEZAKTIV Blue FX-NN 01
BEZAKTIV Green FX-4B
BEZAKTIV Brown FX-R 01
BEZAKTIV Brown FX-4R
BEZAKTIV Grey FX-N 150

4.2.2 Dark shades for bleach effects
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-RR
BEZAKTIV Orange FX-TH*
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-SB
BEZAKTIV Red FX-3D
BEZAKTIV Bordeaux FX-2B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-GG
BEZAKTIV Blue FX-NN 01
BEZAKTIV Green FX-4B
BEZAKTIV Dark Blue FX-5L* (above 0.50 %)
BEZAKTIV Dark Blue FX-WF (above 0.50 %)
BEZAKTIV Navy FX-DN* (above 1.50 %)
BEZAKTIV Navy FX-BR (above 0.50 %)
BEZAKTIV Brown FX-R 01
BEZAKTIV Brown FX-4R
BEZAKTIV Grey FX-N 150
BEZAKTIV Black FX-ND* (above 2.00 %)

CLASSIC SELECTION

4.3 Color-intense respectively highly economic dyes
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-CO
BEZAKTIV Yellow FX-MX
BEZAKTIV Orange FX-TH*
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-DC
BEZAKTIV Red FX-B*
BEZAKTIV Blue FX-NN 01
BEZAKTIV Navy FX-DN*
BEZAKTIV Navy FX-PS
BEZAKTIV Black FX-ND*
BEZAKTIV Black FX-UB
BEZAKTIV Black FX-IT

■ our top recommendation ■ our standard recommendation
* low temperature soaping element

SUSTAINABLE SELECTION

4.4 Selection for low temperature soaping at 50 – 60 °C
BEZAKTIV Yellow FX-NF*
BEZAKTIV Orange FX-TH*
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-B*
BEZAKTIV Blue FX-RD* (up to 2.00 %)
BEZAKTIV Blue FX-ON*
BEZAKTIV Dark Blue FX-5L* (above 0.50 %)
BEZAKTIV Navy FX-DN* (above 0.50 %)
BEZAKTIV Black FX-5F*
BEZAKTIV Black FX-ND*

OLD-DYE & LIGHTFAST SELECTION

4.5 Selection with high light fastness properties and for the use in old-dye process with pre-cationisation
BEZAKTIV Yellow FX-7G
BEZAKTIV Yellow FX-NF* (above 0.33 %)
BEZAKTIV Yellow FX-DL
BEZAKTIV Yellow FX-CO
BEZAKTIV Scarlet FX-2D* (above 0.30 %)
BEZAKTIV Red FX-3D
BEZAKTIV Bordeaux FX-2B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-NN 01 (above 0.33 %)
BEZAKTIV Green FX-4B
(for Turquoise and Green)
BEZAKTIV Dark Blue FX-5L* (above 0.50 %)
BEZAKTIV Dark Blue FX-WF (above 0.40 %)
BEZAKTIV Navy FX-BR
BEZAKTIV Brown FX-4R
BEZAKTIV Grey FX-N 150
BEZAKTIV Black FX-5F* (above 5.00 %)

4.6 Selection with good polyamide reserve
BEZAKTIV Yellow FX-CO*
BEZAKTIV Orange FX-TH*
BEZAKTIV Scarlet FX-SB
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-PL
BEZAKTIV Red FX-3B
BEZAKTIV Red FX-3D
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-GG
BEZAKTIV Brown FX-4R
BEZAKTIV Grey FX-N 150
BEZAKTIV Black FX-5F*

4.7 Yellow ternary elements without photochromism
BEZAKTIV Yellow FX-7G
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-DL

4.8 Selection with good alkaline perspiration light fastness
BEZAKTIV Yellow FX-7G
BEZAKTIV Yellow FX-NF*
BEZAKTIV Yellow FX-DL
BEZAKTIV Orange FX-RS (above 1.20 %)
BEZAKTIV Scarlet FX-SB (above 2.00 %)
BEZAKTIV Red FX-3D
BEZAKTIV Blue FX-GG
BEZAKTIV Navy FX-BR
BEZAKTIV Brown FX-4R
BEZAKTIV Black FX-ND* (above 5.00 %)

4.9 Selection with good fastness to multiple washing at 60 °C with bleach activator
BEZAKTIV Yellow FX-DL
BEZAKTIV Yellow FX-CO
BEZAKTIV Yellow FX-MX
BEZAKTIV Orange FX-RS*
BEZAKTIV Scarlet FX-SB
BEZAKTIV Scarlet FX-2D*
BEZAKTIV Red FX-DC
BEZAKTIV Red FX-PL
BEZAKTIV Red FX-3B
BEZAKTIV Red FX-3D
BEZAKTIV Bordeaux FX-2B
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-ON*
BEZAKTIV Blue FX-GG
BEZAKTIV Turquoise FX-2G
BEZAKTIV Green FX-4B
BEZAKTIV Dark Blue FX-5L* (above 0.50 %)
BEZAKTIV Dark Blue FX-WF (above 0.50 %)
BEZAKTIV Black FX-5F*
BEZAKTIV Black FX-SM
BEZAKTIV Black FX-ND*
BEZAKTIV Black FX-UB
BEZAKTIV Black FX-IT

4.10 Selection with good fastness to chlorinated water (20 ppm)
BEZAKTIV Yellow FX-7G
BEZAKTIV Yellow FX-DL
BEZAKTIV Yellow FX-CO
BEZAKTIV Scarlet FX-SB
BEZAKTIV Red FX-DC
BEZAKTIV Red FX-PL
BEZAKTIV Red FX-3B
BEZAKTIV Bordeaux FX-2B
BEZAKTIV Blue V-2B 133
(combinable element)
BEZAKTIV Blue FX-ON*
BEZAKTIV Dark Blue FX-5L*
BEZAKTIV Navy FX-BR
BEZAKTIV Brown FX-4R
BEZAKTIV Black FX-SM
BEZAKTIV Black FX-IT

4.11 Selection with good fastness to nitrogen oxide (3 cycles) and ozone fading (2' wet)
BEZAKTIV Yellow FX-7G
BEZAKTIV Yellow FX-CO
BEZAKTIV Yellow FX-MX
BEZAKTIV Red FX-PL
BEZAKTIV Red FX-B*
BEZAKTIV Red FX-3B
BEZAKTIV Blue FX-ON*
BEZAKTIV Blue V-2B 133
(combinable element)
BEZAKTIV Dark Blue FX-5L* (above 2.70 %)
BEZAKTIV Navy FX-DN* (above 1.50 %)
BEZAKTIV Navy FX-PS (above 1.50 %)
BEZAKTIV Black FX-ND* (above 5.10 %)
BEZAKTIV Black FX-UB (above 5.10 %)
BEZAKTIV Black FX-IT (above 5.40 %)

4.12 Selection for dyeing at 80 °C
BEZAKTIV Yellow FX-7G**
BEZAKTIV Yellow FX-DL
BEZAKTIV Yellow FX-CO
BEZAKTIV Yellow FX-MX
BEZAKTIV Scarlet FX-SB
BEZAKTIV Scarlet FX-2D
BEZAKTIV Red FX-DC
BEZAKTIV Red FX-PL
BEZAKTIV Red FX-3B
BEZAKTIV Red FX-3D
BEZAKTIV Blue FX-RD**
BEZAKTIV Blue FX-ON*
BEZAKTIV Blue FX-GG**
BEZAKTIV Turquoise FX-2G**
BEZAKTIV Green FX-4B**
BEZAKTIV Brown FX-4R

4.13 Selection for turquoise
BEZAKTIV Turquoise FX-2G is a large-molecular phthalocyanine dyestuff with a copper central ion. Its particular properties make it unique in reactive dyeing. To ensure defect-free dyeing, attention must be paid to important parameters that must be maintained during dyeing.

■ our top recommendation
* low temperature soaping element
■ our standard recommendation
** Elements without risk of catalytic fading

Influence of electrolyte

Phthalocyanine dyes are very sensitive to electrolyte. The quality of the salt has a decisive effect on the dyeing results. Low salt qualities can result in the formation of agglomerates and therefore precipitation and spots. To minimise this risk the usage of Glauber's salt instead of common salt is recommended. The dye solubility is reduced under the influence of electrolyte. The loss of solubility is significantly greater under the influence of common salt than with Glauber's salt. With an amount of 50 – 80 g/l Glauber's salt in the dye bath, the solubility of BEZAKTIV Turquoise FX-2G arrives at 15 g/l.

Influence of nonionic tensides

Nonionic tensides or detergents that have not been properly washed out after pre-treatment can cause precipitations. For this reason it is necessary to rinse them out thoroughly with cold water prior to dyeing. To prevent precipitation due to nonionic tensides, the usage of DENIMCOL LEV-LDR has proven effect.

Dyeing temperature

Phthalocyanine dyes are large-molecular dyes. Due to this size, the diffusion speed is relatively low. The dyeing process should therefore be undertaken at a temperature of 80 °C.

Dye selection

Phthalocyanine dyes show a limited combinability with other reactive dyes. Unsuitable dye combinations therefore lead to dichroism and catalytic fading. The following dyes can be used for brilliant turquoise and green shades:

BEZAKTIV Yellow FX-7G
BEZAKTIV Blue FX-RD*
BEZAKTIV Blue FX-GG
BEZAKTIV Turquoise FX-2G
BEZAKTIV Green FX-4B

5. Dyeing methods

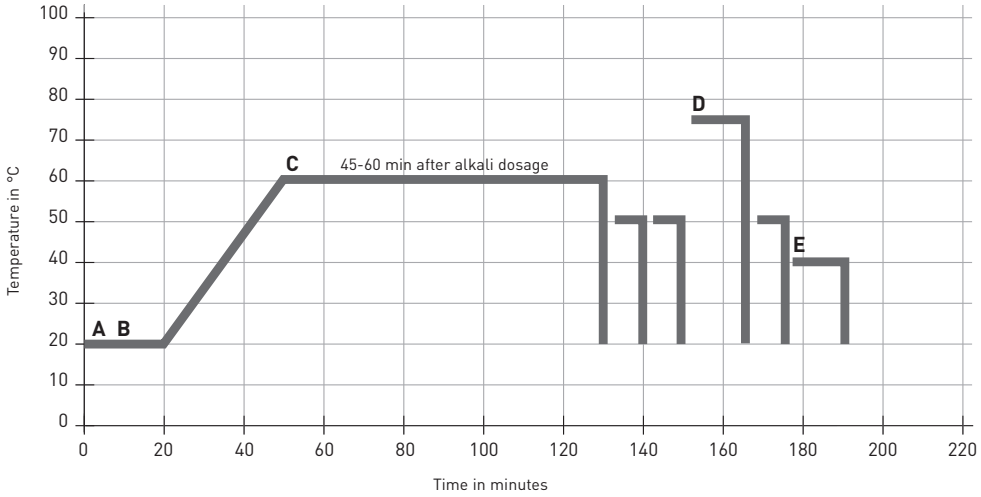
BEZAKTIV FX dyes can be used in exhaust, semi-continuous and continuous dye processes. Due to the reactive anchor system, BEZAKTIV FX dyes can be combined with most BEZAKTIV V, S, HP, S-W, COSMOS S-C, GO and ZERO GO dyes.

5.1 Exhaust process for basic dyeing

In exhaust process the recommended dyeing temperature of the BEZAKTIV FX dyes is 60 °C. The best dyeing results are obtained at this temperature. BEZAKTIV FX dyes are usually used on drum dyeing machines. The recommended auxiliaries and the correct application amounts are listed in the process descriptions. The amounts of salt and alkali depend on the fabric to be dyed (non-mercerised cotton, mercerised cotton/viscose), the concentration of BEZAKTIV FX dyes and the liquor ratio.

5.1.1 Temperature step process

Standard process for drum dyeing machines without a suitable dosing device.
To prevent unlevelness the diluted alkali should be added in portions. Furthermore, this process can be used to improve the tone-in-tone dyeing of cotton/viscose blends.



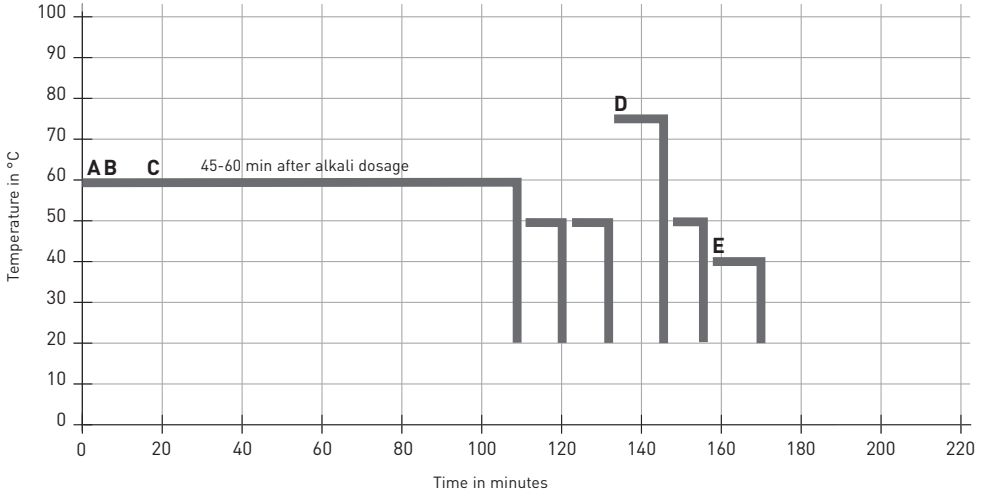
A	1.0 – 2.0	g/l	DENIMCOL LEV-LDR or DENIMCOL DIS-MIP
	1.0 – 2.0	g/l	DENIMCOL LUB-BPA
	10.0 – 90.0	g/l	Glauber's salt or common salt
	5.0	g/l	Sodium carbonate
	0 – 0.5	ml/l	Caustic soda 38 °Bé
B	x	%	BEZAKTIV FX dye (add within 10 min)
C	0 – 3.5	ml/l	Caustic soda 38 °Bé (dose progressively within 30 min or add in 2 portions of 30 % / 70 %)
D	1.0 – 2.0	g/l	DENIMCOL SEL
E	0.2 – 1.0	g/l	DENIMCOL BUFFER-NVM 200
	y	%	DENIMCOL SOFT (of your choice) set pH of 5.5 – 6.5

CLASSIC SELECTION

DISCHARGEABLE SELECTION

5.1.2 COMBI DOS process

The COMBI DOS process is an optimised isothermal dosing process which is coordinated with the characteristics of the BEZAKTIV FX dyes. Due to simultaneous dosing of salt and alkali, a considerably higher process reliability is achieved, especially with light and medium colors, with an excellent levelness, penetration and reproducibility. Articles with a difficult dye penetration, modified cellulose fibres, mercerised cotton and critical shades can be produced with a much higher process safety with COMBI DOS. Dye bath exhaustion and dye fixing are almost linear, whereby fixation of the dye on the fibre occurs approximately 20 minutes after uptake. The dye process itself is performed in accordance with the 60 °C isothermal method. In comparison to the standard process, the dye has better migration conditions, as there is no electrolyte at start. Dosing is started after the migration phase at 60 °C. Calculation of the salt and alkali quantity is possible with the standard tables for BEZAKTIV FX dyes. The use of the COMBI DOS process is generally also possible with dark shades. However, in this case a salt content of 50 % is required at the beginning of the dye process due to the high salt quantity.



A		1.0 – 2.0	g/l	DENIMCOL LEV-LDR or DENIMCOL DIS-MIP
		1.0 – 2.0	g/l	DENIMCOL LUB-BPA
	0 – 50 % of	10.0 – 90.0	g/l	Glauber's salt or common salt (only for dark colors)
B		x	%	BEZAKTIV FX dye
C	50 – 100 % of	10.0 – 90.0	g/l	Glauber's salt or common salt
		5.0	g/l	Sodium carbonate
		0 – 4.0	ml/l	Caustic soda 38 °Bé (dose progressively or add in portions according table below)
D		1.0 – 2.0	g/l	DENIMCOL SEL
E		0.2 – 1.0	g/l	DENIMCOL BUFFER-NVM 200
		y	%	DENIMCOL SOFT (of your choice) set pH of 5.5 – 6.5

Dosing depending on the dye concentration

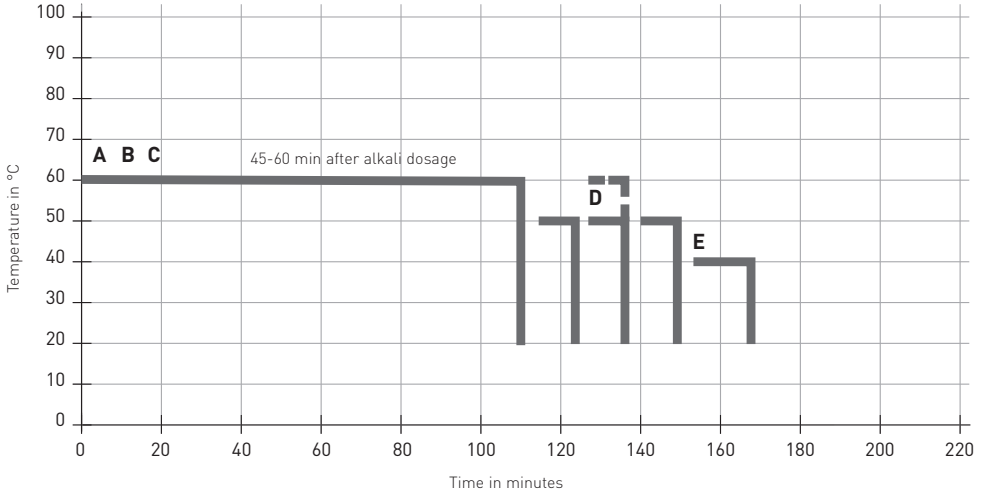
	light shades (1/25 – 1/3 SD)	medium shades (1/3 – 1/1 SD)	dark shades (1/1 – 3/1 SD)
Salt and alkali	Dose together	Dose together	Preliminary addition of 50 % of the salt
Dosing progression	70 %	50 %	30 %
Dosing time	60 min	60 min	45 min
Fixation time	30 min	30 min	45 min

Indication for adding of salt/alkali portions when no dosing unit is available

	light shades (1/25 – 1/3 SD)	medium shades (1/3 – 1/1 SD)	dark shades (1/1 – 3/1 SD)
Salt and alkali	Dose together	Dose together	Preliminary addition of 50 % of the salt
Portions	10 % / 20 % / 70 %	10 % / 30 % / 60 %	20 % / 80 %
Interval between portions	15 min	15 min	15 min
Dosing time	45 min	45 min	30 min
Fixation time	30 min	30 – 45 min	45 – 60 min

5.1.3 Process for BEZAKTIV FX dyes with low temperature soaping suitability

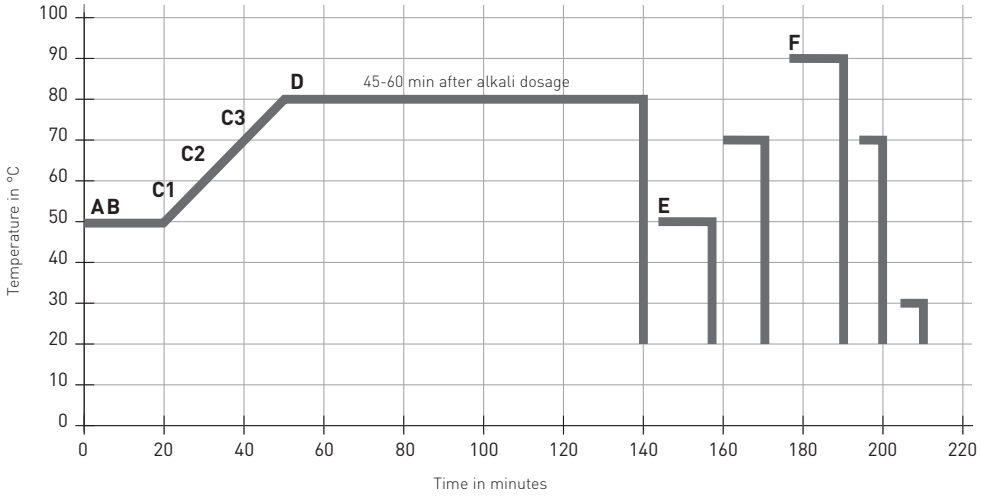
A selection of BEZAKTIV FX dyes can be used for the low temperature soaping process. The running-on time after alkali should not be chosen too short in order to grant an optimal fixation. To assure optimal soaping results at 50 °C, it is not indicated to neutralise the residual alkali. This optimised rinsing and soaping procedure could be as well used in combination with a previous temperature step or the COMBI DOS dye process. For dark shades a soaping temperature of 60 °C may be required.



A	1.0 – 2.0	g/l	DENIMCOL LEV-LDR or DENIMCOL DIS-MIP
	1.0 – 2.0	g/l	DENIMCOL LUB-BPA
	10.0 – 90.0	g/l	Glauber's salt or common salt
	5.0	g/l	Sodium carbonate
	0 – 0.5	ml/l	Caustic soda 38 °Bé
B	x	%	BEZAKTIV FX dye (add within 10 min)
C	0 – 4.0	ml/l	Caustic soda 38 °Bé (dose progressively within 30 min or add in 2 portions of 30 % / 70 %)
D	1.0 – 2.0	g/l	DENIMCOL SEL (verify pH > 9)
E	0.2 – 1.0	g/l	DENIMCOL BUFFER-NVM 200
	2.0 – 3.0	%	DENIMCOL FIX-ACP (the softener can be added in the same bath 5 min after DENIMCOL FIX-ACP)

5.1.4 Process for turquoise and bright green shades

Standard process if phthalocyanine dyes are used. At 80 °C this dyestuffs have the highest exhaustion. With fabrics which are difficult to dye, a migration phase is also possible. This should then be performed in a neutral pH range. The use of Glauber's salt is recommended. If high amounts of turquoise or bright green are applied, the use of DENIMCOL DIS-NWS during soaping is advisable to lower the free heavy metal content.



A		2.0	g/l	DENIMCOL LEV-LDR or DENIMCOL DIS-MIP
		1.0 – 2.0	g/l	DENIMCOL LUB-BPA
		2.0	g/l	Sodium carbonate
B		x	%	BEZAKTIV FX dye (add within 10 min)
C	10 % of	10.0 – 90.0	g/l	Glauber's salt
	30 % of	10.0 – 90.0	g/l	Glauber's salt
	60 % of	10.0 – 90.0	g/l	Glauber's salt
D		3.0 – 23.0	g/l	Sodium carbonate (dose progressively within 30 min or add in 2 portions of 30 % / 70 %)
E		0.5	ml/l	Acetic acid 80 %
F		1.0 – 2.0	g/l	DENIMCOL SEL
		0 – 2.0	g/l	DENIMCOL DIS-NWS or DIS-SF4 (verify pH 7 – 9)

5.1.5 Salt and alkali requirements for BEZAKTIV FX

For non-mercerised cotton

		Alkali compound		
% dye	Salt g/l	Sodium carbonate g/l	Caustic soda 38 °Bé ml/l	Only sodium carbonate g/l
< 0.1	10	5	–	5
0.1 – 0.5	20	10	–	10
0.5 – 1.0	30	5	1.0	15
1.0 – 2.0	40	5	1.5	15
2.0 – 3.0	50	5	2.0	20
3.0 – 4.0	60	5	2.5	20
4.0 – 5.0	70	5	3.0	25
5.0 – 6.0	80	5	3.5	25
> 6.0	90	5	3.5	25

For mercerised cotton and viscose

		Alkali compound		
% dye	Salt g/l	Sodium carbonate g/l	Caustic soda 38 °Bé ml/l	Only sodium carbonate g/l
< 0.1	10	5	–	5
0.1 – 0.5	15	7.5	–	7.5
0.5 – 1.0	20	5	0.8	10
1.0 – 2.0	30	5	1.2	15
2.0 – 3.0	40	5	1.5	15
3.0 – 4.0	50	5	1.7	20
4.0 – 5.0	60	5	2.0	20
5.0 – 6.0	70	5	2.2	25
> 6.0	80	5	2.5	25

For green and turquoise dyes (80 °C)

% dye	Salt g/l	Only sodium carbonate g/l
< 0.1	10	5
0.1 – 0.5	20	10
0.5 – 1.0	30	15
1.0 – 2.0	40	15
2.0 – 3.0	50	20
3.0 – 4.0	60	20
4.0 – 5.0	70	20
5.0 – 6.0	80	25
> 6.0	90	25

Liquor ratio	Factor
1:5	1.30
1:10	1.00
1:15	0.80
1:20	0.65

Conversion factors to determine the lye requirements depending on the liquor ratio

Liquor ratio	Factor
1:5	– 10 g/l salt
1:10	Standard
1:15	+ 10 g/l salt
1:20	+ 20 g/l salt

Conversion factors to determine the salt requirements depending on the liquor ratio

5.1.6 Recommendation for drum dyeing machine control

Optimal results in garment dyeing can be obtained when the load of garments opens up well during the rotation of the drum. This means that the garments should change positions constantly. A rolling-in or interlooping of the load must be avoided. Therefore vertical drum dyeing machines without compartments are usually best suitable for garments such as trousers or jackets. The optimal rotation speed of such an open-pocket drum dyeing machine is achieved, when the garments "fly" from 10 – 11 o'clock to 4 – 5 o'clock. The needed speed will vary depending of the machine diameter, load and liquor content.
To protect the garments from high abrasion and pilling, it is possible to introduce stand-still times between the changes of the direction. Depending of the step of the dyeing process the stand-still times can be longer or shorter.
Especially during the dyestuff fixation period it is highly recommended to build in longer pauses. After 15 – 25 seconds rotation in one direction a rest of 30 – 90 seconds can be kept. For black, navy and other deep shades 60 – 90 seconds, for medium shades 40 – 60 seconds and light shades 20 – 30 seconds pause can be applied.
While rinsing and soaping stand-still pauses of 30 – 90 seconds will help to keep the look of the garments cleaner and less used.

Remarks:
Please make sure that the drum rotates during critical process steps, such as dosing/adding of dyestuff, salt and alkali. Some machines need more time to take up the rotation speed.
The proposed 15 – 25 seconds rotation time should result in at least 2 – 3 complete rotations with the idea of mixing through entirely the whole bunch of garments.

5.2 Exhaust process for dyeing with Old- or Used-Look

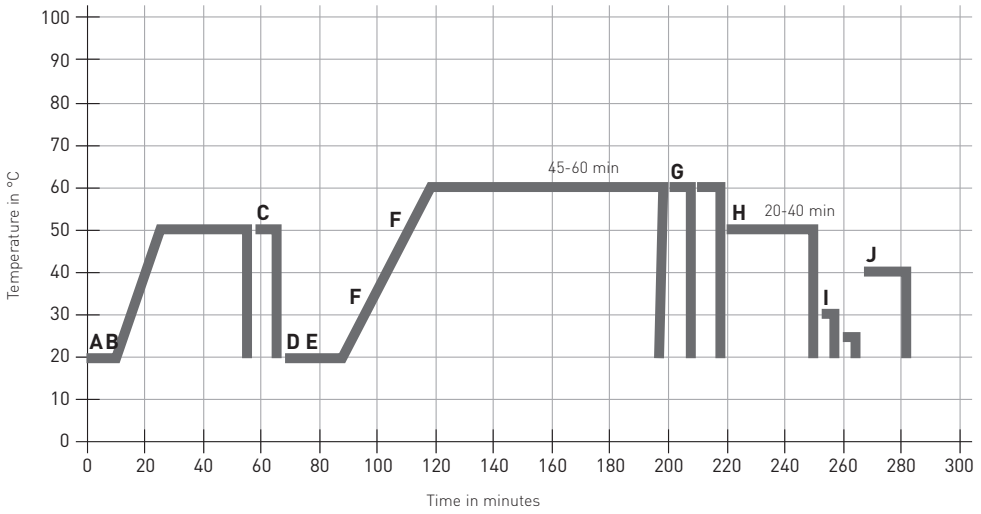
OLD-DYE & LIGHTFAST SELECTION

5.2.1 Old-Dye process with Pre-Cationisation and Enzyme Wash

In order to achieve a nice high-low or salt-n-pepper contrast during the wash-out process, it is necessary to fix the dyestuff on the surface of the material. Herefore the usage of a pre-cationising agent is unavoidable. DENIMCOL FIX-OS bonds permanently to the CO in a similar way as a reactive dyestuff. It is resistant to the alkaline reactive dyeing process.

The necessary salt amount of the dye bath can be reduced in many cases (at least light to medium shades) by 50 %.
The usage of a pre-cationising agent and the following wash-out process is usually lowering the light fastness by 1.5 – 3 grades. It is highly recommended to select BEZAKTIV FX elements with highest possible light fastness.

To achive the desired washed-out look a classical stone-wash (enzymatic or combined with pumice stones) is carried out.



A	3.0 – 8.0	%	DENIMCOL FIX-OS
B	2.0 – 3.0	ml/l	Caustic soda 38 °Bé
C	1.0	ml/l	Acetic acid 80 %
	1.0 – 2.0	g/l	DENIMCOL LEV-LDR or DENIMCOL DIS-MIP
	1.0 – 2.0	g/l	DENIMCOL LUB-BRA
D	5.0 – 45.0	g/l	Glauber's salt or common salt (due to the cationic charging, only 50 % of the regular salt amount is needed)
	5.0	g/l	Sodium carbonate
	0 – 0.5	ml/l	Caustic soda 38 °Bé
E	x	%	BEZAKTIV FX dye (preferably elements of the light fast selection)
F	0 – 3.5	ml/l	Caustic soda 38 °Bé (dose progressively within 30 min or add in 2 portions of 30 %/70 %)
G	0.5	ml/l	Acetic acid 80 %
H	0.3 – 1.5	%	BEIZYM BPN-G (pH 5.5 – 6.5) pumice stones (depends of required wash effect and material)
I	y	ml/l	Separation of stones and garments Caustic soda 38 °Bé (pH 10) If complete drying is not done immediately after softening, we recommend to do a separate enzyme stop at pH 10 or at 80 °C
J	0.2 – 1.0	g/l	DENIMCOL BUFFER-NVM 200
	z	%	DENIMCOL SOFT (of your choice) set pH of 5.5 – 6.5

5.3 Semi-continuous process

Woven and knitted fabric made of cellulose or regenerated cellulose can be dyed very economically with the cold pad batch (CPB) process with BEZAKTIV FX dyes. When selecting the dye it should be ensured that dyes with the same dyeing properties such as fibre affinity, liquor stability and fixing speed are selected. This information is given in the respective tables. Urea can be used for dark shades and as well for cooling the padding liquor. Urea should be added at a temperature below 50 °C. To prevent change of shade from selvedge to centre during padding, a high liquor circulation should be ensured. With lightweight fabrics dyeing should be performed with a low trough level and a high fabric speed.

To ensure a high liquor stability it should be ensured that the temperature of the padding liquor is not higher than 25 °C. Addition of urea makes the padding liquor cool down. A low liquor stability results in change of shade from selvedge to centre, as well as in tailing. Exact dosing of dye and alkali solutions with a 4:1 ratio has to be guaranteed. The application amounts of dye, auxiliaries and fixing alkalis are based on the overall volume of the padding liquor. Proper conditioning of the fabric must be given to ensure reproducibility. If the fabric temperature is too high, the liquor stability is lowered which results in a change of shade from selvedge to centre.

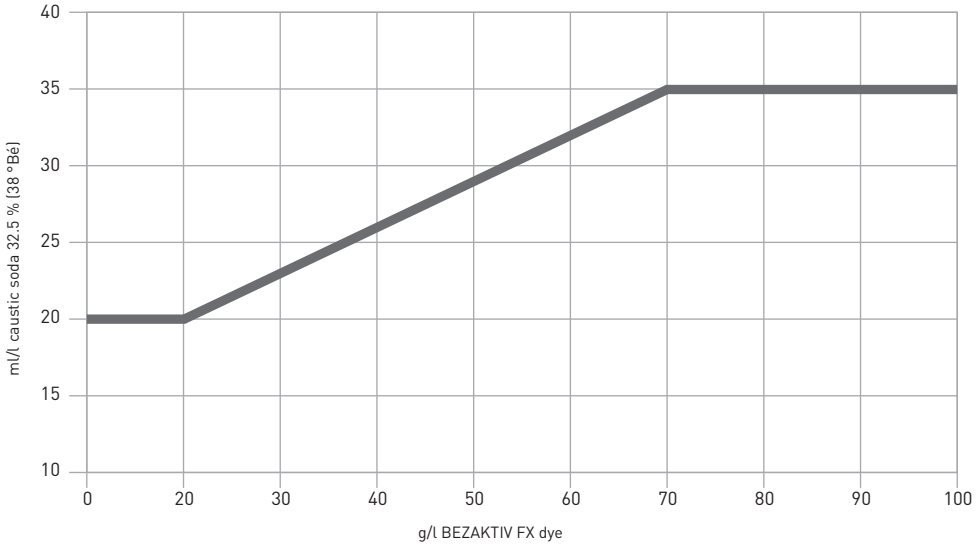
A constant production speed should generally be ensured. Different speeds influence the liquor pick-up and result in tailing. In order to ensure optimum fixation the fabric must be packed in an air-tight plastic film. Caustic soda is partially converted to sodium carbonate under the influence of carbon dioxide, which in turn prolongs the fixing time and can also cause a change of shade from selvedge to centre. The correct dwelling time is shown in the table for technical application information. When dyeing with several items, the dwelling time of the slowest fixing element should be taken.

5.3.1 Cold pad batch process with reduced silicate quantity

The reduced silicate variant is the standard method and guarantees a high pad liquor stability in the temperature range of 20 – 25 °C. The application amount of silicate 38° Bé is generally 50 ml/l. Addition of the dye with the fixing alkali is performed with a mixing pump with a ratio of 4:1. Silicate deposits can occur on the rollers if silicate is used. Furthermore, the use of silicate during the soaping process requires an intensive washing process before neutralisation to prevent silicate precipitation.

Dye solution:	x	g/l	BEZAKTIV FX dye
	0 – 100	g/l	Urea
	1 – 3	g/l	COLORCONTIN VGP
Alkali solution:	50	ml/l	Silicate 38 °Bé
	y	ml/l	Caustic soda 38 °Bé
Mixing ratio:	The stated quantities g/l of dye, ml/l of silicate and ml/l of caustic soda 38 °Bé are based on the total volume of the padding liquor. Dye and alkali solution are combined with a mixing pump in a ratio of 4:1 and form the total padding liquor volume.		
Padding liquor temperature:	20 – 25 °C		
Dwelling time:	6 – 24 hours, up to 60 hours no losses or changes in color occur.		

Alkali concentration for the reduced silicate variant

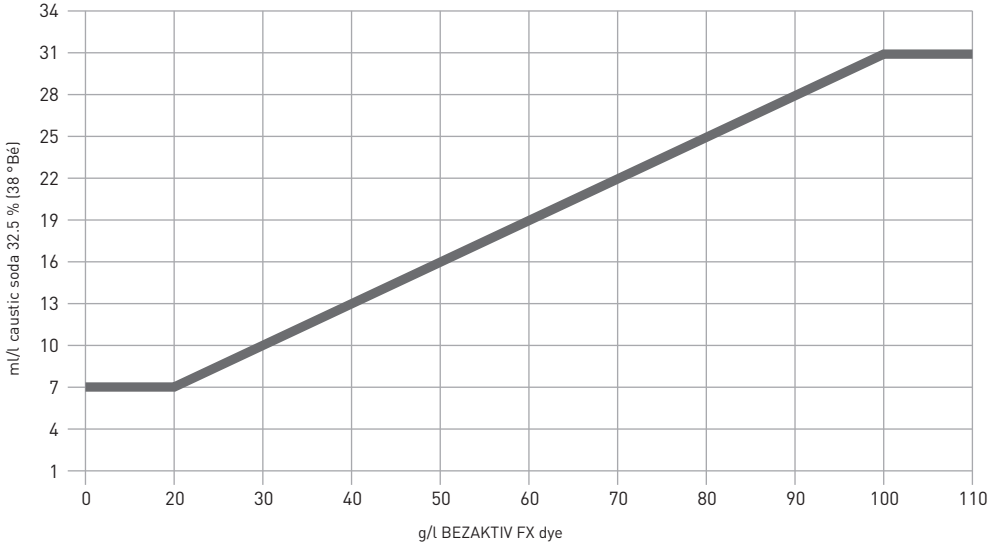


5.3.2 Cold pad batch process sodium carbonate/caustic soda variant

This variant is an alternative to the alkali systems containing silicate at padding liquor temperatures of 20 – 25 °C. The bath stability is lowered considerably at higher temperatures, which can result in change of shade from selvedge to centre. For this reason trough cooling and operation with a mixing pump is necessary. This method does not cause silicate deposits on the rollers. Compared to the reduced sodium silicate variant, the required fixing time is 1.5 times longer when dyeing with the sodium carbonate/caustic soda process.

Dye solution:	x	g/l	BEZAKTIV FX dye
	0 – 100	g/l	Urea
	1 – 3	g/l	COLORCONTIN VGP
Alkali solution:	20	gl/l	Sodium carbonate
	y	ml/l	Caustic soda 38 °Bé
Mixing ratio:	The stated quantities g/l of dye, g/l of sodium carbonate and ml/l of caustic soda 38 °Bé are based on the total volume of the padding liquor. Dye and alkali solution are combined with a mixing pump in a ratio of 4:1 and form the total padding liquor volume.		
Padding liquor temperature:	20 – 25 °C		
Dwelling time:	9 – 36 hours, up to 60 hours no losses or changes in color occur.		

Alkali concentration for the sodium carbonate/caustic soda variant



Important note: BEZAKTIV Turquoise FX-2G is not always suitable for this process. Minimum dwelling time: 48 h

5.3.3 Technical application information

BEZAKTIV FX dyes

Dye designation	Fibre affinity	Liquor stability	Fixing speed	Minimum fixing time
BEZAKTIV Yellow FX-7G	Low	High	Slow	16 hours
BEZAKTIV Yellow FX-NF	Medium	Low	Fast	6 hours
BEZAKTIV Yellow FX-RR	Low	Low	Fast	8 hours
BEZAKTIV Yellow FX-DL	Medium	Medium	Medium	12 hours
BEZAKTIV Yellow FX-CO	Medium	High	Medium	8 hours
BEZAKTIV Yellow FX-MX	Low	High	Medium	12 hours
BEZAKTIV Orange FX-TH	Low	Low	Fast	6 hours
BEZAKTIV Orange FX-RS	Medium	Medium	Fast	6 hours
BEZAKTIV Scarlet FX-SB	Medium	Low	Medium	8 hours
BEZAKTIV Scarlet FX-2D	Medium	Low	Fast	6 hours
BEZAKTIV Red FX-DC	Medium	High	Fast	6 hours
BEZAKTIV Red FX-PL	Medium	Medium	Medium	12 hours
BEZAKTIV Red FX-B	Medium	Medium	Fast	6 hours
BEZAKTIV Red FX-3B	Low	High	Slow	16 hours
BEZAKTIV Red FX-3D	Medium	Medium	Medium	8 hours
BEZAKTIV Bordeaux FX-2B	Medium	Medium	Fast	8 hours
BEZAKTIV Blue FX-RD	Medium	Medium	Fast	8 hours
BEZAKTIV Blue FX-ON	Medium	High	Medium	12 hours
BEZAKTIV Blue FX-NN 01	Low	High	Medium	12 hours
BEZAKTIV Blue FX-GG	Medium	Medium	Fast	8 hours
BEZAKTIV Turquoise FX-2G	Low	High	Slow	24 hours
BEZAKTIV Green FX-4B	Low	High	Slow	24 hours
BEZAKTIV Dark Blue FX-5L	Medium	Medium	Fast	6 hours
BEZAKTIV Dark Blue FX-WF	Medium	High	Medium	8 hours
BEZAKTIV Navy FX-DN	High	Medium	Fast	6 hours
BEZAKTIV Navy FX-BR	Medium	Medium	Medium	12 hours
BEZAKTIV Navy FX-PS	High	High	Medium	12 hours
BEZAKTIV Brown FX-R 01	Medium	High	Fast	8 hours
BEZAKTIV Brown FX-4R	Medium	High	Medium	16 hours
BEZAKTIV Grey FX-N 150	High	Low	Medium	12 hours
BEZAKTIV Black FX-5F	Medium	Medium	Fast	6 hours
BEZAKTIV Black FX-SM	High	High	Fast	8 hours
BEZAKTIV Black FX-ND	Medium	Medium	Fast	6 hours
BEZAKTIV Black FX-UB	High	High	Fast	8 hours
BEZAKTIV Black FX-IT	High	High	Fast	8 hours

Table information:
The given dye specifications were determined based on the reduced silicate variant with 30 g/l at padding temperature of 25 °C and dwelling temperature of 25 °C.

Fibre affinity
The fibre affinity was determined under alkaline conditions and specifies the exhaustion properties of each dye. To prevent tailing problems, high and of low affinity elements should not be used in the same recipe.

Padding liquor stability
The padding liquor stability is given in minutes. A period of time for hydrolysis of 10 % of the employed dye is determined. This theoretical value cannot be implemented directly in practice, as the dye and alkali solution are constantly added to the trough. For this reason the actual value of the liquor replacement in the trough should not exceed three minutes. The values of the BEZAKTIV FX dyes were determined at a temperature of 25 °C and with the use of the reduced silicate variant. A higher temperature and different alkali systems reduce the liquor stability.

The BEZAKTIV FX dyes are categorised as follows:
Low < 10 minutes
Medium 10 – 20 minutes
High > 20 minutes

Fixing speed
The fixing speed depends greatly on the dwelling temperature. A constant temperature of the fabric, liquor and environment is a requirement for regular fixation. The stated values of the BEZAKTIV FX dyes are based on an ambient temperature of 25 °C during dwelling. If the ambient temperature is lower, the dye is fixed more slowly. For this reason it is necessary to adapt the dwelling time accordingly.

Slow > 16 hours
Medium 8 –16 hours
Fast < 8 hours

5.4 Continuous process

5.4.1 Pad dry pad steam process

The pad dry pad steam process is the classic continuous process for dyeing woven fabric with BEZAKTIV FX dyes. It is primarily used for cellulose articles with a high yardage. This process is characterised by a high productivity, a good fabric appearance as well as a good fixing rate. The use of a dosing pump is not necessary with this process, as dye and alkali solution are applied separately.

Dye pad:	x	g/l	BEZAKTIV FX dyes
	1.0 – 3.0	g/l	COLORCONTIN VGP
	3.0 – 5.0	g/l	MEROPAN XRN Pearls
	5.0 – 10.0	g/l	MIGRASOL MV conc./SAP
Liquor pick-up:	60 – 80 %		
Padding temperature:	20 – 30 °C		
Pre-drying to a residual moisture content of 30 – 35 % in the IR zone			
Drying:	110 – 140 °C		
Padding of chemicals:	250	g/l	Common salt
	20	g/l	Sodium carbonate
	7.5 – 15	g/l	Caustic soda 38 °Bé
Liquor pick-up:	80 – 100 %		
Padding temperature:	20 – 30 °C		
Fixation:	Steaming with 102 °C saturated steam for 45 – 90 sec.		

Alkali requirements

BEZAKTIV FX	g/l	< 20	< 40	> 40
Caustic soda 32.5 % (38 °Bé)	ml/l	7.5	10	15

Remarks:
Regular pre-drying is necessary to ensure optimum reproducibility and a level fabric appearance. For phthalocyanine dyes the caustic soda must be increased by 5 ml/l.

5.4.2 Pad dry thermofix process

The pad dry thermofix process is a single-bath and salt-free continuous process. Particularly suitable for light to medium shades.
A lower light fastness level is achieved compared to the pad dry pad steam process. No dosing pump is required for this process. Fixation is performed with hot air. Sodium bicarbonate is normally used as a fixing alkali and provides a higher liquor stability than sodium carbonate. For this reason bicarbonate is recommended for BEZAKTIV FX dyes.
To ensure sufficient fixation of the dye it is necessary to ensure a certain moisture content on the fabric. For this reason the use of 50 – 150 g/l urea is necessary.

Dye pad:	x	g/l	BEZAKTIV FX dyes
	1.0 – 3.0	g/l	COLORCONTIN VGP
	3.0 – 5.0	g/l	MEROPAN XRN Pearls
	5.0 – 10.0	g/l	MIGRASOL MV conc./SAP
	50 – 150	g/l	Urea
	x	g/l	Sodium bicarbonate
Liquor pick-up:	60 – 80 %		
Padding temperature:	20 – 30 °C		
Pre-drying to	30 – 35 % residual moisture content		
Drying:	110 – 140 °C		
Thermofixing:	60 – 180 seconds at 160 °C		

Alkali requirements

BEZAKTIV FX	g/l	5	10	20	30	> 30
Sodium bicarbonate	g/l	10	15	20	25	30

Remarks:
Regular pre-drying is necessary to ensure optimum reproducibility and a level fabric appearance. The dyes should be preselected due to the specific conditions during thermofixing.

6. Soaping of BEZAKTIV FX dyes

In addition to the dye selection, the soaping process has a decisive effect on the final fastness level. Reactive dyes have a fixing rate range of 60 – 90 % depending on the characteristics and color depth. The dyestuff hydrolysate is in the bath and on the fabric. It has to be removed consequently.
The classic soaping process of reactive dyes includes the following steps:

- a rinsing process to remove the electrolyte and non-fixed hydrolysed dye
- a neutralisation (in case of a soaping temperature of over 80 °C) normally done with acetic acid to lower the pH value in the soaping bath and to prevent an alkaline hydrolysis of the dye
- a soaping process to remove the dye hydrolysate from the fabric
- a subsequent rinsing process to wash out the released hydrolysate and to achieve the required fastness level

The rinsing process should be performed with sufficient water to achieve a high bath replacement. Rinsing is a dilution process which is necessary to remove high quantities of electrolyte, alkali and non-fixed dye from the dye bath. The substantivity of the dye hydrolysate influences its washability. The lower it is the better the wash off effect is. If there is a high salt concentration in the rinsing or soaping bath, it is very difficult to remove the hydrolysate from the fibre. The electrolyte lowers the solubility of the dye, increases its affinity and reduces its wash-off properties. The use of hard water also lowers the solubility of the dyes and results in negative wash-off properties. For this reason it should be ensured that soft production water is also used for rinsing and soaping processes. The soaping temperature influences the diffusion of the dye hydrolysate. High temperatures improve diffusion. The recommended soaping temperature on drum dyeing machines is 70 – 90 °C, whereby soaping should be performed for 10 – 15 minutes. The soaping process can be repeated for very dark shades.

The use of DENIMCOL SEL allows to soap at lower temperatures and in the presence of residual salt quantities. Compared to a soaping process with a normal soaping agent, several rinsing baths including thermic energy can be saved.

Soaping at low temperature
A slightly alkaline pH value (pH 8 – 9) can improve the soaping effect. If soaping is done at 50 – 75 °C, no neutralisation should be done! DENIMCOL SEL must be used to make the low temperature soaping process work properly. Staining of PA and other adjacent fibres is reduced if no neutralisation is done.

When washing off and soaping CPB dyes which were dyed with the silicate method, neutralisation is not performed until after soaping. Neutralisation before soaping would result in silicate precipitation.

7. Correction of faulty dye results

7.1 Lightening
Lightening is possible with the following method:
5 – 10 g/l sodium carbonate; 30 min at 95 °C; hot and cold rinsing.
The degree of lightening depends on the dye, its application amount and the liquor ratio. Color change can occur and are caused by the combination of several dyestuff elements.

7.2 Stripping
Reactive dyes can be stripped with both reductive and oxidative methods. Depending on the dye it can be necessary to use a combination of both methods to achieve a good stripping effect. When stripping dyes containing a metal complex element, a suitable sequestering agent should be added to the stripping bath.

Stripping method I

10.0	ml/l	Caustic soda 32.5 % (38 °Bé)
5.0	g/l	Sodium dithionite
2.0	g/l	DENIMCOL LEV-A or DENIMCOL LEV-M

Treatment for 30 min at 80 °C followed by hot and cold rinsing; neutralise.

Stripping method II

3.0	g/l	Active chlorine
x	ml/l	pH 10 – 11 with caustic soda 32.5 % (38 °Bé)

Treatment for 30 min at 25 °C followed by cold rinsing.

1.0	g/l	Sodium bisulphite

Treatment for 10 min at 40 °C followed by hot and cold rinsing.

Stripping method III

10.0	ml/l	Caustic soda 32.5 % (38 °Bé)
5.0	g/l	Sodium dithionite
2.0	g/l	DENIMCOL LEV-A or DENIMCOL LEV-M

Treatment for 30 min at 80 °C followed by hot and cold rinsing.

3.0	g/l	Active chlorine
x	ml/l	pH 10 – 11 with caustic soda 32.5 % (38 °Bé)

Cold treatment for 30 min followed by cold rinsing.

1.0	g/l	Sodium bisulphite

Treatment for 10 min at 40 °C followed by hot and cold rinsing.

Remarks:
To ensure a stable vat reduction system it is necessary to adapt to machines with an air volume accordingly the quantities of caustic soda and sodium dithionite.
The following is required for 1 m^3 air:
1.7 l caustic soda 32.5 % (38 °Bé)
1.7 kg sodium dithionite

8. CHT auxiliaries

8.1 Auxiliaries for drum (garment) dyeing

8.1.1 BEIZYM BPN-G
Cellulase for biopolish treatments and stonewash effects up to the neutral pH range. Low backstaining, low strength loss. On non-denims lowest influence on color shade.

8.1.2 DENIMCOL AR (non-ionic/anionic)
Protection from stains caused by metal zips, rivets and buttons during reactive and direct dyeing of cellulosic garments. The metal accessories are protected as well from strong browning.

8.1.3 DENIMCOL BUFFER-NVM 200
Mix of organic and inorganic buffers. Suitable for the application in combination with enzymes softeners and dyes.

8.1.4 DENIMCOL CDS (non-ionic)
Wetting agent with excellent foam-inhibition properties based on hydrophilic silicone surfactants. Excellent electrolyte stability.

8.1.5 DENIMCOL DIS-MIP (anionic)
Multifunctional product for pretreatment, dyeing and soaping cellulosic materials. RFD fabrics can be dyed just after the pre-wash without rinsing.

8.1.6 DENIMCOL DIS-NWS
Special sequestring and dispersing agent with excellent soil suspending and agglomeration-preventing properties. Very effective in releasing unfixed dyestuffs and heavy metal ions.

8.1.7 DENIMCOL DIS-SF4
Universally applicable sequestering agent for garment artciles

8.1.8 DENIMCOL FIX-ACP (cationic)
Aftertreatment agent for reactive and direct dyed cellulosic garments.

8.1.9 DENIMCOL FIX-OS (cationic)
Reactive agent to mordant garments made of cellulose. Well suited for the subsequent dyeing with BEZAKTIV FX dyes and others.

8.1.10 DENIMCOL LEV-A or DENIMCOL LEV-M (non-ionic)
Universal levelling and stripping agent in garment dyeing. High affinity to anionic dyes.

8.1.11 DENIMCOL LEV-LDR (anionic)
Improves the solubility and has dispersing and sequestering properties. Problem-solver for turquoise dyes. Does not de-mineralise dyes. Reduces risk of precipitations in presence of residual non-ionic surfactants.

8.1.12 DENIMCOL LUB-BPA (non-ionic)
Crease prevention agent for cellulosic materials based on acrylamide. Crease formation is reduced because of a higher liquor viscosity. Improved lubrication reduces the mechanical strain.

8.1.13 DENIMCOL SEL (slightly anionic)
Surfactant-free special product for soaping of reactive dyes to achieve high wet fastness level. Optimal results even in soaping bathes containing residual salt and alkali and as well at low soaping temperature of 50 – 75 °C.

8.1.14 DENIMCOL WASH-FX
Highly effient speical detergent with unique polymers. Used in pretreatment and prewash of all kind of fibres. It shows low foaming, high soil- and oil- removing properties. Its outstanding emulsifying power makes it optimal for Elastane.

8.1.15 organIQ BLEACH system
Biodegradable bleaching system for the local spray bleaching and all-over bleaching by fog or moonwash application of jeans and dyed garments, to obtain authentic used effects. Free from heavy metals, chlorine and AOX.

8.1.16 organIQ NEUTRAL
Biodegradable reduction agent to neutralise potassium permanganate and chlorine and to eliminate manganese dioxide which is formed out of the two substances.

8.2 Auxiliaries for continuous and semi-continuous dyeing

8.2.1 COLORCONTIN VGP (anionic)
Low-foaming rapid wetting agent for continuous and CPB dyeing. Phosphoric acid ester.

8.2.2 MEROPAN XRN Pearls (anionic)
Weak oxidation agent. Acts as a reduction inhibitor, protects dyes against reductive conditions at high temperatures.

8.2.3 MIGRASOL MV conc./SAP (anionic)
Migration inhibitor for semi-continuous and continuous processes for intermediate drying processes. Prevents dye migration during drying.

8.3 Production standards

Product designation	GOTS	ZDHC	bluesign®	OEKO-TEX
BEIZYM BPN-G		•	•	•
DENIMCOL AR	•	•	•	•
DENIMCOL BUFFER NVM-200	•	•	•	•
DENIMCOL CDS		•	•	•
DENIMCOL DIS-MIP		•	•	•
DENIMCOL DIS-SF4		•	•	•
DENIMCOL FIX-ACP		•	•	•
DENIMCOL FIX-OS		•	•	•
DENIMCOL LEV-A		•	•	•
DENIMCOL LEV-M		•	•	•
DENIMCOL LEV-LDR		•	•	•
DENIMCOL LUB-BPA	•	•	•	•
DENIMCOL SEL		•	•	•
organIQ BIOPOWER		•	•	•
organIQ BLEACH system	•	•	•	•
organIQ NEUTRAL		•		•
COLORCONTIN VGP	•	•	•	•
MEROPAN XRN PEARLS	•	•	•	•
MIGRASOL MV conc.		•		•
MIGRASOL SAP	•	•	•	•

9. Annex

9.1 Solubility of process chemicals

9.1.1 Solubility of common salt and Glauber's salt

The solubility of common salt and Glauber's salt depends on the temperature. Generally the solubility of common salt (NaCl) is higher than that of Glauber's salt (sodium sulphate, Na_2SO_4).

Temperature [°C]	Common salt [g/l]	Glauber's salt [g/l]
0	356	
20	358	161
30	362	332
40	363	351
50	367	325
60	370	318
70	371	306
100	391	299

9.1.2 Solubility of sodium carbonate

The solubility of sodium carbonate depends on the temperature. A higher temperature does not always mean a better solubility. With sodium carbonate the highest degree of solubility is already reached at 40 °C. Higher temperatures result in a slight reduction in the solubility.

Temperature [°C]	Sodium carbonate [g/l]
0	71
10	126
20	214
30	409
40	497
50	475
70	458
80	452
100	452

9.2 Convariant

9.2.1 Convariant table for caustic soda

Different caustic soda concentrations are used in different countries and different markets. All information in this application is based on caustic soda 38 °Bé. The application amounts for other concentrations can be taken from the table.

°Bé NaOH	% NaOH	Specific weight g/ml	°Bé NaOH	% NaOH	Specific weight g/ml
1	0.60	1.007	26	19.65	1.220
2	1.20	1.014	27	20.60	1.231
3	1.85	1.022	28	21.55	1.241
4	2.50	1.029	29	22.50	1.252
5	3.15	1.036	30	23.50	1.263
6	3.79	1.045	31	24.48	1.274
7	4.50	1.052	32	25.50	1.285
8	5.20	1.060	33	26.58	1.297
9	5.86	1.067	34	27.65	1.308
10	6.58	1.075	35	28.83	1.320
11	7.30	1.083	36	30.00	1.332
12	8.07	1.091	37	31.20	1.345
13	8.78	1.010	38	32.50	1.357
14	9.50	1.108	39	33.73	1.370
15	10.30	1.116	40	35.00	1.383
16	11.06	1.125	41	36.36	1.397
17	11.84	1.134	42	37.65	1.410
18	12.69	1.142	43	39.06	1.424
19	13.50	1.152	44	40.47	1.438
20	14.35	1.162	45	42.02	1.453
21	15.15	1.171	46	43.58	1.468
22	16.00	1.180	47	45.16	1.483
23	16.91	1.190	48	46.73	1.498
24	17.81	1.200	49	48.41	1.514
25	18.71	1.210	50	50.10	1.530

1 l caustic soda 38 °Bé = 441 g sodium hydroxide 100 %
= 700 g caustic soda 48 °Bé
= 766 g caustic soda 50 °Bé

9.2.2 Convariant table for silicate

Silicate (sodium silicate) is available in different qualities and concentrations. The most common commercially available silicate variants are shown here.

°Bé	Specific weight [g/ml]	Weight ratio Na_2:SiO_2
37 – 40	1.35	1:3.3
40 – 42	1.40	1:3.3
48 – 50	1.50	1:2.6
58 – 60	1.70	1:2.1

No responsibility is taken for the correctness of this information

9.2.3 Convariant table for water hardness

The water hardness varies in each country. The different degrees of hardness are shown with the corresponding German degree of hardness (°dH).

German hardness °dH	British hardness °dH	French hardness °dH
1	1.25	1.79
2	2.50	3.57
3	3.75	5.36
4	5.00	7.14
5	6.25	8.93
6	7.50	10.72
7	8.75	12.50
8	10.00	14.29
9	11.25	16.07
10	12.50	17.86
11	13.75	19.65
12	15.00	21.43
13	16.25	23.22
14	17.50	25.00
15	18.75	26.79
16	20.00	28.58
17	21.25	30.36
18	22.50	32.15
19	23.75	33.93
20	25.00	35.72

9.2.4 Levels of water hardness

Classification	Total hardness °dH	Specifications mmol/l CaO
Very soft	0 – 4	0 – 0.7
Soft	4 – 8	0.7 – 1.4
Medium hardness	8 – 12	1.4 – 2.1
Quite hard	12 – 18	2.1 – 3.2
Hard	18 – 30	3.2 – 5.3
Very hard	> 30	> 5.3

Definition of the water hardness:

1° dH (German hardness) refers to 10 mg CaO in 1 l water.

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04/2026_en

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