



Textilní zkušební ústav, s.p.
TESTING LABORATORY
Cejl 480/12, 602 00 Brno, Czech Republic

TESTING LABORATORY 1001

accredited according to ČSN EN ISO/IEC 17025:2018 by the Czech Accreditation Institute

TEST REPORT

AZL 24/0617-01

CUSTOMER: UAB TEKSNİJA
J. Dobkevičiaus g. 8a
021 89 Vilnius
Lithuania

SAMPLE: Knitted fabric: Art. 16396EN+SP
(according to the customer order) Fibre composition: 52 % cotton/ 44 % polyester/ 4 % elastane
Colour: blue



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Textilní zkušební ústav, s.p.

Determination of textile fibres composition in mixtures by gravimetry

was performed according to ČSN EN ISO 1833-11:2018 and ČSN EN ISO 1833-21:2019. Before the analysis all fibres in the sample were examined and identified microscopically and/or using ATR-FTIR spectrometry.

- 1833-11 using sulphuric acid – content of cellulose fibres
- 1833-21 using cyclohexanone – content of elastane fibres

Result: Content of analysed fibres as a percentage (%) corrected using agreed allowances (EU Regulation 1007/2011, Annex IX)

Uncertainty of measurement 0,5 %.

Results (%)	
cotton	51,3
polyester	44,1
elastane	4,6

Determination of mass indicators - mass per unit area using small samples

was performed according to ČSN EN 12127:1998

- conditions of testing: ČSN EN ISO 139:2005; temperature (20±2) °C; RH (65±4) %
- treatment/relaxation procedure before testing: any procedure applied
- specimens tested: 5
- specimen dimensions: 10 x 10 cm

Results	
Mean mass per unit area (g.m ⁻²)	193
Coefficient of variation (%)	0,3

Weave

was determined according to ČSN 80 0018:1993

- testing and conditioning atmosphere: temperature (20±2) °C; RH (65±4) %

Result: verbal description of the weave

This test is outside of the accreditation scope.

Results
pique





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Determination of number of stitches per unit length and unit area

was determined according to ČSN EN 14971:2006

- standard atmosphere used: ČSN EN ISO 139:2005; temperature (20±2) °C; RH (65±4) %
- method used: A
- the number of tests: 5x in wale, 5x in course
- surface tested: technical back

Results*	wale / courses
Individual results (number of stitches per 1 cm)	12;13;12;13;13/24;25;23;24;24
Mean density (number of stitches per 1 cm)	13 / 24

* Tested on sample delivered 21.06.2024.

Dimensional change after wet treatment

was evaluated according to ČSN EN ISO 5077:2008. The samples for evaluation were prepared according to ČSN EN ISO 3759:2012. Washing was carried out according to ČSN EN ISO 6330:2022

- conditioning: ČSN EN ISO 139:2005; temperature (20±2) °C, RH (65±4) %
- washing machine: type A (FOM-71MP, Electrolux-Wascator)
- specimens tested: 1, procedure: 4N (40±3) °C
- detergent: standard 3 ECE
- ballast used: type III (ČSN EN ISO 6330:2022)
- total ballast load: 2 kg
- number of washing cycles: 1
- drying procedure: procedure A – Line dry
- measuring positions number: three pairs of markers
- specimen type: flat textile

The combined measurement uncertainty is approximately 0.1%

Results	warp / weft direction
Dimensional change (%)	-0,5 / 0

Determination of the permeability of fabrics to air

was performed according to ČSN EN ISO 9237:1995

- testing and conditioning atmosphere: temperature (20±2) °C; RH (65±4) %
- direction of the air flow: from inner to face side
- test surface area used: 20 cm²
- specimens tested: 10
- pressure drop used: 100 Pa

Results*	
Mean air permeability R (mm.s ⁻¹)	650
Coefficient of variation (%)	2,5

* Test result was taken from the Test Report No. AZL 24/0283 issued 15.03.2024 delivered by customer.





Textilní zkušební ústav, s.p.

Measurement of water-vapour resistance under steady state-conditions

was performed according to ČSN EN ISO 11092:2015

- arrangement of test specimens: side facing the human body towards the measuring unit
- specimens tested: 3
- individual measurement on each specimen: 1x
- atmosphere for testing: air temperature ($35 \pm 0,1$) °C, RH (40 ± 3) %
- hotplate temperature: 35 °C
- measuring unit area: 0,044 m²

Results*	
Mean value R_{et} (m ² . Pa. W ⁻¹)	3,9
coefficient of variation (%)	1,5

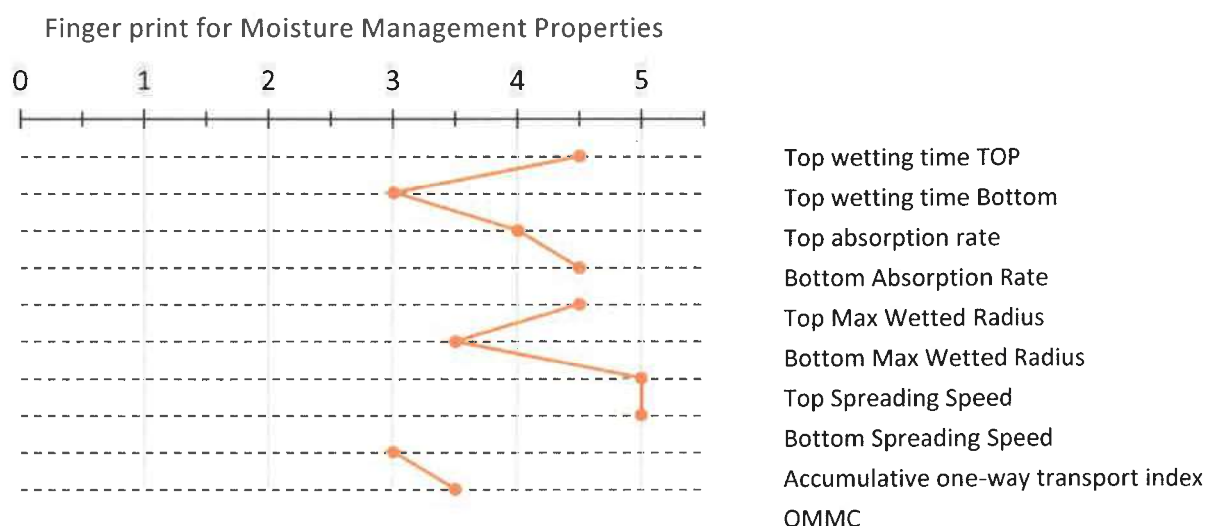
* Test result was taken from the Test Report No. AZL 24/0283 issued 15.03.2024 delivered by customer.

Overall Moisture Management Capability (OMMC)

was performed according to AATCC 195:2011

- conditioning: temperature (20 ± 2) °C, RH (65 ± 4) %
- number of specimens tested: 5
- dimension: 80 x 80 mm
- machine: MMT
- wetting time: 120 s

Results*	
One – way transport index (index)	3,0
Overall moisture management (index)	3,5
Max wetted radius (ratio top/bottom)	1,0



* Test results was taken from the Test Report No. AZL 24/0283 issued 15.03.2024 delivered by customer.





Textilní zkušební ústav, s.p.

Testing the resistance to pilling and matting of textile fabrics. Modified Martindale method and assessment of pilling, fuzzing and matting by visual analysis

was performed according to ČSN EN ISO 12945-2:2021 – modified Martindale method

- conditioning: temperature (20±2) °C; RH (65±4) %;
- specimens' treatment before testing: tested in original state
- loading mass and nominal pressure used: (155±1) g
- number of specimens tested / evaluators: 3 / 3
- abradant: wool

Results: Evaluation of surface change in grades according to ČSN EN ISO 12945-4:2021

Results:												
Pilling rubs	Pilling				Fuzzing				Matting			
	sp.1	sp.2	sp.3	average	sp.1	sp.2	sp.3	average	sp.1	sp.2	sp.3	average
125	5	5	5	5	5	5	5	5	-	-	-	-
500	5	5	5	5	5	5	5	5	-	-	-	-
1000	5	5	5	5	4-5	4-5	4-5	4-5	-	-	-	-
2000	5	5	5	5	4-5	4-5	4-5	4-5	-	-	-	-
5000	5	5	5	5	4-5	4-5	4-5	4-5	-	-	-	-
7000	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	-	-	-	-

Determination of the abrasion resistance of fabrics using a Martindale abrasion testing apparatus

was performed according to ČSN EN ISO 12947-2:2017

- conditioning: temperature (20±2) °C; RH (65±4) %
- mass and nominal pressure used: (595±7) g/ 9 kPa
- specimen treatment before testing: tested in original state
- specimens tested: 3
- foam backing: used
- specimen fabric type/end-point assessment: knitted fabric (without pile) / 1 thread broken

Result: The lowest individual result of all test specimens expressed by the number of rubs, prior to the end-point being reached.

Results	
Abrasion resistance	45 000
specimen 1	45 000
specimen 2	45 000
specimen 3	45 000





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Determination of colour fastness to rubbing

was tested according to ČSN EN ISO 105-X12:2017

- rubbing conditions: dry / wet (wetting of rubbing cloth: 100 %)
- rubbing finger: for textiles [diameter (16±0,1) mm; downward force (9±0,2) N]
- climatic conditions during testing: temperature (20±2) °C, RH (65±2) %
- time of air-conditioning of samples: 4 hours

Result: grade of grey scale (staining to cotton rubbing cloth according to ČSN EN ISO 105-A03:2020)

Results	
staining in warp / weft direction	
dry conditions	5 / 5
wet conditions	4-5 / 4-5

Determination of colour fastness to washing

was tested according to ČSN EN ISO 105-C06:2010

- test conditions: A1S (40 °C)
- steel balls number: 10
- washing detergent: ECE
- souring treatment: not used
- adjacent fabrics: cotton/polyester
- treatment before testing: 5x washing according to ČSN EN ISO 6330:2022 (4N, A)

Result: grade of grey scale (colour change according to ČSN EN 20105-A02:1995, staining according to ČSN EN ISO 105-A03:2020)

Results
colour change / staining
5 / 5 / 5

Determination of colour fastness to perspiration

was tested according to ČSN EN ISO 105-E04:2013

- adjacent fabrics: cotton/polyester
- the option used: samples tested horizontally

Result: grade of grey scale (colour change according to ČSN EN 20105-A02:1995, staining according to ČSN EN ISO 105-A03:2020)

Results	
colour change / staining	
alkaline solution	5 / 5 / 5
acid solution	5 / 5 / 5





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Determination of colour fastness to artificial light: Xenon arc fading lamp test

was tested according to ČSN EN ISO 105-B02:2015

- instrument: QSUN-Xe2, model B02, air cooled Xe lamp
- lighting procedure: method 2
- sample's rotation: not used
- exposure conditions: A1 - normal, adequate to mild zone (RH 40 %, BST (45±3) °C)
- approximate radiation energy: (300-400 nm): 20,1 MJ/m²

Result: grade of blue scale

Results
colour change 5

Determination of antibacterial activity by absorption, culture plate method

was determined according to ČSN EN ISO 20743:2022 – Absorption method.

Used bacteria (cultures delivered from Czech collection of Microorganisms):

CCM 8853	<i>Klebsiella pneumoniae</i>
CCM 4516	<i>Staphylococcus aureus</i>

Conditions of assessment:

- mass of samples: (0,40 ± 0,05) g
- number of samples for each used germ: 6 untreated references, 6 treated samples
- concentration of testing inoculum: *K. pneumoniae* 1,5 x 10⁵ CFU/ml, *S. aureus* 1,0 x 10⁵ CFU/ml
- inoculated volume on test specimens: 0,2 ml
- influence time: 24 h
- temperature in incubator: (37 ± 2) °C
- incubation time of Petri dishes: 24 – 48 h

Results: The antibacterial activity value is obtained according to the following formula and it says, by how many logarithmic orders the growth of the tested bacteria in the treated sample is lower comparing to the untreated reference

$$A = (\log Ct - \log C0) - (\log Tt - \log T0) = F - G$$

where

A is the antibacterial activity value**F** is the growth value on the control fabric ($F = \log Ct - \log C0$)**G** is the growth value on the antibacterial-treated sample ($G = \log Tt - \log T0$)**log Ct** is the average common logarithm for the number of bacteria obtained from three test samples of control fabric after an 18 h to 24 h incubation**log C0** is the average common logarithm for the number of bacteria obtained from three test samples of control fabric after immediately after inoculation**log Tt** is the average common logarithm for the number of bacteria obtained from three antibacterial-treated test samples after an 18 h to 24 h incubation



log T0 is the average common logarithm for the number of bacteria obtained from three antibacterial-treated test samples immediately after inoculation

Assessment of antibacterial efficiency (ČSN EN ISO 20743:2022, Annex F):

Significant: $2 \leq A < 3$

Heavy: $A \geq 3$

Results*				
Name of test bacteria (strain number)	<i>Staphylococcus aureus</i> (CCM 4516)		<i>Klebsiella pneumoniae</i> (CCM 8853)	
Concentration of inoculum (CFU/ml)	1,0 x 10 ⁵		1,5 x 10 ⁵	
Difference of extremes for three control fabrics (log)	0 h	24 h	0 h	24 h
	0,10	0,06	0,22	0,10
Growth value of F	2,97		4,11	
Growth value of G	-1,22		-2,60	
Antibacterial activity value A	4,19		6,71	
Quantitative method of measuring	method of counting colonies			
Sterilization method	dry heat sterilization (105 °C, 3 h)			
Incubation time	24 h			

* Test result was taken from the Test Report No. AZL 24/0283 issued 15.03.2024 delivered by customer.

Determination of free, hydrolysable and releasable formaldehyde (water extraction method) by spectrophotometry

was performed according to ČSN EN ISO 14184-1:2012 (ISO 14184:2011)

- sample delivery: by regular postal service, wrapped in plastic bag
- sample storage before testing: in original plastic bag, prior analysis stored in glass bottles
- specimen weight: ca 1g
- range of calibration graph: 4 - 600 mg.kg⁻¹

Result ¹⁾	
Content of Formaldehyde (mg.kg ⁻¹)	not detectable

¹⁾ Results below 16 mg.kg⁻¹ are reported as "not detectable".





Textilní zkušební ústav, s.p.

Determination of certain aromatic amines derived from azo colorants by GC/MS method

was performed according to ČSN EN ISO 14362-1:2017 and ČSN EN ISO 14362-3:2017. Determination was carried out using gas chromatography with mass spectrometry (GC-MS).

Arylamine	CAS Number	Value obtained ¹⁾ (mg.kg ⁻¹)	Limit REACH (mg.kg ⁻¹)
4-aminobiphenyl	92-67-1	< 0,5	< 30
benzidine	92-87-5	< 0,5	< 30
4-chlor-o-toluidine	95-69-2	< 0,5	< 30
2-naftylamine	91-59-8	< 0,5	< 30
o-aminoazotoluene	97-56-3	< 0,5	< 30
5-nitro-o-toluidine	99-55-8	< 0,5	< 30
4-chloraniline	106-47-8	< 0,5	< 30
4-methoxy-m-fenylendiamine	615-05-4	< 0,5	< 30
4,4'-methylendianiline	101-77-9	< 0,5	< 30
3,3'-dichlorbenzidine	91-94-1	< 0,5	< 30
3,3'-dimetoxibenzidine	119-90-4	< 0,5	< 30
3,3'-dimethylbenzidine	119-93-7	< 0,5	< 30
4,4'-methylen-di-o-toluidine	838-88-0	< 0,5	< 30
6-methoxy-m-toluidine	120-71-8	< 0,5	< 30
4,4'-methylen-bis(2-chloraniline)	101-14-4	< 0,5	< 30
4,4'-oxydianiline	101-80-4	< 0,5	< 30
4,4'-thiodianiline	139-65-1	< 0,5	< 30
o-toluidine	95-53-4	< 0,5	< 30
4-methyl-m-fenylenediamine	95-80-7	< 0,5	< 30
2,4,5-trimethylaniline	137-17-7	< 0,5	< 30
o-anisidine	90-04-0	< 0,5	< 30
4-aminoazobenzene ²⁾	60-09-3	< 0,5	< 30
aniline	62-53-3	< 0,5 ³⁾	

¹⁾ Symbol "<" means bellow LOD (limit of detection) of analytical method.

²⁾ Azo colorants, which are able to form 4-aminoazobenzene, generate aniline (CAS 62-53-3) and 1,4-phenylenediamine (CAS 1056-50-3) at conditions of ČSN EN ISO 14362-1:2017. If aniline is detected above 5 mg.kg⁻¹ then the presence of 4-aminoazobenzene should be additionally tested according to ČSN EN ISO 14362-3:2017 (unaccredited test method). The obtained value of 4-aminoazobenzene is valid for total content.

³⁾ The value obtained meets the limit valid for 4-aminoazobenzene.





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Content of nonylphenol, octylphenol, nonylphenol ethoxylates, octylphenol ethoxylates was determined according to DIN EN ISO 18254-1:2016 and DIN EN ISO 18254-2:2019. Determination was subcontracted in STFI, Test Report No. P20241123 issued 11.06.2024.
Result: Content in mg.kg^{-1} .

	Results (mg.kg^{-1})
Octylphenol ¹⁾	< 2,0
Nonylphenol ¹⁾	< 2,0
Octylphenolethoxylates	< 2,0
Nonylphenolethoxylates	2,2
DIN EN ISO 18254-1	
Octylphenol ¹⁾	< 2,0
Nonylphenol ¹⁾	< 2,0
Octylphenolethoxylates	< 2,0
Nonylphenolethoxylates	2,5
DIN EN ISO 18254-2	

¹⁾ DIN 18254 is not explicit for these substances, but these substances can be determined according to this standard.

Content of phthalates

was determined according to ČSN EN ISO 14389:2023. Determination was subcontracted in VÚTCH s.r.o., Test Report No. 63/2024 issued 06.06.2024.

Results: Content in wt (%).

Individual phthalate	Results (wt %)
DEHP	< 0,01
BBP	< 0,01
DBP	< 0,01
DMEP	< 0,01
DIBP	< 0,01
DIHP	< 0,01
DHNUP	< 0,01
DHP	< 0,01

Approved by:


 Anna Uhrová

Head of the chemical testing laboratory

End of report

