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Date: 29 June 2018

Our ref.: Za

From: Daniel Zahn

## Test Report

**Order No.:** 8321/2 Page 1 of 6

**Client :** CHTC JIAHUA NONWOVEN CO.,LTD  
No.99,WaGou New Village,  
Pengchang,Xiantao ,Hubei ,  
CHINA


**Date of order:** 5 May 2018

**Receipt of sample material:** 11 May 2018

**Origin of sample material:** From CHTC Jiahua Nonwoven Co.,Ltd, No.99,WaGou  
New Village, Pengchang,Xiantao ,Hubei ,China

**Purpose:** Analysis of a nonwoven sample according to EN868-2  
and ISO 11607-1

  
(Dr. Derra)

  
(Zahn)  
Manager  
Physical Material Testing

The present report refers exclusively to the samples as laid out therein, Information and statistical data on the results can be obtained on request.

## Sample Material

For analysis the following sample material was in hand:

Sample Material	Sample Designation
Nonwoven wrapping	Polypropylene SMS Blue Nonwoven 50 g/m <sup>2</sup>

## Carrying out of the Tests

Examination period: 12 May 2018 to 29 June 2018

The conditioning of the sample material and the examination of the physical characteristics took place in standard atmosphere according to ISO 187 at 23(+/-)°C and 50 (+/-2) % relative humidity.

The sterilization by steam(134°C), ethylene and H<sub>2</sub>O<sub>2</sub>-plasma(see section 2 and 3 of this test report) was performed in cooperation with a partner institute.

### 1. Determination of Physical and Chemical Properties

In order to show compliance to ISO 11607-1,section 5.1.6 c)“physical and chemical properties” as well as to the demands ISO 1107-1, section 5.1.7 b) to 5.1.7 f), the sample was examined according to EN868-2,section 4.2.1 “General requirements” and section 4.2.2.3 “specific requirements-Nonwoven”.

The test regulations are listed on page 3 of this test report

The number of individual values corresponds to the rules of the test regulations mentioned, regarding chemical analyses, a double determination was carried out.

### Result:

The results of the tested parameters to show compliance to ISO11607-1, section 5.1.6 c) “physical and chemical properties” Are listed on the following page (page 3 of this test report).

## Compliance to ISO 11607-1, section 5.1.6 c) "physical and chemical properties"

### Examination according to EN868-2

Order number: 8321/2

Client: CHTC Jiahua Nonwoven Co., Ltd

Sample designation: Polypropylene SMS

Sample arrival date: 10 May 2018

Nonwoven 50 g/m<sup>2</sup>

Testing period: 11 May to 29 June 2018

Parameter	Test Regulation EN868-2	Test result	
		Average value	Standard deviation
<b>General requirements</b>			
Visual test	ISO 11607, sect.5.1.7 b) & d)	No objections	
Colour	Sect. 4.2.1.1, ISO6588-2	blue	
Grammage* -difference to nominal value	Sect. 4.2.1.2, DIN EN ISO 536	49.3 g/m <sup>2</sup> -1.3%	1.82 g/m <sup>2</sup>
Ph-value*	Sect. 4.2.1.3, ISO 6588-2	6.8	0.03
Mass portion -chloride* -sulphate*	Sect. 4.2.1.4, ISO 9197 Sect. 4.2.1.5, ISO 9198	<0.002% NaCl <0.002% Na <sub>2</sub> SO <sub>4</sub>	--- ---
Fluorescent Substances* Brightening effect	Sect. 4.2.1.6, Annex B	No spots > 1mm/0.01m <sup>2</sup> <1%	
Drapability* -side A -side B	Sect. 4.2.1.7, ISO 9073-9, Method A, $\Phi=36$ cm	83% 82%	2.7% 2.6%
<b>Specific requirements-Nonwoven wrapping material</b>			
Tearing resistance* -machine direction -cross direction	Sect. 4.2.2.3.1, ISO 1974	5211 mN ----- <sup>2)</sup> mN	875 mN -----mN
Bursting strength(dry)*	Sect. 4.2.2.3.2, DIN ISO 3689	>150 kPa	
Bursting strength (wet)*	sect. 4.2.2.3.3	>145 kPa	
Elongation at break(dry)* -machine direction -cross direction	Sect. 4.2.2.3.4, DIN EN ISO 1924-2	112% 92%	8.7% 14%
Hydrostatic pressure test <sup>1)</sup> -side A -side B	Sect. 4.2.2.3.5, EN 20811	570 mm 529 mm	41.2 mm 101 mm
Tensile strength (dry)* -machine direction -cross direction	Sect. 4.2.2.3.6, DIN EN ISO 1924-2	2.07 kN/m 1.07 kN/m	0.06 kN/m 0.09 kN/m
Tensile strength (wet)* -machine direction -cross direction	Sect.4.2.2.3.7, DIN ISO 3781	2.08 kN/m 1.07 kN/m	0.16 kN/m 0.10 kN/m

1) This examination was performed in cooperation with a partner institute

2) Determination in cross direction not possible, All specimen only tear in machine direction.

## 2 . Determination of the Microbial Barrier

In order to show compliance to ISO 11607-1, section 5.1.6 a) “microbial barrier”, the sample was examined according to ISO 11607-1, section 5.2.3, test method DIN 58 953-6 each after sterilization by steam (134°C), ethylene oxide and H<sub>2</sub>O<sub>2</sub>-plasma.

### 2.1 Determination of Germ Proofness with Air Permeance\*

The determination was performed according to DIN 58 953-6, subclause 4. Each after sterilization by steam (134°C), ethylene oxide and H<sub>2</sub>O<sub>2</sub>-plasma the sample material was contaminated with the test germ on both sides.

#### Result:

Sterilization-Test side	Number of CFU/specimen										
	1	2	3	4	5	6	7	8	9	10	Σ
<b>Ethylene oxide-side A:</b>	1	0	0	0	0	0	0	0	0	0	1
<b>side B</b>	1	1	0	1	0	0	1	0	0	0	4
<b>H<sub>2</sub>O<sub>2</sub>-Plasma-side A:</b>	1	0	0	0	0	0	0	0	0	0	1
<b>side B</b>	1	0	2	0	1	0	0	0	0	0	4

CFU=colony forming unit

### 2.2 Determination of Germ Proofness under Humidity\*

The determination was performed according to DIN 58-983-6, subclause 3. Each after sterilization by steam (134°C), ethylene oxide and H<sub>2</sub>O<sub>2</sub>-plasma the sample material was contaminated with the test germ on both sides.

#### Result:

Sterilization-Test side	Number of CFU/agar plate					
	1	2	3	4	5	Σ
<b>Ethylene oxide-side A:</b>	0	0	0	0	0	0
<b>side B</b>	0	0	0	0	0	0
<b>H<sub>2</sub>O<sub>2</sub>-Plasma-side A:</b>	0	0	1	0	0	1
<b>side B</b>	0	0	0	0	0	0

CFU=Colony forming unit

According to DIN 58953-6, section 3.7.3,a re-examination had to be performed on side A of the material sterilized by H<sub>2</sub>O<sub>2</sub>-Plasma due to a total number of CFU between 1 and 5.

**Result of the re-examination:**

Sterilization- Test side	Number of CFU/ agar plate																				Σ
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
H <sub>2</sub> O <sub>2</sub> -Plasma- side A:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
side B	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

CFU=Colony forming unit

**Evaluation of the Microbial Barrier:**

The sample material submitted for analysis was examined for its germ proofness under humidity and with air permeance after sterilization by ethylene oxide and after sterilization by H<sub>2</sub>O<sub>2</sub>-Plasma and is evaluated as "sufficiently germ-proof" according to DIN 58 953-6, subclause 3.7 and subclause 4.7.6.

**3. Determination of Compatibility with the Sterilization Processes**

In order to show compliance to ISO 11607-1, section 5.1.6 e)"compatibility with respect to the intended sterilization processes", the sample was examined according to EN 868-2, section 4.2.2.3.4,4.2.2.3.6,4.2.2.3.7 and in analogy with DIN EN 646(without test simulants) each after sterilization by steam(134°C), ethylene oxide and H<sub>2</sub>O<sub>2</sub>-plasma.

**Compliance to ISO 11607-1, section 5.1.6 e)**  
**"compatibility with respect to the intended sterilization processes"**  
**Examination according to EN 868-2**

Order number:8321/2

Client: CHTC Jiahua Nonwoven Co., Ltd

Sample designation: Polypropylene SMS

Sample arrival date: 5 May 2018

Nonwoven 50 g/m<sup>2</sup>

Testing period: 6 May to 29 June 2018

Parameter	Test Regulation EN 868-2	Sterilization	Test result	
Visual test	ISO 11607-1 Sect. 5.1.7 b)&d)	Steam: Ethylene oxide: H <sub>2</sub> O <sub>2</sub> -Plasma	No objections No objection s No objections	
Colour fastness*	DIN EN 646 (without test simulants)	Steam: Ethylene oxide: H <sub>2</sub> O <sub>2</sub> -Plasma	5 <sup>1)</sup> 5 <sup>1)</sup> 5 <sup>1)</sup>	
			Average value	Standard dev.
Elongation at break(dry)* -machine direction	Sect. 4.2.2.3.4 DIN EN ISO 1924- 2	Steam: Ethylene oxide: H <sub>2</sub> O <sub>2</sub> -Plasma	43% 106% 105%	3.9% 7.9% 6.9%
-cross direction		Steam: Ethylene oxide: H <sub>2</sub> O <sub>2</sub> -Plasma	42% 89% 90%	4.6% 10% 12%

Tensile strength (dry)* -machine direction	Sect. 4.2.2.3.6 DIN EN ISO 1924- 2	Steam:	1.85 kN/m	0.10 kN/m
		Ethylene oxide:	2.00 kN/m	0.13 kN/m
-cross direction		H <sub>2</sub> O <sub>2</sub> -Plasma	2.03 kN/m	0.11 kN/m
		Steam:	0.93 kN/m	0.09 kN/m
		Ethylene oxide:	1.09 kN/m	0.09 kN/m
		H <sub>2</sub> O <sub>2</sub> -Plasma	1.08 kN/m	0.08 kN/m
Tensile strength (wet)* -machine direction	Sect. 4.2.2.3.7 DIN EN ISO 3781	Steam:	1.92 kN/m	0.12 kN/m
		Ethylene oxide:	2.16 kN/m	0.12 kN/m
-cross direction		H <sub>2</sub> O <sub>2</sub> -Plasma	2.07 kN/m	0.14 kN/m
		Steam:	0.93 kN/m	0.08 kN/m
		Ethylene oxide:	1.11 kN/m	0.06 kN/m
		H <sub>2</sub> O <sub>2</sub> -Plasma	1.07 kN/m	0.09 kN/m

1) Distinction is made between five evaluation grades, 1 means poor and 5 good fastness

The accreditation (Register no. D-PL-1416-01-10 and D-PI-1416-01-02) applies to the methods marked with\* in the test report. **End of report.**