BIOTECH TESTING SERVICES

TEST REPORT

LAB NO. : 2002688/1 - 2 **DATE: 17/08/2020**

NAME OF CUSTOMER	: M/S KRUSHA ENTERPRISES LLP
ADDRESS	: Ground Floor, Shreeram Mansion, Prarthna Samaj, Mumbai 400004
REFERENCE	: Letter Ref. No.: Nil dated August 04, 2020 K. Attention: Mr. Kruti Adnani
DATE OF RECEIPT	: 05/07/2020
DATE OF INITIATION	: 08/08/2020
DATE OF COMPLETION	: 14/08/2020
SAMPLE DESCRIPTION	: FABRIC SAMPLE LABELED AS: -

Sr. No.	Description	washes
1.	Virus Shield (W) knitted fabric for mask Tevero with 10% HeiQ Viroblock	Original
2.	Virus Shield (W) knitted fabric for mask Tevero with 10% HeiQ Viroblock	after 30 washes
Untreated lab control		

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Name of Test:

Determination of Antibacterial Activity of Textile products by ISO 20743:2013(E); Quantitative Method

Test Conditions:

Sterilization of Sample	: autoclaving
Neutralizer used	: Buffered Saline with Triton X 100 - 0.01 %
Contact Time	: 20 hours
Contact Temperature	: 37^0 C
Media and Reagent	: Soyabean-casein digest agar

ANTIBACTERIAL ACTIVITY

Results:

1. Virus Shield (W) knitted fabric for mask Tevero with 10% HeiQ Viroblock - Original

Test Bacteria	**Staphylococcus aureus**		**Klebsiella pneumoniae**	
Strain Number	ATCC 6538		ATCC 4352	
Concentration of inoculums (cfu/ ml)	1.90×10^5		2.10×10^5	
Difference of extremes for three control specimens **Untreated lab control** (log) (Condition< 1)	**0 hours**	**20 hours**	**0 hours**	**20 hours**
	0.009	0.051	0.025	0.065
Difference of extremes for three Antibacterial testing specimens (log) (Condition< 2)	**0 hours**	**20 hours**	**0 hours**	**20 hours**
	0.017	0.176	0.012	0.039
Growth value of F ($F= \log C_1 - \log C_0$)	+1.485: ($\log C_1$: +6.49, Log C_0:+5.01)		+1.516: ($\log C_1$: +6.52, Log C_0:+5.01)	
Growth value of G ($G= \log T_1 - \log T_0$)	-2.599: ($\log T_1$: +2.41, Log T_0:+5.01)		-1.727: ($\log T_1$: +3.29, Log T_0:+5.02)	
Antibacterial activity value ($A= F - G$)	**4.08** (99.99% bacterial reduction)		**3.24** (99.94% bacterial reduction)	
Measuring Method	Plate Count Method			
Type of Sample Material	Fabric Sample			
Sterilisation Method	Autoclave			
Incubation Time	20 hrs.			

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2. Virus Shield (W) knitted fabric for mask Tevero with 10% HeiQ Viroblock - after 30 washes

Test Bacteria	Staphylococcus aureus		Klebsiella pneumoniae	
Strain Number	ATCC 6538		ATCC 4352	
Concentration of inoculums (cfu/ ml)	1.90×10^5		2.10×10^5	
Difference of extremes for three control specimens **Untreated lab control** (log) (Condition< 1)	**0 hours**	**20 hours**	**0 hours**	**20 hours**
	0.009	0.051	0.025	0.065
Difference of extremes for three Antibacterial testing specimens (log) (Condition< 2)	**0 hours**	**20 hours**	**0 hours**	**20 hours**
	0.021	0.255	0.012	0.079
Growth value of F ($F = \log C_1 - \log C_0$)	+1.485: ($\log C_1$: +6.49, Log C_0:+5.01)		+1.516: ($\log C_1$: +6.52, Log C_0:+5.01)	
Growth value of G ($G = \log T_1 - \log T_0$)	-2.169: ($\log T_1$: +2.84, Log T_0:+5.01)		-1.653: ($\log T_1$: +3.38, Log T_0:+5.03)	
Antibacterial activity value ($A = F - G$)	**3.65** (99.97% bacterial reduction)		**3.16** (99.92% bacterial reduction)	
Measuring Method	Plate Count Method			
Type of Sample Material	Fabric Sample			
Sterilisation Method	Autoclave			
Incubation Time	20 hrs.			

Antibacterial Efficacy:

Antibacterial Value A	Antibacterial Efficacy
$2.0 \leq A < 3.0$	Significant
$A \geq 3.0$	Strong

COMMENT:

When tested as specified, Fabric labeled as **Virus Shield (W) knitted fabric for mask Tevero with 10% HeiQ Viroblock – Original** and **Virus Shield (W) knitted fabric for mask Tevero with 10% HeiQ Viroblock - after 30 washes** has shown **Strong Antibacterial Efficacy** by Quantitative Assessment of activity for Staphylococcus aureus and Klebsiella pneumoniae by ISO 20743: 2013(E) Test Method.

For BIOTECH TESTING SERVICES

BIOTECH TESTING SERVICES BTS MUMBAI

Dr Shilpa U. Nair
Quality Manager
(Authorized Signatory)

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APX laboratories
ACCURACY PRECISION & EXCELLENCE IN TESTING

TEST REPORT
NABL ACCREDITED LABORATORY

Ref. No: APX- P20100009 **Doc No. APX-QSF-050**

Issued To:
MS. KRUTI ADNANI
Ground Floor, Shreeram Mansion,
Prathana Samaj, Mumbai-4

Date of Project Start	13th Oct, 2020	Start Of Analysis	16th Oct, 2020
Report Issued Date	31st Oct, 2020	End Of Analysis	29th Oct, 2020

I. Objective: To study the antibacterial activity of the material supplied when tested using BS EN ISO 20743 against *Staphylococcus aureus* and *Klebsiella pneumonia.*

II. Name of Sample: TEVERO VIRUS SHIELD SW MASK CHARCOAL GREY(Quantity – 4 Pieces)

III. Site/ location: This study was conducted in APX Laboratories, Thane.

IV. Test Method: BS EN ISO 20743

V. Testing Details:

i. Test Method:

- The absorption method was used for the determination of antibacterial activity of textile products to BS EN ISO 20743 against *Staphylococcus aureus* ATCC 6538P and *Klebsiella pneumonia* ATCC 4352.
- The test sample (0.4 g) were inoculated with 0.2 ml of the relevant culture containing a known number of organisms (1×10^5 - 3×10^5 cfu/ml) in Tryptone Soya Broth(TSB) (1/20 Dilution). The product was tested in triplicate against each organism. The non-adhesive material was inoculated. Three test samples were sampled immediately and 3 samples were incubated for 24 h 37 ± 2° C. After incubation (or immediately) the samples were rinsed with 20 ml of neutralizer

Checked by
Ganesh Sonawane (Admin)

APX Laboratories THANE

Authorized Signatory
Sujata Bagad (TM- Microbiology)

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(DE broth) and stomached. The extracts were serially diluted and the bacteria enumerated using pour plate method with Tryprone Soya Agar (TSA). The plates were incubated at 37 ± 2° C for 40-48 hrs and any resultant colonies counted.

- The control used was a non-woven cloth of the same weight as the test sample. Each control was prepared by inoculating the control samples with broth culture and incubating as described above. The controls were tested in triplicate. 3 samples were extracted immediately after inoculation, as well as at 24 hrs. The extracts were treated as described above the resultant counted.

ii. Calculations:

The number of viable bacteria per sample (M) was determined using the formula

$M = Z \times R \times 20$

where,

Z = average plate count for duplicate plates

R = Dilution factor for plates counted

20= Volume of neutralizer

The mean for the triplicate samples was then calculated.

The antibacterial activity (A) was calculated compared to the control at time t using the formulae

$$A = (\text{Log } C_T - \text{Log } C_0) - (\text{Log } T_T - \text{Log } T_0)$$

where,

A = antibacterial activity value

Log T_T = common log of arithmetic average of the number of bacteria from the 3 treated specimens after incubation

Log T_0 = common log of arithmetic average of the number of bacteria from the 3 treated specimens immediately after incubation

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Ref. No: APX- P20100009 **Doc No. APX-QSF-050**

Log C_T = common log of arithmetic average of the number of bacteria from the 3 control specimens after incubation

Log C_0 = common log of arithmetic average of the number of bacteria from the 3 control specimens immediately after incubation

VI. Results:

Sample No.	*Staphylococcus aureus* ATCC 6538P			
	Control T=0	Treated Sample T=0 hrs	Control T=24 hrs	Treated Sample T=24 hrs
1 (cfu/ml)	5.6×10^4	4.9×10^4	6.5×10^7	9.7×10^2
2 (cfu/ml)	4.8×10^4	5.3×10^4	7.7×10^7	8.8×10^2
3 (cfu/ml)	5.2×10^4	6.0×10^4	7.1×10^7	9.0×10^2
Mean (cfu/ml)	5.2×10^4	5.4×10^4	7.1×10^7	9.2×10^2
Antibacterial Activity	-	-	-	4.90

Note: Initial inoculum was 0.2 ml of 1.8×10^5 cfu/ml

Sample No.	*Klebsiella pneumonia* ATCC 4352			
	Control T=0	Treated Sample T=0hrs	Control T=24 hrs	Treated Sample T=24 hrs
1 (cfu/ml)	7.9×10^4	8.1×10^4	5.0×10^8	1.5×10^3
2 (cfu/ml)	6.6×10^4	7.2×10^4	4.1×10^8	2.0×10^3
3 (cfu/ml)	7.0×10^4	7.5×10^4	4.8×10^8	2.2×10^3
Mean (cfu/ml)	7.2×10^4	7.6×10^4	4.6×10^8	1.9×10^3
Antibacterial Activity	-	-	-	5.40

Note: Initial inoculum was 0.2 ml of 2.3×10^5 cfu/ml

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VII. Inference :

From the results the antibacterial activity against *Staphylococcus aureus* was 4.9 and against *Klebsiella pneumonia* was 5.40. BS EN ISO 20743 states that the efficacy of the antibacterial property can be considered as strong when a material has an antibacterial value ≥ 3.

Note:

- Test results are applicable to the sample/s tested as per Job ID only.
- Test Certificate shall not be reproduced without written permission of the Technical Manager - APX Laboratories.
- APX Laboratories is not responsible for the authenticity of photocopied or scanned reports.

Supplementary Information

Supporting documents for the measurements taken and results derived like graphs, tables, sketches, photographs as appropriate test report, if any [To be attached]	NONE

---- End of Report ---

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TEST REPORT
NABL ACCREDITED LABORATORY

Ref. No: APX- P20100010 **Doc No. APX-QSF-050**

Issued To:
MS. KRUTI ADNANI
Ground Floor, Shreeram Mansion,
Prathana Samaj, Mumbai-4

Date of Project Start	15th Oct, 2020	Start Of Analysis	16th Oct, 2020
Report Issued Date	31st Oct, 2020	End Of Analysis	29th Oct, 2020

I. Objective: To study the antibacterial activity of the material supplied when tested using BS EN ISO 20743 against *Staphylococcus aureus* and *Klebsiella pneumonia.*

II. Name of Sample: TEVERO VIRUS SHIELD SW MASK NAVY BLUE (Quantity – 4 Pieces)

III. Site/ location: This study was conducted in APX Laboratories, Thane.

IV. Test Method: BS EN ISO 20743

V. Testing Details:

i. Test Method:

- The absorption method was used for the determination of antibacterial activity of textile products to BS EN ISO 20743 against *Staphylococcus aureus* ATCC 6538P and *Klebsiella pneumonia* ATCC 4352.
- The test sample (0.4 g) were inoculated with 0.2 ml of the relevant culture containing a known number of organisms (1×10^5 - 3×10^5 cfu/ml) in Tryptone Soya Broth(TSB) (1/20 Dilution). The product was tested in triplicate against each organism. The non-adhesive material was inoculated. Three test samples were sampled immediately and 3 samples were incubated for 24 h 37 ± 2° C. After incubation (or immediately) the samples were rinsed with 20 ml of neutralizer

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(DE broth) and stomached. The extracts were serially diluted and the bacteria enumerated using pour plate method with Tryprone Soya Agar (TSA). The plates were incubated at 37 ± 2° C for 40-48 hrs and any resultant colonies counted.

- The control used was a non-woven cloth of the same weight as the test sample. Each control was prepared by inoculating the control samples with broth culture and incubating as described above. The controls were tested in triplicate. 3 samples were extracted immediately after inoculation, as well as at 24 hrs. The extracts were treated as described above the resultant counted.

ii. Calculations:

The number of viable bacteria per sample (M) was determined using the formula

$M = Z \times R \times 20$

where,

Z = average plate count for duplicate plates

R = Dilution factor for plates counted

20= Volume of neutralizer

The mean for the triplicate samples was then calculated.

The antibacterial activity (A) was calculated compared to the control at time t using the formulae

$$A = (\text{Log } C_T - \text{Log } C_0) - (\text{Log } T_T - \text{Log } T_0)$$

where,

A = antibacterial activity value

Log T_T = common log of arithmetic average of the number of bacteria from the 3 treated specimens after incubation

Log T_0 = common log of arithmetic average of the number of bacteria from the 3 treated specimens immediately after incubation

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Log C_T = common log of arithmetic average of the number of bacteria from the 3 control specimens after incubation

Log C_0 = common log of arithmetic average of the number of bacteria from the 3 control specimens immediately after incubation

VI. Results:

Sample No.	*Staphylococcus aureus* ATCC 6538P			
	Control T=0	Treated Sample T=0 hrs	Control T=24 hrs	Treated Sample T=24 hrs
1 (cfu/ml)	5.6×10^4	5.9×10^4	6.5×10^7	7.6×10^2
2 (cfu/ml)	4.8×10^4	5.0×10^4	7.7×10^7	7.1×10^2
3 (cfu/ml)	5.2×10^4	6.6×10^4	7.1×10^7	8.3×10^2
Mean (cfu/ml)	5.2×10^4	5.8×10^4	7.1×10^7	7.7×10^2
Antibacterial Activity	-	-	-	5.01

Note: Initial inoculum was 0.2 ml of 1.8×10^5 cfu/ml

Sample No.	*Klebsiella pneumonia* ATCC 4352			
	Control T=0	Treated Sample T=0hrs	Control T=24 hrs	Treated Sample T=24 hrs
1 (cfu/ml)	7.9×10^4	7.3×10^4	5.0×10^8	9.2×10^3
2 (cfu/ml)	6.6×10^4	7.6×10^4	4.1×10^8	8.9×10^3
3 (cfu/ml)	7.0×10^4	6.9×10^4	4.8×10^8	9.5×10^3
Mean (cfu/ml)	7.2×10^4	7.3×10^4	4.6×10^8	9.2×10^3
Antibacterial Activity	-	-	-	4.70

Note: Initial inoculum was 0.2 ml of 2.3×10^5 cfu/ml

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VII. Inference :

From the results the antibacterial activity against *Staphylococcus aureus* was 5.01 and against *Klebsiella pneumonia* was 4.7. BS EN ISO 20743 states that the efficacy of the antibacterial property can be considered as strong when a material has an antibacterial value ≥ 3.

Note:

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- Test Certificate shall not be reproduced without written permission of the Technical Manager - APX Laboratories.
- APX Laboratories is not responsible for the authenticity of photocopied or scanned reports.

Supplementary Information

Supporting documents for the measurements taken and results derived like graphs, tables, sketches, photographs as appropriate test report, if any [To be attached]	NONE

---- End of Report ---

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