20 May 2020

A National Policy Workshop Webinar Series on

“Countermeasures for Riverine and Marine Plastic Litter in India”

A Review on PPEs for COVID19

-Materials and Composition

-Standardization and Testing

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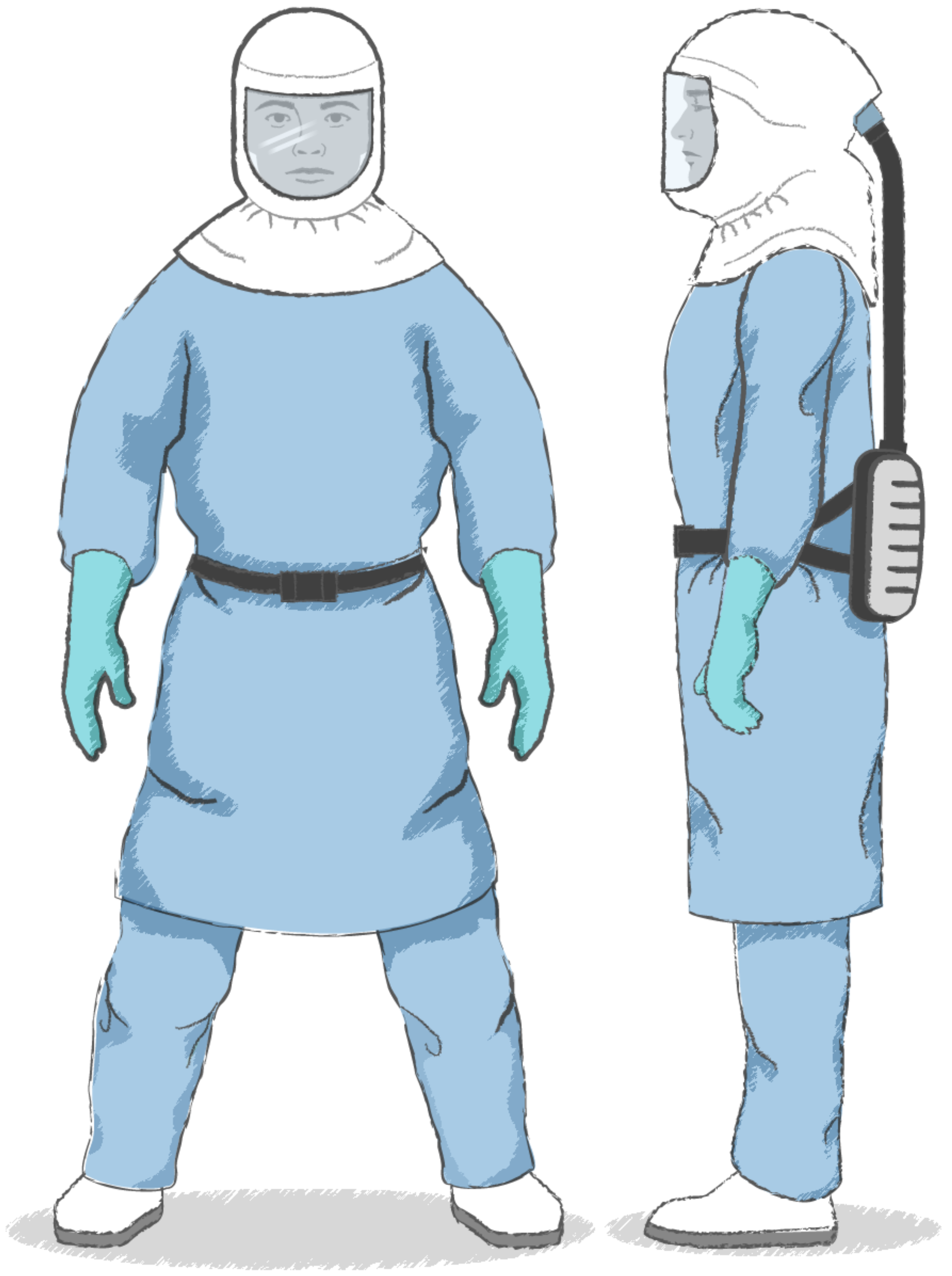

PPEs (Personal Protective Equipment's)

protective gears designed to safeguard the health of workers

Courtesy: Google Images

Coverall (Gown)
Hair Cover
Mask
Gloves
Shoe Cover
Protective Goggles
Face Shield

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Coverall

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Coverall's – Raw Materials and Technology

	Type	Technology	Raw Material	Laminated Material
Coverall (Gown)	Nonwoven	Spun-bond / Melt-Blown	Polypropylene	TPU/Teflon/PE
	Knitted	Weft Knitting	PET/Nylon	TPU/Teflon/PE
	Woven	Weaving (Plain)	PET/Nylon	TPU/Teflon/PE

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Coverall – Testing and Standard

World Health Organization

		BRAND
		MODEL TYPE
	Test Title	**WHO Rapid Advice Guideline for PPE**
Biohazard performance	Resistance to blood penetration*	**Option 1: minimum ISO 16603 Class 3**
	Resistance to blood penetration with virus*	**Option 1: minimum ISO 16604 Class 2**
Other performance criteria		
physical performance	Tensile strength*	ISO 13934-1 (MD/CD)
	Tear Resistance*	EN ISO 9073-4
	Puncture resistance*	EN 863
	Abrasion resistance*	EN 530 Method 2
	Basis weight	
Whole suit perform	Seam strength*	EN ISO 13935-2
	Whole suit performance*	EN 14126

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Coverall – Testing and Standard

Tensile strength (dry and wet) (N)	**Nonwoven: IS 15891 (Part 3), Woven: IS 1969 (Part 1)**
Bursting strength (dry and wet) (kPa)	IS 1966 (Part 1)
Seam strength (dry and wet) (N)	Nonwoven: IS 15891 (Part18)*, Woven: IS/ISO 13935 (Part 1)
Blood resistance (see note 1), Class 5, (for pressure upto 14 kPa	IS 16546/ISO 16603
Viral resistance (see note 1) Class 5, (for pressure upto 14 kPa)	IS 16545/ISO 16604
Cleanliness–microbial (CFU/100 cm^2) (for non-sterile coverall)	ISO 11737-1
Cytotoxicity	IS/ISO 10993- 5
Irritation and skin sensitization	IS/ISO 10993- 10

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Coverall's List by WHO

World Health Organization

	BRAND		3M		DuPont	Honeywell
	MODEL TYPE		4545	4565	Classic Xpert (EU)	Mutex 2
	Test Title	WHO Rapid Advice Guideline for PPE				
Biohazard performance	Resistance to blood penetration*	Option 1: minimum ISO 16603 Class 3	3	6	3	conform/no class
Biohazard performance	Resistance to blood penetration with virus*	Option 1: minimum ISO 16604 Class 2	0	0	no class	6
	Other performance criteria					
physical performance	Tensile strength*	ISO 13934-1 (MD/CD)	1	1	2	2
physical performance	Tear Resistance*	EN ISO 9073-4	1	1	1	2/3
physical performance	Puncture resistance*	EN 863	1	1	2	2
physical performance	Abrasion resistance*	EN 530 Method 2	1	1	2	6
physical performance	Basis weight		49 gsm	49 gsm	41 gsm	69 gsm
Whole suit perform	Seam strength*	EN ISO 13935-2	2	2	3	3
Whole suit perform	Whole suit performance*	EN 14126	Type 5/6 (4545 model)	Type 4 (4565 model)	Type 5B/6B (Classic Xpert mdl)	5/6

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Testing for Coverall (@SITRA)

Synthetic blood penetration resistance test: ASTM F 1670	Rs. 3700/sample+18 % GST
Viral penetration resistance test (ASTM F 1671)	Rs. 10000/sample+18 % GST

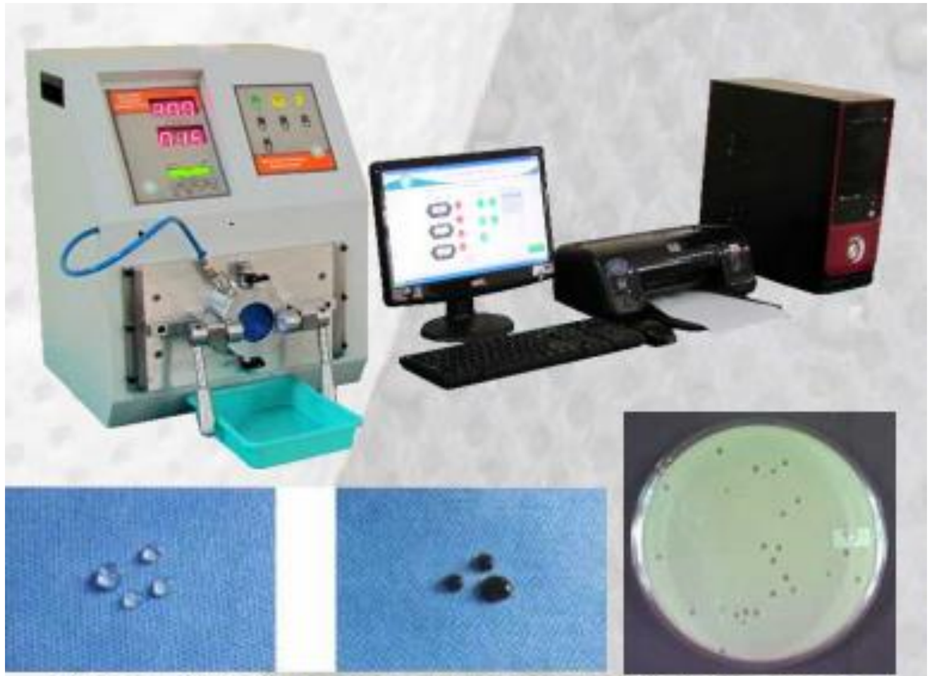

Figure 2. Synthetic blood penetration resistance testing instrument

Courtesy: SITRA

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Mask

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Mask – Raw Materials and Technology

	Type	Technology	Raw Material	Filter Material
Mask	Medical (i.e. N95)	Nonwoven	Polypropylene	Melt blown
	Surgical	Nonwoven	Polypropylene	Melt blown
	Textile Based Protective Mask	Knitting / Woven	Cotton/PET/Nylon	Melt blown
	Normal Textile based	Knitting / Woven	Cotton/PET/Nylon	No Filter layer

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Mask - FFP1/FFP2/FFP3 (European Standard)

European Standard

EN 149 + A1:2009

FFP1 FFP2 FFP3

Polypropylene Microfibers

Type	Filtration Protection (0.3 Micron)
FFP1	80%
FFP2	94%
FFP3	99%

✓ WHO recommends that FFP2/3 for 4-6 h usage

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Mask – N95 (US based Standard)

N95 / R95/ P95

certified under 42 CFR 84 of National Institute for Occupational Safety and Health and the United States CDC

Type	Filtration Protection (0.3 Micron)
N95	95%
N99	99%
N100	100%

high penetrating aerosols (0.3 µm diameter)

N – Not Resistance to Oil
R - Resistant to oil
P - strongly resistant (oil Proof)

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NIOSH Certification for N95

National Institute for Occupational Safety and Health

NIOSH

- ✓Fit Test
- ✓Filtration Test
- ✓Others

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Testing for Mask (@SITRA)

Breathability - Differential Pressure (Delta P) - IS 16289	550
Splash Resistance - ASTM F1862	3000
Particulate Filtration Efficiency at 0.3 Microns (ASTM F2299)	7500
Bacterial Filtration Efficiency at 3 Micron (ASTM F 2101) using S. aureus	2900
Flammability - 16 CFR.	1500

Fit Test
at DRDO lab at Gwalior

Courtesy: SITRA

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KAWACH™ Mask by IIT Delhi

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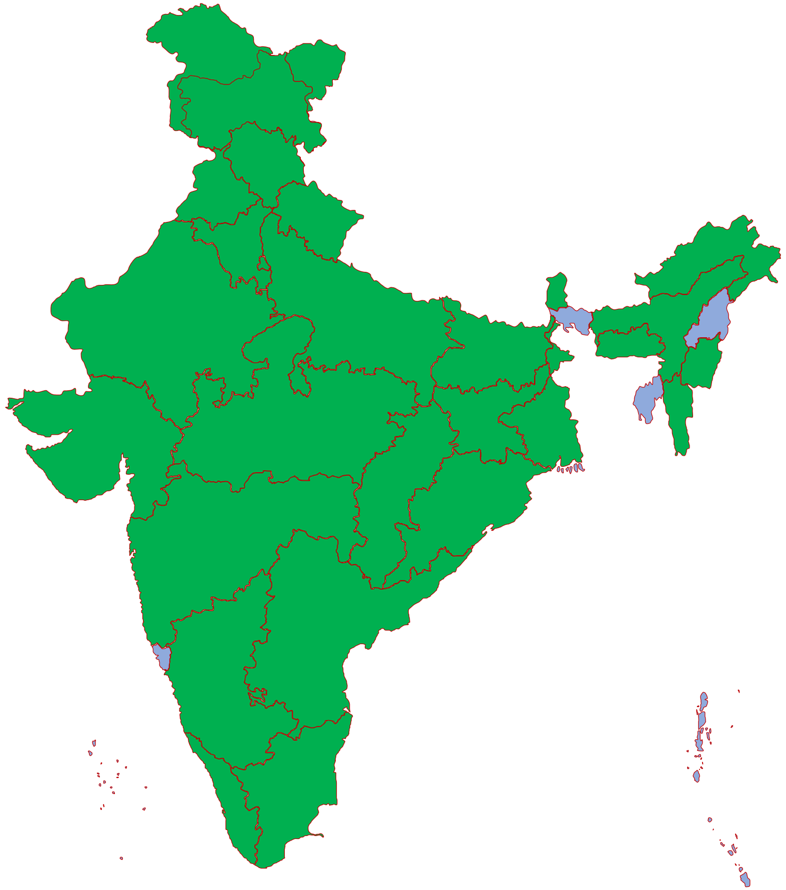
A product of IIT Delhi startup ETEX

	KAWACH^{TM}	N95	Surgical
Filtration (3 μm)	98%	>95%	>90%
Filtration (0.3 μm)	90%	95%	>80%
Price (INR)	45	100-700	5-20
Fit	Secure	Secure	Loose
ΔP , Pa/cm^2	<30	>60	>60
Splash (160 mmHg)	Pass	Pass	Pass
Biodegradability	Yes	No	No
Weight (g)	13-15	<30	<15

E-TEX
Thriving Lifestyle

MAKE IN INDIA

kawach



Current Scale

800000
KAWACH units dispatched in last 10 days

30 Lakh
KAWACH units to be dispatched in next 10 days

2-3 lakh
Current per day production capacity of KAWACH mask

Let's Fight COVID 19 together

Save our Country

Courtesy: BCCL2020

Thank You

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