

NYLSTAR
HYDROGEN TECHNOLOGIES



MASCARILLAS REUTILIZABLES 100% RECICLABLES

ACABEMOS CON LOS RESIDUOS DE MASCARILLAS

Necesitamos una mascarilla de calidad para nosotros y nuestro planeta. Los residuos de las mascarillas desechables serán peores que el COVID-19.

Mantén tus pulmones, tu piel y el planeta libres de mascarillas desechables.

Esta mascarilla es para siempre.

PCIAW 2021 LONDON AWARD WINNER MEJOR MASCARILLA RECICLABLE



Los residuos de mascarillas azules son un problema para el medio ambiente y la salud. Están fabricadas con microfibras de plástico que se liberan al respirar, y la mayoría acaban en vertederos y en nuestros océanos.

#STOPFACEMASKWASTE



1

**MASCARILLA
NYLSTAR**

VS

300

**MASCARILLAS
DESECHABLES**



RECICLAJE Y CIRCULARIDAD

Las extraordinarias propiedades de las mascarillas NYLSTAR permiten que sean infinitamente reciclables sin generar residuos, permitiéndonos crear un modelo totalmente sostenible de economía circular.

Únase a nuestro compromiso por un futuro mejor, solicitando nuestros servicios de reciclaje. Proporcionamos soluciones para la recogida de mascarillas NYLSTAR usadas, adaptándonos a las necesidades del cliente y nos encargamos de convertirlas infinitamente en nuevas prendas.

Una vez finalizado su ciclo de vida útil (tres meses o 50 lavados), las mascarillas se pueden devolver a nuestras instalaciones, donde las reciclaremos y las volveremos a convertir en nuevo hilo.

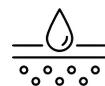
Las mascarillas se pueden reciclar en nuestros puntos de reciclaje, o bien podemos suministrar uno en la localización deseada. Colaborando con el proceso de reciclaje de mascarillas NYLSTAR, puede disfrutar de un 10% de descuento en su próximo pedido.



Descubre más



PROPIEDADES Y CARACTERÍSTICAS



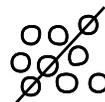
+27% DE HIDRATACIÓN EN 7 DÍAS



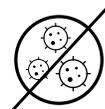
REAFIRMANTE CON TECNOLOGÍA HYALURONAN



100% RECICLABLES



CERO MICROPLÁSTICOS EN EL AIRE Y EN EL AGUA



PROTECCIÓN ANTIVIRAL PERMANENTE



TACTO EXQUISITO



COMPLETAMENTE INODORAS E HIPOLERGÉNICAS



CERTIFICADA POR LEITAT, AQUIMISA, US EPA Y OEKO-TEX



MASCARILLAS CONVENCIONALES

- ✗ Sin protección contra virus y bacterias
- ✗ Liberan pelusas a tus pulmones
- ✗ Tejido y confección incómodo
- ✗ No reutilizables ni lavables
- ✗ Mala respirabilidad y filtración
- ✗ No reciclables



MASCARILLAS NYLSTAR

- ✓ Protección permanente contra virus, bacterias y hongos
- ✓ No liberan microplásticos ni pelusas a tus pulmones
- ✓ Confort, tacto exquisito e hipoalergénico
- ✓ Reutilizables hasta 50 lavados
- ✓ Excelente filtración (hasta un 99%)
- ✓ 100% reciclables

MASCARILLA SKINLIFE HIDRATANTE

Mascarilla reutilizable con tecnología antiviral permanente Meryl® Skinlife Force.

Con un tacto exquisito, cómoda e hipolergénica que hidrata y cuida tu piel.

La sencillez de su diseño y respirabilidad la convierte en una mascarilla perfecta para actividades cotidianas, así como para actividades de alto rendimiento.



COMPOSICIÓN: Dos capas de tejido Meryl® Skinlife Force

PESO TEJIDO: 160gr/m²

FILTRACIÓN BACTERIANA: 93,07% (antes lavados), 92,58% (después lavados)

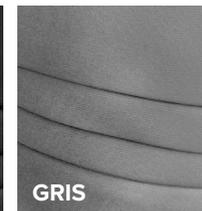
RESPIRABILIDAD: 58 Pa/Cm² (antes lavados), 58 Pa/Cm² (después lavados)

Nº MÁXIMO DE LAVADOS: 50

COLORES DISPONIBLES:



NEGRO



GRIS



BLANCO



MASCARILLA SKINLIFE FORCE HYALURONAN

Fabricadas con el hilo Meryl® Hyaluronan, estas mascarillas contienen ácido hialurónico unido con partículas de oro para potenciar la producción natural de ácido hialurónico en nuestra piel y contribuir a su regeneración, manteniéndola firme e hidratada. Junto con la tecnología Meryl® Skinlife Force, ofrece la máxima protección antiviral y antimicrobiana.

COMPOSICIÓN: Dos capas de tejido Meryl® Skinlife Force

PESO TEJIDO: 160gr/m²

FILTRACIÓN BACTERIANA: 93,07% (antes lavados), 92,58% (después lavados)

RESPIRABILIDAD: 58 Pa/Cm² (antes lavados), 58 Pa/Cm² (después lavados)

Nº MÁXIMO DE LAVADOS: 50

MASCARILLA QUIRÚRGICA HIDRATANTE

Mascarilla con filtración y protección quirúrgica gracias a la tecnología de los hilos Meryl® Skinlife Force y el filtro quirúrgico reutilizable y lavable. Ajuste y protección ideal para espacios con altos requisitos higiénicos mientras hidrata tu piel. Incluye una bolsa protectora reutilizable para depositar tu mascarilla en un ambiente libre de bacterias y gérmenes.

COMPOSICIÓN: Dos capas de tejido Meryl® Skinlife Force + filtro quirúrgico reutilizable

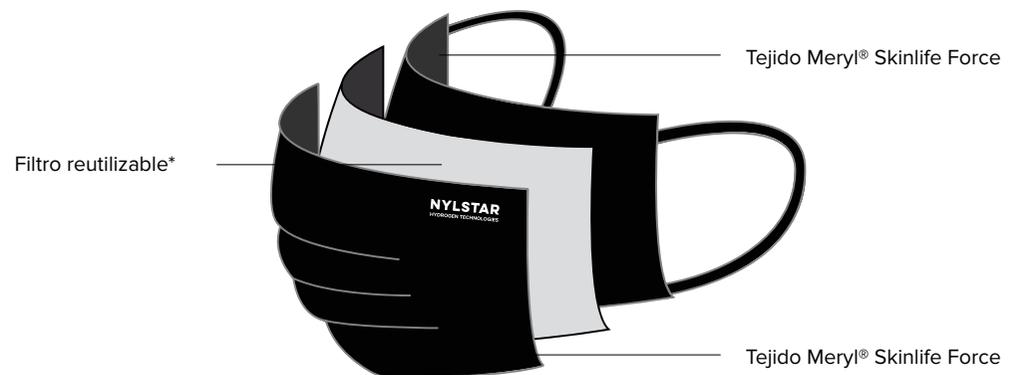
PESO TEJIDO: 150gr/m²

FILTRACIÓN BACTERIANA: 99% (antes lavados), 99% después lavados)

RESPIRABILIDAD: 56 Pa/Cm² (antes lavados), 47 Pa/Cm² (después lavados)

Nº MÁXIMO DE LAVADOS: 30

SUJECIONES Y FLEXO NASAL AJUSTABLES



Filtro reutilizable ensayado según la normativa ISO 18184 como antiviral resistente y la ISO 20743 como antibacteriano resistente contra virus con envoltura.



Bolsa reutilizable incluida

MASCARILLA QUIRÚRGICA HYALURONAN

Fabricadas con el hilo Meryl® Hyaluronan, estas mascarillas contienen ácido hialurónico unido con partículas de oro para potenciar la producción natural de ácido hialurónico en nuestra piel, y contribuir a su regeneración manteniéndola firme e hidratada. Con la tecnología Skinlife Force en el tejido, más un filtro quirúrgico reutilizable y lavable en su interior, inhiben permanentemente la proliferación de virus, bacterias, microbios y son 100% reciclables.

Son extremadamente suaves al tacto e hipoalergénicas. Certificados según Oeko-Tex® 100, Aquimisa, Leitat Technological Center, y homologados según la normativa UNE 0065/2020.

COMPOSICIÓN: Dos capas de tejido Meryl® Skinlife Force + filtro quirúrgico reutilizable

PESO TEJIDO: 150gr/m²

FILTRACIÓN BACTERIANA: 99% (antes lavados), 99% después lavados)

RESPIRABILIDAD: 56 Pa/Cm² (antes lavados), 47 Pa/Cm² (antes lavados)

Nº MÁXIMO DE LAVADOS: 30

SUJECIONES Y FLEXO NASAL AJUSTABLES

Filtro reutilizable ensayado según la normativa ISO 18184 como antiviral resistente y la ISO 20743 como antibacteriano resistente contra virus con envoltura.



Bolsa reutilizable incluida



CERTIFICADOS



MASCARILLA SKINLIFE FORCE

NYLSTAR, S.L.
AVDA. DE L'ESTACIÓ, 53
17300 - BLANES
GIRONA (ESPAÑA)

TECHNICAL REPORT

Report Nr: **IN-00643/2020-2**
Total pages: 7

SAMPLE PRESENTED

Description of the sample:

According to the information provided by applicant:

Description of the product:
Reference: **28H_46330_SLF_KIT (2 LAYERS)**

Date arrival: 25/04/2020

REQUESTED DETERMINATIONS

➤ Test(s) according UNE-EN 14683:2019+AC (EN 14683:2019+AC)

5.2.2 METHOD FOR IN VITRO DETERMINATION OF BACTERIAL FILTRATION EFFICIENCY (BFE).
(Anexo B)

5.2.3 METHOD FOR THE DETERMINATION OF BREATHABILITY (DIFFERENTIAL PRESSURE).
(Anexo C)

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Terrassa, 26th April, 2020

METHOD FOR IN VITRO DETERMINATION OF BACTERIAL FILTRATION EFFICIENCY (BFE).

According to: UNE-EN 14683:2019+AC (EN 14683:2019+AC), paragraph 5.2.2 and annex B

Scope: The purpose of this test is to verify the bacterial filtration efficiency (BFE) of the masks, by determining the number of colonies forming units that pass through the material, expressed as a percentage of the number of colonies forming units present in the inoculation spray.

Testing equipment: Six Stage Cascade Impactor
Nebulizer
Spray chamber
Flowmeters
Manometer
Peristaltic pump
Vacuum pump
Erlenmeyer flasks (250 ml, 500 ml)

Pre-conditioning of the samples: ≥ 4 hours / 21°C ± 5°C / 85% RH. ± 5% RH.

Test conditions

Identification of the material tested: According to the information provided by applicant

• Reference **28H_46330_SLF_KIT (2 LAYERS)**

Test conditions: 23°C ± 2°C / 50% HR. ± 5% HR.

Number of samples: 5

Test sample dimensions: 100 cm² (10 cm x 10 cm)

Area under test: 50 cm²

Face in direct contact with the inoculating spray: Indistinct

Flow during the test: 28,3 ml/min.

Test microorganism: Staphylococcus aureus ATCC 6538

Bacterial suspension (inoculum): 1,5 x 10⁵ cfu/ml

Incubation conditions: 24 hours at 36°C ± 1°C

Date of performance: 22 - 23 April, 2020

Results:

CONTROL VALUES							
Control	Level 1 (cfu/pl)	Level 2 (cfu/pl)	Level 3 (cfu/pl)	Level 4 (cfu/pl)	Level 5 (cfu/pl)	Level 6 (cfu/pl)	Total count (cfu)
Positive	564	620	688	756	908	462	3998
Negative	0	0	0	0	0	0	0

MASCARILLA SKINLIFE FORCE

VALUES OF TEST SAMPLE							
Sample	Level 1 (cfu/pl)	Level 2 (cfu/pl)	Level 3 (cfu/pl)	Level 4 (cfu/pl)	Level 5 (cfu/pl)	Level 6 (cfu/pl)	Total count (cfu)
#1	1	0	0	13	189	74	277
#2	5	0	26	52	153	92	328
#3	10	17	34	38	171	79	349
#4	7	13	22	17	134	82	275
#5	9	9	16	27	146	47	254

CALCULATION OF BACTERIAL FILTRATION EFFICACY (BFE)	
According to equation: $B = (C - T) / C \times 100$	
Where,	
C: Mean total plate count for the two positive controls	
T: Total count for the sample tested	
Test #1	93,07%
Test #2	91,80%
Test #3	91,27%
Test #4	93,12%
Test #5	93,65%
Middle value	92,58%

Conclusions:

Requirement (UNE 0065:2020)	Result	Test OK	Test NOK	NA/ NR
BFE ≥ 90%	92,58%			

METHOD FOR THE DETERMINATION OF BREATHABILITY (DIFFERENTIAL PRESSURE).

According to: UNE-EN 14683:2019+AC (EN 14683:2019+AC), paragraph 5.2.3 and annex C

Scope: The purpose of this test is to determine the differential pressure of a mask or a material intended for a mask, understanding air permeability as such, measured by determining the pressure difference through the material under specified conditions of flow, temperature and humidity of the air. Differential pressure is an indicator of the "breathability" of the mask.

Testing equipment: Permeability air, TEXTEST FX 3300-III, nº EQ189

Pre-conditioning of the samples ≥ 4 hours / 21°C ± 5°C / 85% RH, ± 5% RH.

Test conditions:

Identification of the material tested: According to the information provided by applicant

• Reference: 28H_46330_SLF_KIT (2 LAYERS)

Test conditions: 20°C ± 2°C / 85% RH, ± 4% RH.

Number of samples: 1 (minimum 5 measurements)

Test surface: 4,9 cm²

Flow during test: 8 l/min.

Face tested in contact with the head: Indistinct

Date of performance: 22nd April 2020

Results:

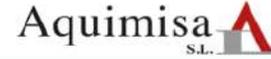
	#1	#2	#3	#4	#5
Differential pressure (Pa)	284	289	279	289	284
Differential pressure (Pa/cm ²)	58	59	57	59	58
Mean value (Pa/cm ²)	58				
Uncertainty ⁽¹⁾	± 3%				

⁽¹⁾ This value corresponds to the relative method uncertainty (%) obtained by multiplying the standard method uncertainty by the coverage factor $k = 2$, which, for a normal distribution, corresponds to a coverage probability of approximately 95%.

Conclusions:

Requirement (UNE 0065:2020)	Results	Test OK	Test NOK	NA/ NR
Breathability ≤ 60 Pa/cm ²	58 Pa/cm ² ± 3%			

MASCARILLA QUIRÚRGICA SUPERIOR



AQUIMISA S.L. • C/ Hoces del Duratón, 30-34, P. I. El Montolvo II • 37008 SALAMANCA • Teléf. 923 19 33 43 - fax 923 19 16 93 • aquimisa@aquimisa.com

INFORME DE ENSAYO



Nº DE MUESTRA: 21.087069
 Nº de Boleín: 03757599 // 937188 Recibida el: 05/03/2021
 Inicio del Ensayo: 06/03/2021 Final de Ensayo: 17/03/2021

THE MERYL COMPANY, S.L.

NYLSTAR, S.L.
 Avenida de la estación, 53
 17300 BLANES
 GIRONA

DATOS DE LA MUESTRA APORTADOS POR EL SOLICITANTE

Artículo: Mascarilla higiénica (reutilizable) - 3 capas (Tejido exterior S28+Filtro Heiq+Tejido interior S28)
 Referencia (*): S28 Composición: Poliamida 66 con Viroblock Ferment. Filtro Heiq Polyester con Viroblock

DESCRIPCIÓN DEL LABORATORIO: Producto sanitario

Ensayos	Resultado(#)	Unidades	Método
Fotomascarillas	Realizada		
BFE (exhalador) NS Sin lavados	>99	%	PEM1002
Respirabilidad (Presión dif.) Sin lavados	56	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 1	60	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 2	53	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 3	56	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 4	52	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 5	58	Pa/m2	PE-Q861
Lavado (x30 ciclo)	Realizado		
Respirabilidad (Presión dif.) Tras lavados	47	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 1	46	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 2	48	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 2	43	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 4	51	Pa/m2	PE-Q861
Presión diferencial- Exhala - Submuestra 5	48	Pa/m2	PE-Q861
BFE (exhalador) NS Con lavados.	99	%	PEM1002

SALAMANCA a 19 de Marzo de 2021

Documento Firmado Electrónicamente por:
 AQUIMISA S.L. C.I.: B37289823
 Nombre: D. Jesus Maria Garcia Sanchez - Director. N.I.F.: 0783211K

Método: PEM1002-Filtración- PE-Q860-Manométrico

-EL RESPONSABLE DE LA INFORMACIÓN NO ANALÍTICA (Evaluaciones, Interpretaciones, Etiquetado, Verificaciones de cumplimiento legal, ...) ES EL DEPT. DE CONSULTORA DE AQUIMISA S.L.
 -El solicitante ha proporcionado y es responsable de la muestra, ficha técnica, etiquetado y datos identificativos de la misma no se indica en contrario. Aquimisa dispone de la información técnica y las direcciones correspondientes a la aplicación. El informe no debe reproducirse sin la autorización escrita de AQUIMISA S.L. y aplica a la muestra ensayada con el mismo se recibió.
 -Regla de división en los resultados: comparación directa. (FC=Control de Calidad) (Q=Presencia), (A=Absencia) (S=Suma) (D=Diferencia) (R=Resto) (M=Multiplicación) (D=División)

AITEK
INSTITUTO TECNOLÓGICO TEXTIL
PLAZA EMILIO SALA, 1
03801 ALCÓY (ALICANTE) ESPAÑA, SPAIN

OEKO-TEX®
INSPIRING CONFIDENCE

CERTIFICATE

The company

Nylstar, S.L.
Avda. de la Estación, 53 - Apdo. 5
17300 Blanes (Girona), SPAIN

is granted authorisation according to STANDARD 100 by OEKO-TEX® to use the STANDARD 100 by OEKO-TEX® mark, based on our test report 20210K1328



for the following articles:

Polyamide 6.6 yarns, multifilament (greige articles) brand: 'MERYL PURE', 'MERYL PUREFIT', 'MERYL DRY', 'MERYL COTTON 66', 'MERYL SUBLIME', 'MERYL HYDROGEN', 'MERYL DERM', 'MERYL TANGO', 'MERYL CRYO', 'MERYL SENSE', 'MERYL SOFT', 'MERYL MERINO', 'MERYL SUPREME', 'MERYL SUPERDRY', 'MERYL NATEDO', 'MERYL HILO DE BLANES', 'MERYL NATURAL SILK', 'MERYL LINEN', 'MERYL CASHMERE', 'MERYL MODAL'. Polyamide 6.6 multifilament yarns (articles in colours) brand: 'MERYL ECODYE'. And Polyamide 6.6 multifilament yarns (greige articles) brand: 'MERYL HYALURONAN', 'MERYL NEXTEK' and 'MERYL SKINLIFE', "MERYL SKINLIFE FORCE" the last two with biological active properties allowed to Standard 100 by OEKO-TEX®.

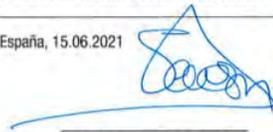
The results of the inspection made according to STANDARD 100 by OEKO-TEX®, Annex 4, **product class I** have shown that the above mentioned goods meet the human-ecological requirements of the STANDARD 100 by OEKO-TEX® presently established in Annex 4 for baby articles.

The certified articles fulfil requirements of Annex XVII of REACH (incl. the use of azo colourants, nickel release, etc.), the American requirement regarding total content of lead in children's articles (CPSIA; with the exception of accessories made from glass) and of the Chinese standard GB 18401:2010 (labelling requirements were not verified).

The holder of the certificate, who has issued a conformity declaration according to ISO 17050-1, is under an obligation to use the STANDARD 100 by OEKO-TEX® mark only in conjunction with products that conform with the sample initially tested. The conformity is verified by audits.

The certificate 950148 is valid until 31.03.2022

Alicoy (Alicante) España, 15.06.2021


Silvia Devesa Valencia
Innovation Assistant Manager


Isabel Soriano Sarrió
Chief of Innovation Area



AITEK
INSTITUTO TECNOLÓGICO TEXTIL
PLAZA EMILIO SALA, 1
03801 ALCÓY (ALICANTE) ESPAÑA, SPAIN

OEKO-TEX®
INSPIRING CONFIDENCE

CERTIFICATE

The company

Nylstar, S.L.
Avda. de la Estación, 53 - Apdo. 5
17300 Blanes (Girona), SPAIN

is granted authorisation according to STANDARD 100 by OEKO-TEX® to use the STANDARD 100 by OEKO-TEX® mark, based on our test report 20210K1330



for the following articles:

Yarns made of 100% recycled polyamide 6.6 pre-consumer made from airbags in raw. Yarns made of 50% recycled polyamide 6.6 (pre-consumer made from airbags)/50% conventional polyamide 6.6 in raw. Yarns made of 100% recycled polyamide 6.6 post-consumer made from masks, fabrics, t-shirts in raw. Yarns made of 50% recycled polyamide 6.6 (post-consumer made from masks, fabrics, t-shirts)/50% conventional polyamide 6.6 in raw.

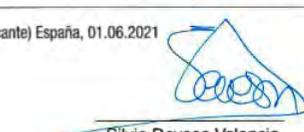
The results of the inspection made according to STANDARD 100 by OEKO-TEX®, Annex 4, **product class II** have shown that the above mentioned goods meet the human-ecological requirements of the STANDARD 100 by OEKO-TEX® presently established in Annex 4 for products with direct contact to skin.

The certified articles fulfil requirements of Annex XVII of REACH (incl. the use of azo colourants, nickel release, etc.), the American requirement regarding total content of lead in children's articles (CPSIA; with the exception of accessories made from glass) and of the Chinese standard GB 18401:2010 (labelling requirements were not verified).

The holder of the certificate, who has issued a conformity declaration according to ISO 17050-1, is under an obligation to use the STANDARD 100 by OEKO-TEX® mark only in conjunction with products that conform with the sample initially tested. The conformity is verified by audits.

The certificate 20210K1330 is valid until 31.05.2022

Alicoy (Alicante) España, 01.06.2021


Silvia Devesa Valencia
Innovation Assistant Manager


Isabel Soriano Sarrió
Chief of Innovation Area



GLOBAL RECYCLED STANDARD (GRS)



Control Union Certifications B.V.
Meeuwenlaan 4-6, 8011 BZ, Zwolle, Netherlands
+31 38 426 0100
www.controlunion.com

SCOPE CERTIFICATE

Scope Certificate Number: CU1000441GRS-2021-00106630

Control Union Certifications declares that

Nylstar
License Number: 1000441
Av. Estació 53
17300 Blanes, Cataluña
Spain

has been inspected and assessed in accordance with the
Global Recycled Standard (GRS)
- Version 4.0 -

and that products of the categories as mentioned below (and further specified in the product appendix) conform with this standard.

Product categories: Greige yarns

Processing steps / activities carried out under responsibility of the above mentioned company for the certified products

Spinning, Trading

This certificate is valid until
2022-10-04

Place and date of issue: Stamp of the issuing body Standard's Logo





2021-10-18, Zwolle

Name of authorized person:

On behalf of the Managing Director
Cristina Rodriguez Vegas/Certifier

This Scope Certificate provides no proof that any goods delivered by its holder are GRS certified. Proof of GRS certification of goods delivered is provided by a valid Transaction Certificate (TC) covering them.
The issuing body may withdraw this certificate before it expires if the declared conformity is no longer guaranteed.
Accredited by: Sri Lanka Accreditation Board (SLAB), Accreditation No. CP 004/01



Control Union Certifications B.V.
POST - Meeuwenlaan 4-6 - 8011 BZ - Zwolle - Netherlands
T +31 38 426 0100 - F +31 38 423 7040 - certifications@controlunion.com
Scope Certificate CU1000441GRS-2021-00106630 and License Number 1000441 - Page 1 / 3

This electronically issued document is the valid original version.



Control Union Certifications B.V.
Meeuwenlaan 4-6, 8011 BZ, Zwolle, Netherlands
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www.controlunion.com

Nylstar
Global Recycled Standard (GRS)

Products Appendix to Certificate no. CU1000441GRS-2021-00106630
In specific the certificate covers the following products:

Product category	Product details	Material composition	Label grade
Greige yarns	Fancy yarns	100.0% Recycled Pre-Consumer Polyamide (Nylon)	Pre-Consumer
Greige yarns	Filament	100.0% Recycled Post-Consumer Polyamide (Nylon)	Pre to Post-Consumer
Greige yarns	Filament	50.0% Recycled Pre-Consumer Polyamide (Nylon) 50.0% Conventional Polyamide (Nylon)	Pre-Consumer

Place and date of issue: Stamp of the issuing body Standard's Logo





2021-10-18, Zwolle

Name of authorized person:

On behalf of the Managing Director
Cristina Rodriguez Vegas/Certifier

This electronically issued document is the valid original version. Scope Certificate CU1000441GRS-2021-00106630 and License number 1000441, 18-04-2021

GLOBAL RECYCLED STANDARD (GRS)



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 Meeuwenlaan 4-6, 8011 BZ Zwolle, Netherlands
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 www.controlunion.com

Nylstar
Global Recycled Standard (GRS)

Facility Appendix to Certificate no. CU1000441GRS-2021-00106630

Under the scope of this certificate the following facilities / subcontractors have been inspected and assessed. The listed processing steps/activities comply with the corresponding criteria of the Global Recycled Standard (GRS) for the certified products:

Name of facility	Address of operation	Processing steps / activities	Type of relation
Nylstar	Av. Estació 53 17300 Blanes, Catalunya Spain	Spinning Trading	main

Non-Certified Subcontractor Appendix to Certificate no. CU1000441GRS-2021-00106630 Under the scope of this certificate the following non-certified subcontractors have been inspected and assessed. The listed processing steps/activities conform with the corresponding criteria of the Global Recycled Standard (GRS) for the certified products:

Name of facility	Address of operation	Processing steps / activities
No subcontractors		

Certified Subcontractor Appendix to Certificate no. CU1000441GRS-2021-00106630 The following independently certified subcontractors are listed under this scope certificate:

License number	Expiry date	Name of facility	Address of operation	Processing steps / activities
No certified subcontractors				

Place and date of issue:

Stamp of the issuing body

Standard's Logo



2021-10-18, Zwolle

Name of authorized person:

On behalf of the Managing Director
 Cristina Rodriguez Vegas/Certifier

GLOBAL RECYCLED STANDARD (GRS)



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Nylstar
Global Recycled Standard (GRS)

Facility Appendix to Certificate no. CU1000441GRS-2021-00106630

Under the scope of this certificate the following facilities / subcontractors have been inspected and assessed. The listed processing steps/activities comply with the corresponding criteria of the Global Recycled Standard (GRS) for the certified products:

Name of facility	Address of operation	Processing steps / activities	Type of relation
Nylstar	Av. Estació 53 17300 Blanes, Catalunya Spain	Spinning Trading	main

Non-Certified Subcontractor Appendix to Certificate no. CU1000441GRS-2021-00106630 Under the scope of this certificate the following non-certified subcontractors have been inspected and assessed. The listed processing steps/activities conform with the corresponding criteria of the Global Recycled Standard (GRS) for the certified products:

Name of facility	Address of operation	Processing steps / activities
No subcontractors		

Certified Subcontractor Appendix to Certificate no. CU1000441GRS-2021-00106630 The following independently certified subcontractors are listed under this scope certificate:

License number	Expiry date	Name of facility	Address of operation	Processing steps / activities
No certified subcontractors				

Place and date of issue:

Stamp of the issuing body

Standard's Logo



2021-10-18, Zwolle

Name of authorized person:

On behalf of the Managing Director
 Cristina Rodriguez Vegas/Certifier

ZERO WATER MICROPLASTIC RELEASE

LEITAT
managing technologies

NYLSTAR

Quantification of microplastics released during laundering

25. October 2021

LEITAT

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Introduction

NYLSTAR has shown an interest to quantify the microplastics released during the laundering process of a nylon polo shirt. Leitat has applied the internal assessment method for the quantification of microplastics released during laundering of textiles, which is based in an accelerated laundering process, the vacuum filtration of the wash liquor and the gravimetric determination of the material loss during laundering.

Materials and methods

Materials

The material analysed is a nylon polo shirt provided by Nylstar.

For accelerated washing process, a Gyrowash apparatus has been used. Stainless steel balls (6 mm) and a reference Light-duty detergent (LDD) from EU Ecolabel have been added. For filtration step, a vacuum filtration system for 47 mm diameter filter and glass fibre filters of 1.6 micron of pore size (Whatman Grade A) have been used.

Methods

The following assessment method has been followed to quantify the microplastics released during laundering of the material.

Sample preparation:

1. 3 samples of 110 x 180 mm have been cut with scissors in the same fabric direction (weft).
2. Each cut edge has been folded twice towards the reverse of the material to form a double rolled hem, resulting in a final size of 70 x 140 mm.
3. The folded edges have been sewed with a polyester monofilament yarn (Figure 1).



Figure 1. Folded and sewed samples

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Material conditioning and preparation:

1. Filters have been placed in aluminum trays and conditioned by drying in an oven without ventilation at 50°C for 12 h and cooled in a desiccator for 4 h. Conditioned filters have been weighted (W_0) using an analytical balance (± 0.0001 g).
2. Filters have been pre-rinsed with distilled water on vacuum filtration device to remove soluble compounds.
3. Pre-rinsed filters have been conditioned by drying in an oven without ventilation at 50°C for 12 h and cooled in a desiccator for 4 h. Conditioned pre-rinsed filters have been weighted (W_1) using an analytical balance (± 0.0001 g).
4. Textile samples have been conditioned at 20°C and 56% r.h. Conditioned textiles have been weighted (S_1) using an analytical balance (± 0.0001 g).

Accelerated laundering process:

1. The accelerated laundering machine has been pre-heated to 60°C.
2. Wash solution has been prepared with distilled water and 0.25% detergent.
3. Textile samples have been rolled up and placed into 500 ml vessels containing 150 ml of wash solution and 20 steel balls.
4. 4 vessels have been placed into the accelerated laundering device: 1 vessel for each sample and 1 verification vessel, containing only wash solution.
5. The laundering process has been conducted at 60°C (as requested by Nylstar), with a rotation speed of 40 rpm and during 45 min.

Filtration process:

1. Conditioned pre-rinsed filters have been placed into the vacuum filtration device and vacuum has been applied.
2. The wash solution from each vessel has been filtered separately and using a different filter. The inside of the vessel and the textile samples have been rinsed with distilled water to recover all possible remaining microplastics.
3. Filters have been dried in an oven without ventilation at 50°C for 12h and cooled in a desiccator for 4h. Conditioned filters (Figure 2) have been weighted (W_2) using an analytical balance (± 0.0001 g).



Figure 2. Filters after filtration

4. Textile samples have been flat dried and conditioned at 20°C and 56% r.h. Conditioned textiles have been weighted (S_2) using an analytical balance (± 0.0001 g).

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Material loss assessment:

1. The microplastics loss or release is determined gravimetrically:

$$W_{loss}(mg) = W_2 - W_1$$

Where:

W_{loss} = Mass (mg) of microplastics released.

W_1 = Mass (mg) of pre-rinsed conditioned filters and weighing tray.

W_2 = Mass (mg) of post-filtration conditioned filters and weighing tray.

2. The amount of material loss as a mass percentage of the original specimen is calculated as follows:

$$W_{loss}(mg / g \text{ of textile}) = \frac{W_{loss}}{S_1}$$

Where:

W_{loss} = Mass (mg) of microplastics released.

S_1 = Mass (g) of pre-test conditioned textile sample.

Results

In Table 1 the results from this study are presented. As explained before, W_0 is the mass of the filter (placed on a tray) before the pre-rinsing step, W_1 is the mass of the same filter after the pre-rinsing and before the filtration step, and W_2 is the mass of the filter after the filtration step, containing the microplastics released during the simulated laundering process. A blank has been added to validate the results with a low weight gain after filtration.

Table 1. Quantification of microplastics released during accelerated laundering process

Sample	W_0 [Mass (mg) initial conditioned filters and weighing tray]	W_1 [Mass (mg) of pre-rinsed conditioned filters and weighing tray]	W_2 [Mass (mg) of post-filtration conditioned filters and weighing tray]	S_1 [Mass (g) of initial conditioned textile sample]	W_{loss} [$W_2 - W_1$ (mg)]	Mass of microplastics per g of textile [W_{loss}/S_1 (mg/g textile)]	
1	93,866	93,652	96,224	4,284	2,572	0,6004	0,6171 ±
2	92,509	92,421	94,862	4,0748	2,441	0,5990	0,0301
3	93,658	93,558	96,230	4,0995	2,672	0,6518	
Blank	93,603	93,513	93,557	-	0,044	-	-

The results of the microplastic release quantification study conducted on a nylon polo shirt provided by Nylstar show that **0,6171 ± 0,0301 mg of microplastics are released per each gram of textile** during laundering process at 60°C and with a light-duty detergent (LDD).

ZERO AIR MICROPLASTIC RELEASE

NYLSTAR

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Date of issue: October 11, 2021

CERTIFICATE

COMPANY DATA

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Hereby, we certify that NYLSTAR fabric article "HH20 (SLUNJ)" made with Meryl® yarn is:

ZERO MICROPLASTIC RELEASE into the air

Particle release according to EN 13795-1:2019, section 4, table no. 1, which determines if the material is suitable for surgical use:

Determination of number of released particles from size 3 to 25 µm	Standard performance of products used in surgical procedures		High performance of products used in surgical procedures	
	Critical product area	Less critical product area	Critical product area	Less critical product area
	≤ 4,0	≤ 4,0	≤ 4,0	≤ 4,0

*The requirement of Regulation EN 13795-1 of the particle release is ≤ 4,0.

Declaration of conformity:

Requirements	Results	PASS	FAILS	NR
Particle release according to the Regulation EN 13795-1 (≤ 4,0).	STANDARD PERFORMANCE 3,335	✓		
	HIGH PERFORMANCE 3,502	✓		

ALFONSO CIRERA - CEO & Chairman
NYLSTAR S.L.

JOAN PARRA - CEO
LEITAT TECHNOLOGICAL CENTER

NUESTROS CLIENTES



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