Call4Innovation – Rules

Article 1

General aspects

Herambiente S.p.A. is organizing the Call4Innovation, aimed at promoting the use of regenerated carbon fiber by third parties within the innovation ecosystem, such as, by way of example, design studios focused on innovative products, Italian and foreign manufacturing start-ups and innovative SMEs (Europe), and research groups.

This initiative, unique of its kind, is organized by Herambiente S.p.A., with registered office in Bologna, Viale Berti Pichat 2/4 - 40127, VAT No. 03819031208, registered with the Rome Companies Register under No. 02175430392, in close collaboration with esteemed technological and scientific partners.

Article 2

Scope

In order to promote and implement the circular economy, as well as to accelerate the adoption of low-emission solutions, Herambiente S.p.A. makes available, under the terms and conditions set out below and in the relevant documentation, an initiative aimed at encouraging the reuse of regenerated carbon fiber by third parties within the innovation ecosystem – including, by way of example, start-ups, scale-ups, small and medium-sized enterprises, design studios, academic institutions, research centres and aspiring entrepreneurs (hereinafter, the "**Applicants**") – proposing solutions, applications and/or processes for the use of regenerated carbon fiber (the "**Projects**").

Application categories:

A) Product engineering and design using regenerated carbon fiber;

B) Processing methods and enabling technologies for reuse (e.g. compounds, semi-finished products, additives and blends);

C) Industrial and manufacturing applications (e.g. automotive, marine, sport & leisure, construction, furniture and technical packaging);

D) Material qualification, testing and certification (e.g. mechanical properties, durability, traceability and regulatory compliance);

E) Business models and go-to-market strategies for third-party adoption (e.g. supply chain, logistics, partnerships, services and end-of-life management).

At the time of submission, Applicants shall accurately describe the application area and the activities envisaged, highlighting the intended use of regenerated carbon fiber and the expected outcomes.

The annexes to these Rules contain the technical data sheets of the materials covered by the initiative, including regenerated carbon fiber and the nonwoven fabric produced, as well as the related characteristics and conditions of availability/use for evaluation activities.

Applicants shall demonstrate their ability to develop, industrialize and/or validate their Projects within application categories A-B-C-D-E, specifying the intended use of the materials, performance requirements, manufacturing process, quality and safety criteria, as well as, where applicable, sample testing and scalability plans.

During the course of the initiative, selected Applicants may benefit from technical discussion sessions with Herambiente and the initiative partners, according to the arrangements and timetable communicated by the Organizing Committee.

It is understood that, should a Project prove to be of interest and/or be successfully validated, Herambiente reserves the right to initiate, with the relevant Applicant(s), negotiations for possible forms of collaboration, joint development, supply, wider-scale testing and/or the granting of usage rights, through separate and ad hoc agreements, without this entailing, for either Herambiente or the Applicants, any obligation to successfully conclude such negotiations.

Article 3

Allocation and evaluation procedure

Under the Call4Innovation call, the selected Applicants will be assigned an agreed quantity of material (including, by way of example, regenerated carbon fiber and/or nonwoven fabric), in order to enable the performance of tests, application trials and validations as part of a pilot project consistent with the subject matter of the application. The selected Applicants shall be identified on the basis of the ranking drawn up by the Evaluation Committee.

In the event of a tie in score between different Projects, priority shall be given to proposals that demonstrate (i) greater use of material for testing and validation purposes and (ii) better technical-industrial scalability of the Project.

Article 4

The Organizing Committee

Through its members, the Organizing Committee appoints a Project Manager for the Call4Innovation initiative, who is entrusted with overseeing the Call, coordinating the relevant internal and external stakeholders, participating in Organizing Committee meetings, and supervising and managing the activities of the Evaluation Committees.

The Organizing Committee is also responsible for the following activities:

- Define the guidelines for the Evaluation Committees, approving these Rules and any amendments thereto;
- Appoint the members of the technical and final evaluation committees, issue an official announcement of the Call4Innovation call, and announce, among the eligible applicants, the winners selected by the Evaluation Committee.

Article 5

The Evaluation Committee

The Evaluation Committee (technical and final) consists of Herambiente personnel with plant management/innovation responsibilities and external consultants selected on the basis of their proven expertise in the matters covered by the Call4Innovation call. The members of the Evaluation Committee are appointed by the Organizing Committee pursuant to Article 4 of these Rules. The

activities of the Evaluation Committee are coordinated by the Project Manager of the initiative, who ensures liaison with the Organizing Committee.

Article 5.1 – application phase

The Evaluation Committee receives and assesses the applications, verifying their compliance with the requirements of these Rules and the technical-applicative feasibility of the proposed solutions. It then assigns scores to the accepted projects and prepares the provisional ranking, identifying the Projects selected for the subsequent prototype/application development phase.

Article 5.2 – prototype/application development phase

During the testing/prototyping phase, the accepted projects will have the following quantities of material available for testing:

A) rCF patch – 10 kg – see Annex 1
B) rCF chopped – 10 kg – see Annex 2
C) Nonwoven mat – 10 m^2 – see Annex 3

The Evaluation Committee monitors the timing and implementation of the awarded pilot projects, verifying the responsible use of the allocated material (increasing the quantities, if necessary) and consistency with the information submitted in the application.

Article 5.3 – final award phase

Projects must be submitted to the Evaluation Committee by the deadline set out in the call. At the end of this phase, the Evaluation Committee prepares the final ranking and awards the prizes referred to in Article 10.

For any doubts or questions, an email may be sent to the Project Manager of the call.

Article 6

Application terms

Application forms are available on the website https://ha.gruppohera.it/fib3r-call4innovation:

A) The application form is mandatory and must be completed in full by the indicated deadline, with particular attention to the description of the Project and the information necessary for its evaluation;

B) Any scientific publications, technical reports or other supporting documentation relating to the results, methodologies or assumptions of the Project may be attached to the application; applicants are encouraged to have a digital copy (.pdf file) of the documents ready for uploading in the relevant section during completion of the form.

Applications may be submitted in Italian or English and must correctly and fully identify the Applicants in order to be considered valid.

In addition, applications must contain responses to the “technical request” questions (application categories A–E) included in the application form, in order to assess compliance with these Rules and to understand the suitability and value of the proposed solution.

Herambiente reserves the right to exclude applications that do not comply with these Rules or for which the Applicants are unable to demonstrate compatibility therewith.

If the application is selected, access to any resources made available under the initiative shall be granted exclusively to the people indicated in the application and authorized in accordance with the procedures communicated by the Organizing Committee.

In order to apply, Applicants must satisfy all the requirements and provisions set out in these Rules, which they shall confirm they have read and accepted at the time of submission of the application.

Applicants shall also declare that they have read and are aware of the "Hera Group Code of Ethics", available on the official Hera Group website (link), and that they share the principles contained therein and undertake to ensure full compliance therewith.

Article 7

Closing ceremony

An official closing ceremony to present the names of the awarded projects will be held in Italy on 3 November 2026, during Ecomondo – Rimini Trade Fair (Rimini Expo Centre), from 3 to 6 November 2026. Details will be promptly communicated to the applicants of the selected projects.

Article 8

Amendments or changes to the Rules

The Organizing Committee reserves the right to make amendments or additions to these Rules, giving immediate notice thereof and ensuring broad visibility.

Article 9

Publication of results

The names of the applicants selected for "phase 2" (see Article 5.1) will be made public by the Organizing Committee on the website https://ha.gruppohera.it/fib3r-call4innovation and through any other communication channels deemed appropriate.

The Organizing Committee, in collaboration with the awarded Applicants, may undertake initiatives to promote the publication, dissemination and communication of the awarded pilot projects at scientific and technological conferences.

Article 10

Prizes

The prizes are managed by the Organizing Committee, whose headquarter is located at the Herambiente offices in Viale Carlo Berti Pichat 2/4, 40124 Bologna (BO), Italy.

They consist of:

A) Supply of 1,000kg of rCF to the winner – 500kg of rCF to the runner-up – 250kg of rCF to the third-placed applicant (overall value of approximately €50,000);

B) Cash prize: €10,000 to the winner – €5,000 to the runner-up – €2,500 to the third-placed applicant (overall value of €17,500);

C) Long-term commercial agreement at dedicated purchase prices for rCF.

Winners may choose between option A) + C) or option B) + C).

Article 11

Contact information

Organizing Committee:

Andrea Ramonda – Herambiente S.p.A.

Via Carlo Berti Pichat 2/4, Bologna (BO), 40127

Project Manager:

Daniele Biondi – Herambiente S.p.A.

Via Carlo Casalegno 1, Imola (BO), 40026

e-mail: daniele.biondi@gruppohera.it

Evaluation Committee:

HERA S.p.A. – Eng. Salvatore Molè – Central Innovation Director

Herambiente S.p.A. – Dr. Andrea Ramonda – Central Director of Treatment and Recovery and Chief Executive Officer of Herambiente S.p.A.

UNIBO – Prof. Loris Giorgini – Director of the "Toso Montanari" Department of Industrial Chemistry, University of Bologna

Composites sector company – Angeloni Group – Eng. Carlo Della Bona – Chief Executive Officer

ASSOCOMPOSITI – Prof. Roberto Frassine – Full Professor of Polymeric and Composite Materials at the Department of Industrial Chemistry and Chemical Engineering of POLIMI. President of Assocompositi Association

Secretariat:

Secretariat activities are managed by Plug & Play Italy Srl with the following contact persons:

- Arianna Deli – Partner Success Manager a.deli@pnptc.com
- Valerio Mennone – Ventures Associate v.mennone@pnptc.com

Article 12

Intellectual property

Applicants warrant and declare, under their sole responsibility, that the Projects are original and do not infringe the intellectual and industrial property rights of third parties.

The intellectual property of each individual Project shall remain vested in the respective proposer.

However, Herambiente S.p.A. reserves the right to involve the selected Applicants, either during or following the pilot project testing phase, by proposing one of the following options:

1) Purchase the economic rights relating to the Project's intellectual property;

2) Purchase the patent or design patents, where existing at the time the Project is submitted;
3) Enter into a partnership with the Applicant for the development of the Project, to be jointly structured in terms of timing and implementation arrangements.

Both Herambiente S.p.A. and the Applicants to whom one of the above proposals may be submitted undertake to negotiate in good faith in order to reach a mutually satisfactory agreement based on the implementation, in whole or in part, of the submitted Project.

Article 13

Personal data protection

The processing of personal data shall be managed directly by PLUGandPLAY, as indicated in the application submission form.

Article 14

Compliance requirements

At the time of submitting the application, the Applicant declares that it has read and accepts the Terms and Conditions of the call, as well as the applicable compliance documentation made available through the official Hera Group/Herambiente channels, including the principles and commitments set out in the “Hera Group Code of Ethics”.

A) Hera Group Code of Ethics (link);

B) The provisions of the Organization, Management and Control Model pursuant to Italian Legislative Decree No. 231/2001 (including the principles of transparency and integrity), together with any additional compliance, anti-corruption, human rights protection, and workplace violence and harassment prevention policies and procedures adopted by the Hera Group/Herambiente, where applicable.

In addition, the Applicant undertakes to comply with the following:

A) Anti-corruption and anti-money laundering laws;

B) Human rights (meaning thereby (i) the principles contained in applicable national and international laws and instruments, guidelines and best practices aimed at preventing human rights violations, including the United Nations Guiding Principles on Business and Human Rights, the OECD Guidelines for Multinational Enterprises and the ILO Declaration on Fundamental Principles and Rights at Work; (ii) the applicable legal provisions governing terms and conditions of employment; and (iii) national and international legislation against human trafficking and smuggling, as well as legislation relating to immigration, the lawful residence rights of third-country nationals and forced labour).

By submitting the application, the Applicant also declares that it is not in any situation of conflict of interest in relation to participation in the call and undertakes to promptly inform Herambiente should such a situation arise or emerge during the selection process.

ANNEXES

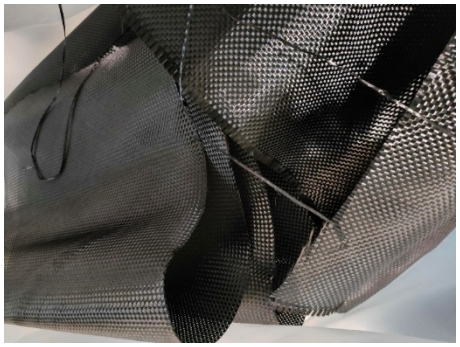
Technical data sheet – rCF fabric – Annex 1

Once the resin and added additives have been removed through the pyrogasification process, recycled carbon fiber (rCF) retains its lightness and mechanical properties unchanged.
The industrial plant is capable of processing the following types of composites: *prepregs, process scrap, cured materials and finishing scrap*.
The regenerated carbon fiber is therefore ready to be rewoven and/or re-impregnated for all typical uses of virgin fiber, for autoclave, press and moulding processes: nonwoven fabric, patchwork, carbon milled products, short fibers, SMC, BMC and much more.

Morphological (SEM) and mechanical (dynamometer) comparison between rCF and the corresponding virgin carbon fibers

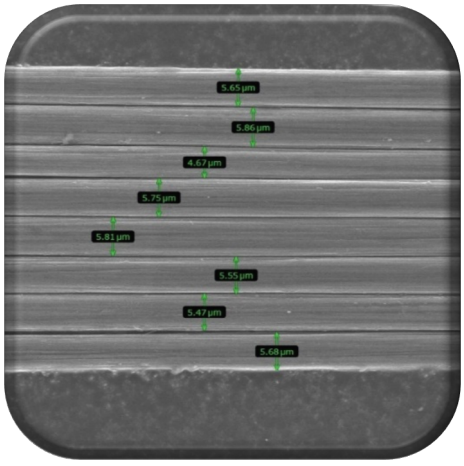
CFRP scrap – Image of CFRP BEFORE thermal treatment

rCF – Image of the rCF obtained AFTER thermal treatment



Typical patch dimensions:
Width: up to 90 cm
Length: 80 ÷ 120 cm

Pyrogasified rCF – SEM image
Magnification: 3000×



Pyrogasified rCF – SEM image
Magnification: 5000×

The mechanical properties of both virgin fibers (technical data sheet) and rCF are reported below. The results relating to the mechanical properties of rCF were obtained using a dynamometer by means of a *single-fiber tensile test*. For each sample under examination, 20–30 individual fibers were tested and the results obtained were subsequently averaged and reported in the table.

Virgin CF – Mechanical properties (Values from TDS – such as T800)

RESULTS	VALUES	σ
Elastic modulus (GPa)	**294**	**/**
Breaking stress (GPa)	**5,49**	**/**
Elongation at break (%)	**1,9**	**/**

Pyrogasified rCF – Mechanical properties (Experimental values)

RESULTS	VALUES	σ
Elastic modulus (GPa)	**273**	**10**
Breaking stress (GPa)	**5,2**	**0,6**
Elongation at break (%)	**1,73**	**0,19**

Types of fibers that can be treated and recycled by the industrial furnace:

Within the industrial plant it is possible to process any composite carbon-fiber waste material (and the corresponding virgin prepregs, whether expired or fresh), provided that they meet the incoming material acceptance requirements set out in the protocol. **Downstream** of the process, the **same types of carbon fiber** present in the **input** material are obtained, since the pyrogasification treatment is optimized so as to degrade only the polymer matrix (and any sizing present on the fibers). Therefore, in detail, it is possible to process and obtain the following types of rCF:

- Standard modulus: T300, T400, T600, T700, etc.
- Intermediate modulus: T800, T830, T1000, T1100, etc.
- High modulus: M35J, M40J, M46J, M55J, M60J, etc.

Health and Safety

Herambiente certifies that recycled carbon fiber products comply, where applicable, with the provisions of European Union Regulation (EC) No. 1907/2006 governing the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), and that they do not contain substances subject to restriction or authorisation above 0.1% by weight.
The recommended precautions for safe handling are to limit dust formation in the workplace and to handle the fibers while wearing the following personal protective equipment (PPE): gloves, safety glasses, mask and protective clothing.

Technical data sheet – chopped rCF – Annex 2

Recycled carbon fiber (rCF), once the resin and added additives have been removed through the pyrogasification process, retains its lightness and mechanical properties unchanged.
The industrial plant is capable of processing the following types of composites: *prepregs, process scrap, cured materials and finishing scrap*.
The regenerated carbon fiber is therefore ready to be rewoven and/or re-impregnated for all typical uses of virgin fiber, for autoclave, press and moulding processes: nonwoven fabric, patchwork, carbon milled products, short fibers, SMC, BMC and much more.

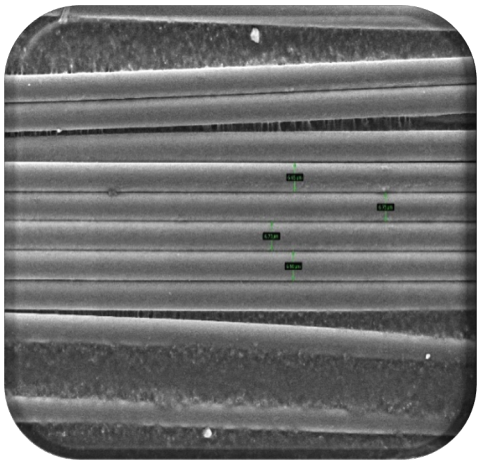
Morphological (SEM) and mechanical (dynamometer) comparison between rCF and the corresponding virgin carbon fibers

CFRP scrap – Image of CFRP BEFORE thermal treatment

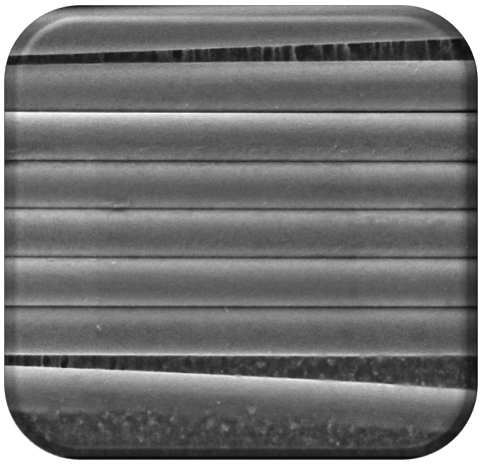
rCF – Image of the rCF obtained AFTER thermal treatment

The regenerated fibers can then be cut uniformly to different lengths to produce semi-finished products such as nonwoven fabric, SMC, BMC and much more.

Pyrogasified rCF – SEM image
Magnification: 3000×



Pyrogasified rCF – SEM image
Magnification: 5000×



The mechanical properties of both virgin fibers (technical data sheet) and rCF are reported below. The results relating to the mechanical properties of rCF were obtained using a dynamometer by means of a single-fiber tensile test. For each sample under examination, 20–30 individual fibers were tested and the results obtained were subsequently averaged and reported in the table.

Virgin CF – Mechanical properties (Values from TDS – such as T700)

RESULTS	VALUES	σ
Elastic modulus (GPa)	**230**	/
Breaking stress (GPa)	**4,9**	/
Elongation at break (%)	**2,1**	/

Pyrogasified rCF – Mechanical properties (Experimental values)

RESULTS	VALUES	σ
Elastic modulus (GPa)	**210**	**12**
Breaking stress (GPa)	**3,8**	**0,3**
Elongation at break (%)	**1,68**	**0,10**

Types of fibers that can be treated and recycled by the industrial furnace:

Within the industrial plant it is possible to process any composite carbon-fiber waste material (and the corresponding virgin prepregs, whether expired or fresh), provided that they meet the incoming material acceptance requirements set out in the protocol. **Downstream** of the process, the **same types of carbon fiber** present in the **input** material are obtained, since the pyrogasification treatment is optimized so as to degrade only the polymer matrix (and any sizing present on the fibers). Therefore, in detail, it is possible to process and obtain the following types of rCF:

- Standard modulus: T300, T400, T600, T700, etc.
- Intermediate modulus: T800, T830, T1000, T1100, etc.
- High modulus: M35J, M40J, M46J, M55J, M60J, etc.

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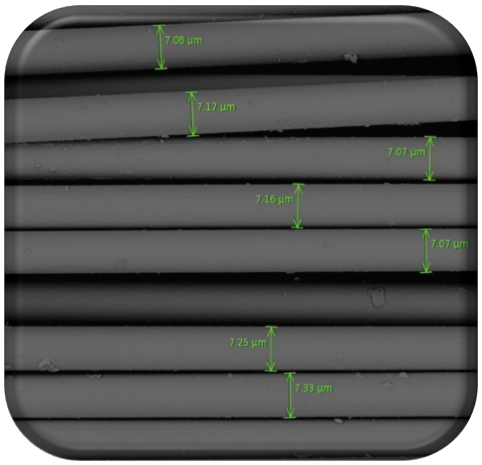
The recommended precautions for safe handling are to limit dust formation in the workplace and to handle the fibers while wearing the following personal protective equipment (PPE): gloves, safety glasses, mask and protective clothing.

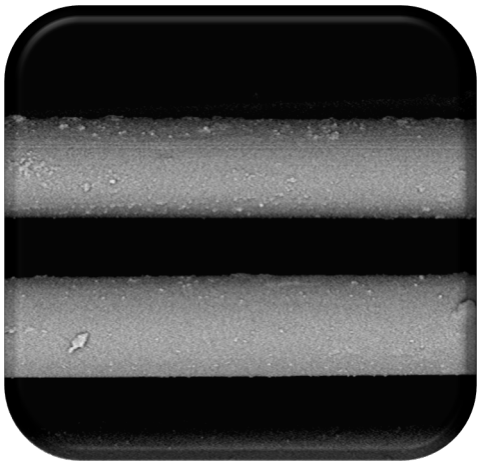
Technical data sheet – rCF nonwoven fabric – Annex 3

Recycled carbon fiber (rCF), once the resin and added additives have been removed through the pyrogasification process, retains its lightness and mechanical properties unchanged.
The industrial plant is capable of processing the following types of composites: prepregs, process scrap, cured materials and finishing scrap.
The regenerated carbon fiber is therefore ready to be rewoven and re-impregnated for all typical uses of virgin fiber, for autoclave, press and moulding processes: nonwoven fabric, patchwork, carbon milled products, short fibers, SMC, BMC and much more.
The technical characteristics of one of the above-mentioned applications are specified below: nonwoven fabric.
Shown below are scanning electron microscope (SEM) images of virgin carbon fibers and fibers obtained through pyrogasification treatment from which the nonwoven fabric is produced. The images are intended to highlight the effectiveness of the treatment, through which fibers with an appearance and diameters comparable to virgin fibers are obtained.

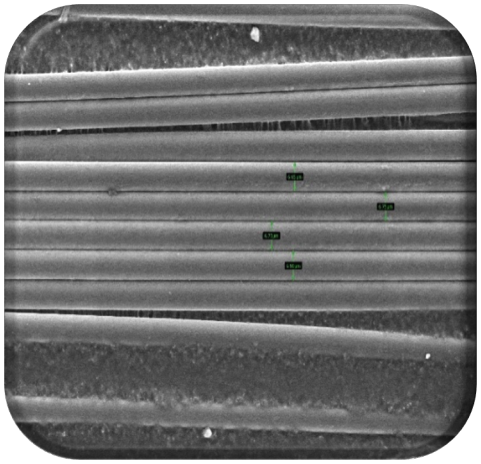
Virgin CF – SEM image
Magnification: 3000×



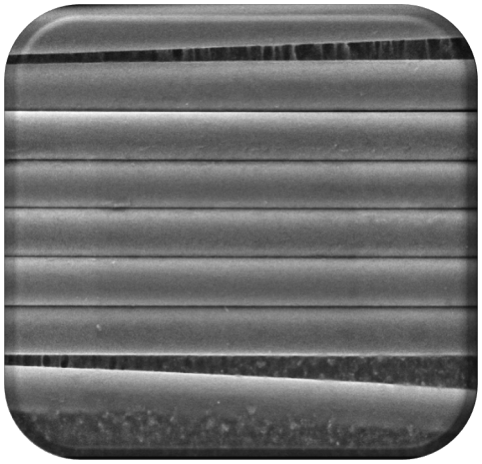
Virgin CF – SEM image
Magnification: 5000×



Pyrogasified rCF – SEM image
Magnification: 3000×



Pyrogasified rCF – SEM image
Magnification: 5000×



Types of fibers that can be treated and recycled by the industrial furnace:

Within the industrial plant it is possible to process any composite carbon-fiber waste material (and the corresponding virgin prepregs, whether expired or fresh), provided that they meet the incoming material acceptance requirements set out in the protocol. **Downstream** of the process, the **same types of carbon fiber** present in the **input** material are obtained, since the pyrogasification treatment is optimized so as to degrade only the polymer matrix (and any sizing present on the fibers). Therefore, in detail, it is possible to process and obtain the following types of rCF:

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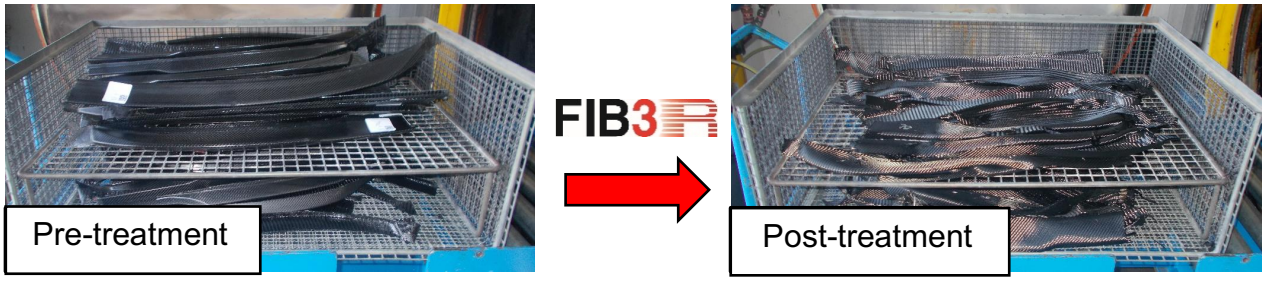
EXAMPLE OF NONWOVEN MAT



TECHNICAL CHARACTERISTICS – 100% rCF NONWOVEN FABRIC

Grammage (Areal weight)	200 ÷ 500 gsm
Grammage tolerance (50 ÷ 100 gsm)	± 10 %
Grammage tolerance (100 ÷ 200 gsm)	± 5 %
Grammage tolerance (> 200 gsm)	< 5 %
Nonwoven width	1200 mm
Contamination from other fibers	< 2 %

HERAmbiente
Società del Gruppo Hera

FIB3R
Recover Reduce Reuse
Carbon Fiber

TECHNICAL CHARACTERISTICS – NONWOVEN FABRIC WITH THERMOPLASTIC

Content	*Carbon Fiber* *Polypropylene* *Binder*	*≤ 40 %* *60 %* *0,5 ÷ 1 %*
Grammage (Areal weight)	50 ÷ 500 gsm	
Grammage tolerance	± 10 %	
Fiber length	35 ÷ 90 mm	
Grammage tolerance (> 200 gsm)	< 5 %	
Nonwoven width	1000 ÷ 1250 mm	

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