<table>
<thead>
<tr>
<th>Material</th>
<th>Code</th>
<th>Prefix</th>
<th>Metal</th>
<th>Resin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyester</td>
<td>850011725</td>
<td>FARADAY P-N</td>
<td>Nickel</td>
<td>epoxy resin R25T</td>
</tr>
<tr>
<td>Polyester</td>
<td>850012625</td>
<td>FARADAY HC P-N</td>
<td>High Conductivity Nickel</td>
<td>epoxy resin R25T</td>
</tr>
<tr>
<td>Polyester</td>
<td>850012525</td>
<td>FARADAY G P-N</td>
<td>Nickel</td>
<td>epoxy resin R25T</td>
</tr>
<tr>
<td>Carbon</td>
<td>850047925*</td>
<td>FARADAY C-N</td>
<td>Nickel</td>
<td>epoxy resin R25T</td>
</tr>
<tr>
<td>Carbon</td>
<td>850047925*</td>
<td>FARADAY C-C</td>
<td>Copper</td>
<td>epoxy resin R25T</td>
</tr>
</tbody>
</table>

*prototype pre-preg

**Conductive pre-pregs for composite components with shielding performance**

**Examples of interiors applications**

- panels and covers
- ducts
- boxes
- joints
FEATURES

FARADAY pre-pregs, are produced with epoxy resin and woven metalized with Nickel, Copper (available also Zinc on request), have the aim of solving the problems of shielding from electromagnetic interference on composite structures virtually devoid of natural Faraday cage that instead is still guaranteed by a metal structure. Polyester reinforcement is the standard configuration; optimal solution for light and conductive layer in a composite structure, using the carbon reinforcement it is possible to meet an high level of shielding mixed with an optimal mechanical and flame retardant behavior; it is the best solution for structural and shielding applications.

The electronics devices and cable for electrical connection as well doesn’t offer in many installation a security for the range of new sources involved outside from Telecommunication and other power magnetic generator. In this condition with the new increasing transformation of structure from metal to composite, it’s natural to offer more vulnerability to many devices. The scope to use the fabric metalized in a combination of the composite are the best solution to reduce the interferences from out side or inside to out side.

The use of NICKEL as metal over the textile structure is a guaranties for the electrical surface resistivity of the composite.

The level of metallization in very deep; each filament is covered with a metal skin.

The R25T system is designed to guarantee a very good surface and curing cycle at medium – high temperature.

FARADAY pre-pregs can offer an huge frequency range of shielding.

A comparison with standard copper mesh solution show this behavior.
The quantity of the metal increases the shielding performance but also the grammage of the pre-preg; a correct concept of shielding gives a compromise between weight and shielding level.

Testing IEEE 299:2006 shielding panels (1GHz to 6GHz)
(where non specified is one conductive layer molded in epoxy resin)

The structures of reinforcement modifies the shielding performance; the more compact structure increases the shielding at the high frequencies.

Testing IEEE 299:2006 shielding panels (1GHz to 6GHz)
(where non specified is one conductive layer molded in epoxy resin)
The composites FARADAY solution gives an advantage in term of weight; at the same shielding level the weight is 1/3 less than an aluminum panel with 2mm of thickness.

FARADAY P\_N - dB Effective Shielding (EMI Panel tests Faraday P\_N vs Aluminum) according to IEEE 299:2006

FARADAY C\_N - dB Effective Shielding (EMI Panel tests Faraday C\_N vs Faraday TNT01 P\_N and Faraday P\_N) according to IEEE 299:2006
The Blue line is the standard shielding capability of carbon without metallization
PROPERTIES of EPOXY RESIN R25

- From 45dB up to 90dB attenuation level from 1 Mhz to 18 GHz (value for single layer)
- Stability of the surface conductivity
- Flexibility in design
- Weight reduction in comparison to the metal mesh
- High performance of electromagnetic shielding
- Curing in autoclave, with vacuum bag and oven or by press with hot plates
- Excellent tack (using at room temperature, between 21°C and 25°C)
- Excellent resin flow
- Excellent compatibility with Hexcel resin 1454 Airbus homologated
- long pot life at ambient temperature > than 1 month

CURING CYCLE

Curing cycle may be performed between 100 and 180 ° C.

example of curing

5 h at 100°C
1 h at 130°C
40 min at 140°C
1 h 120°C + 2 h 140°C
30-40 min at 160°C
30 min at 180°C (not exceed 45-50 min at 180 ° C to avoid excessive yellowing resin

Tg temperature

<table>
<thead>
<tr>
<th>Curing</th>
<th>Tg</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 h 100°C</td>
<td>100-110°C</td>
</tr>
<tr>
<td>1 h 120°C</td>
<td>110°C</td>
</tr>
<tr>
<td>2 h 120°C</td>
<td>110-120°C</td>
</tr>
<tr>
<td>1 h 130°C</td>
<td>112-122°C</td>
</tr>
<tr>
<td>40 min 140°</td>
<td>114-124°C</td>
</tr>
<tr>
<td>30 min 90°+1 h 120°C</td>
<td>114-124°C</td>
</tr>
<tr>
<td>1 h 120°C+2 h 140°C</td>
<td>115-125°C</td>
</tr>
<tr>
<td>30-40 min at 160°C</td>
<td>120-125°C</td>
</tr>
<tr>
<td>30 min at 180°C</td>
<td>120-125°C</td>
</tr>
</tbody>
</table>
STORAGE CONDITIONS

Pre-preg could be stocked at controlled temperature -15/-18 °C; at this range pot life is:

12 months at -18°C
4-6 weeks at 23°C

Before using it is recommended to maintain product at the room temperature for many hours into the polyethylene bag to avoid the moisture contact. Before to stock in to the freezer put the product into the bag.
PRE-PREG FEATURES

Color: Grey
Tack: medium - low
Gel time (miscela) at 130°C: 14 ± 3 minutes
Volatile: <1%
Length: max: 150m carbon – 200m polyester

<table>
<thead>
<tr>
<th>Metal</th>
<th>Fabric</th>
<th>Pre-preg</th>
<th>Height</th>
<th>Metal Content</th>
<th>Superficial Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>FARADAY</td>
<td>P_N</td>
<td>nickel</td>
<td>60</td>
<td>110 +/-10</td>
<td>550</td>
</tr>
<tr>
<td>FARADAY HC</td>
<td>P_N</td>
<td>nickel</td>
<td>100</td>
<td>200 +/-10</td>
<td>550</td>
</tr>
<tr>
<td>FARADAY G</td>
<td>P_N</td>
<td>nickel</td>
<td>75</td>
<td>120 +/-10</td>
<td>500</td>
</tr>
<tr>
<td>FARADAY</td>
<td>C_N</td>
<td>nickel</td>
<td>250</td>
<td>340 +/-10</td>
<td>550</td>
</tr>
<tr>
<td>FARADAY</td>
<td>C_C</td>
<td>copper</td>
<td>250</td>
<td>340 +/-10</td>
<td>550</td>
</tr>
</tbody>
</table>

Values are typical for low quantities of resin. Gel times could be modified in function of laminate thickness. Customized grammages are available for more than 300ml. Customized superficial resistance are available under request for more than 300ml.

PACKAGING

Pre-preg are packed in vacuum polyethylene bag, dry ice available and cardboard box with label.

DATA LABEL

- Code:
- Manufactory date:
- Quality control:
- Length:
- Width:
USING RECOMMENDATIONS

Peel Ply and conductive FARADAY PAINT

Using peel ply avoid a non conductive layer of resin over the conductive fabric. The section of composite, after curing and peeling, could be shown in picture 1. Some residual spot of resin could give electric contact problems.

A solution is using a layer of conductive FARADAY PAINT available in Lamiflex and a conductive-adhesive TNT (available in 1mm or 3mm of thickness)
Lamiflex warrants only that its products meet the specifications agreed with the buyer. Typical properties, where stated, are to be considered as representative of current production and should not be treated as specifications.

The manufacture of materials is the subject of granted patents and patent applications; freedom to operate patented processes is not implied by this publication.

While all information and recommendations in this publication are, to the best of our knowledge, information and belief, accurate at the date of publication, nothing herein is to be construed as a warranty, express or otherwise.

In all cases, it is the responsibility of the user to determine the applicability of such information and recommendations and the suitability of any product for its own particular purpose.

The behavior of the products referred to in this publication in manufacturing processes and their suitability in any given end-use environment are dependent upon various conditions such as chemical compatibility, temperature, and other variables, which are not known to Lamiflex. It is the responsibility of the user to evaluate the manufacturing circumstances and the final product under actual end-use requirements and to adequately advise and warn purchasers and users thereof.

Except where explicitly agreed otherwise, the sale of products referred to in this publication is subject to the general terms and conditions of sale of Lamiflex Spa.

All rights reserved.