

# Creating Material Change



**SYNERG**»»<sup>3D</sup>  
CONDUCTIVE FILAMENT

## Technical Data Sheet



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# SynerG Conductive PLA 3D Printing Filament

Haydale's SynerG nanomaterial enhanced polylactic acid (PLA) filaments for 3D printing are improving the speed, strength, print quality and accuracy of 3D printed parts.

- Electrically conductive
- 50% increase in Young's modulus
- 30% increase in the strength of the filament
- 3x increase in thermal conductivity
- High quality print and excellent first layer adhesion and z-axis bonding

Product code: FM-ELC  
 Physical form: 1.75mm diameter filament packaged on 1000g reels  
 Appearance: Black filament  
 Product status: Commercial

Properties			
Property Tested	Method Standard	Units	Average Value
<b>Filament:</b>			
Volume Resistivity	ASTM D257-14	Ω.cm	3.2E+02
Young's Modulus	Internal	MPa	762
Tensile Strength	Internal	MPa	65
Strain to Failure	Internal	%	14
<b>XY Direction Printed Test Specimens:</b>			
Volume Resistivity	ASTM D257-14	Ω.cm	4.7E+05
Young's Modulus	ISO 527-2	MPa	3144
Tensile Strength	ISO 527-2	MPa	40
Strain to Failure	ISO 527-2	%	2.3
Thermal Conductivity	ASTM D7984	W/mK	0.41
<b>Z Direction Printed Test Specimens:</b>			
Volume Resistivity	ASTM D257-14	Ω.cm	4.5E+04
Young's Modulus	ISO 527-2	MPa	3057
Tensile Strength	ISO 527-2	MPa	36
Strain to Failure	ISO 527-2	%	1.4
Thermal Conductivity	ASTM D7984	W/mK	0.44
<b>Injection Moulded Test Specimens:</b>			
Volume Resistivity	ASTM D257-14	Ω.cm	3.5E+02
Young's Modulus	ISO 527-2	MPa	4184
Tensile Strength	ISO 527-2	MPa	65
Strain to Failure	ISO 527-2	%	2.4
Flexural Modulus	ISO 178	MPa	4114
Flexural Strength	ISO 178	MPa	103
Thermal Conductivity	ASTM D7984	W/mK	0.41

NB: All properties listed are typical properties only, using 1.75mm diameter filament unless stated otherwise. Data are indicative of as-tested performance and are not to be construed as specifications.

## Processing Guidance

- SynerG Conductive PLA 3D printing filament can be processed on all FDM/FFF type 3D printers.
- SynerG Conductive PLA 3D printing filament should typically be extruded using a nozzle temperature of 210°C and a heated bed temperature of 60°C is recommended for good first layer adhesion in 3D printing.
- SynerG Conductive PLA 3D printing filament should be printed at a maximum of 50mm/sec using a 0.4mm brass or tungsten carbide nozzle (tungsten carbide recommended) with a retraction distance of 14mm and speed of 8mm/sec.
- SynerG Conductive PLA 3D printing filament should not be left hot in the nozzle when not printing and should be removed immediately after printing using a forward purge followed by retraction.
- 3D printers, especially their nozzles, should always be maintained, and should be cleaned before and after use in line with the printer manufacturer's instructions.

## Storage

PLA is a biodegradable thermoplastic polyester and will absorb moisture over time which can affect product performance. To ensure a good shelf life before use the 3D printing filament is packaged under a controlled vacuum and sealed to prevent moisture ingress. It is recommended that filament be kept in cool and dry conditions before use.

## Health, Safety and Environmental

Please refer to the Safety Datasheet for the product before use – available at <https://haydale.com/resources/>.

The content supplied in this technical data sheet ("Information") supersedes all previous versions supplied. Version 4, April 2021

The Information should be used solely as guidance for the safe handling, storage, processing and/or use of the Product and is only typical of the methods described. The Haydale Group (Haydale Group means Haydale Limited, as a subsidiary of Haydale Graphene Industries plc., and any subsidiary or holding company from time to time and any subsidiary from time to time of any holding company of Haydale Limited) gives no express or implied warranty or guarantee or representation as to the behaviour of the Product described herein during any handling or storage or processing or use of the Product. To the extent permissible by law the Haydale Group shall under no circumstances whatever be liable whether in contract, tort (including negligence), breach of statutory duty, or otherwise, for any damage, including loss of profit, or any indirect or consequential loss arising under or in connection with any handling or storage or processing or use of the Product.



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