



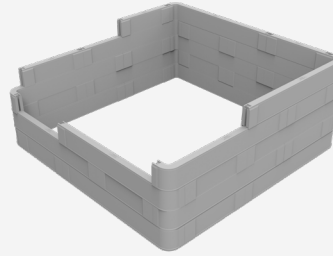
## ULTIMA Connect Access Chamber Material & Product Properties

**BRIEF**

The purpose of this document is to provide material and product performance properties for the Glass Reinforced Polyester Resin (GRP) ULTIMA Connect system.

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**1.1 GENERAL**

*General properties of the material used to manufacture ULTIMA Connect.*

- GRP - (Glass Reinforced Polyester Resin)
- Grey colour
- Classed as Non-Hazardous to the Environment (Halogen free)

**1.2 MECHANICAL PROPERTIES**

*Key mechanical properties of the GRP material used to manufacture ULTIMA Connect, from both in house tests and generically known values.*

Characteristic	Test Method	Value
Elastic Modulus	ISO 527-4	11 GPa
Tensile Strength	ISO 527-4	45 MPa
Flexural Modulus	ISO 14125	9.5 GPa
Flexural Strength	ISO 14125	110 MPa
Impact Strength	ISO 179	50 KJ/m <sup>2</sup>
Density	ISO 1183	1.75 g/cm <sup>3</sup>

**1.3 THERMAL PROPERTIES**

*Relevant thermal properties of the GRP material used to manufacture ULTIMA Connect, from both material supplier tests and generically known values.*

Characteristic	Test Method	Value
Heat Distortion Temperature	EN ISO 75-2	>200°C
Coefficient of Linear Thermal Expansion	ISO 11359-2	33 x 10 <sup>-6</sup> m/m°C
Thermal Conductivity	ASTM E1530-11 (2016)	0.49 W.m <sup>-1</sup> k <sup>-1</sup>
Operating Range		-40 to 110°C

## 1.4 ELECTRICAL PROPERTIES

Relevant electrical properties of the GRP material used to manufacture ULTIMA Connect, from both material supplier tests and generically known values.

Characteristic	Test Method	Value
Dielectric Strength	IEC 60243-1 / ASTM D149-09 (2013)	12 Kv/mm / 330V/mil
Dielectric Constant	ASTM D150 at 60 Hz / 1MHz	4.2 K / 4.35 K
Dissipation Factor	ASTM D150 at 60 Hz	0.01
Volume Resistivity	IEC 60093	1E+12 Ohm/cm
Surface Resistivity	IEC 60093	1,00E+14 Ohm

## 1.5 FIRE BEHAVIOUR

Fire behavioural properties of the GRP material used to manufacture ULTIMA Connect, from both material supplier tests and independent third party tests.

GRP is a thermoset material and does not melt or form droplets. It is not sensitive to ambient operating temperatures and thus, not subject to heat distortion or thermal expansion.

Characteristic	Test Method	Value
Reaction to fire - single-flame source	ISO 11925-2 (surface @ 30 sec)	Pass @ 30 sec
Flammability fire test	UL 94	HB rating
Smoke test	NF F 16101&16102	Class F1 Classification
Limited Oxygen Index	EN ISO 4589-2	23%
Reaction to fire performance	EN 13501	D - s3, d0

## 1.6 UV STABILITY

UV tests conducted by the material supplier, on the GRP material used to manufacture ULTIMA Connect.

As moulded GRP sections were exposed to accelerated UV Exposure as per ISO 4892-3:2006 (Method A). The test consisted of a repetitive cycle of 4 hours of UV light (UVB-313 lamp) at 60°C followed by 4 hours condensation (UV light off) at 60°C for a total of 1000 hours. Flexural strength and Modulus was determined before and after exposure as per ISO 14125

Specimen	Average Change in Flexural Strength (%)	Flexural Modulus (%)
Exposed Specimen @ 1000 hr	3	10

## 1.7 CHEMICAL RESISTANCE

Independent chemical resistance tests conducted by an independent third party, on the GRP material used to manufacture ULTIMA Connect.

Samples of GRP product (of the same material composition and a similar wall thickness) were exposed to each of the listed chemicals for 48 hours. Weight and shape changes were determined before and after exposure to the chemical reagents along with flexural modulus and strength.

Specimen	Average Weight Change (%)	Average Change in Flexural Strength (%)	Average Change in Flexural Modulus (%)
Herbicide (2%)	-0.14	-3.0	-1
Kerdane (0.1N)	0.02	-14.8	-4.1
Isooctane (0.1N)	-0.02	-11.1	0
Sodium Hydroxide (0.1N)	0.57	-10.6	0.1
Transformer Oil (Mineral Oil)	-0.02	-8.1	-5.1

### 1.8 OTHER PROPERTIES

*Relevant properties for the GRP material used to manufacture ULTIMA Connect.*

Characteristic	Test Method	Value
Water Absorption @ 24hrs	ISO 62	<0.5%

## 2.0 PRODUCT TESTS

Test reports are available on request.