Catalogue 2016

POLYMERIZATION BY JOULE EFFECT

ELECTRONIQUE AMR

SUMMARY

PRESENTATION

COMPANY

AMR ELECTRONIQUE

Located in Saint just (FRANCE) over 35 years AMR Electronique develops and manufactures new production processes for winding trades. Our expertise how has steadily developed which allows us today to accompany our customers in areas such as:

- The agglomeration winding son with polymerization by Joule Effect
- Analysis and qualification of enameled wire (for new product)
- Connection without unenamelling with COSDEM
- Prototyping of specific products manufactured for the imposed constraints
- The qualification and validation of connections
- Bench Test motors

QUALITY AND PROCESSES

Now present in 5 continents, we give special attention on the quality tools in both :

- Analysis and qualification tests
- Production
- Production management of our equipment

AREAS OF ACTIVITIES

AMR Electronique delivers reliable and sustainable business solutions to our partners in Aeronautics, Automotive, Energy, Medical, Nuclear, Railway ...






PRESENTATION

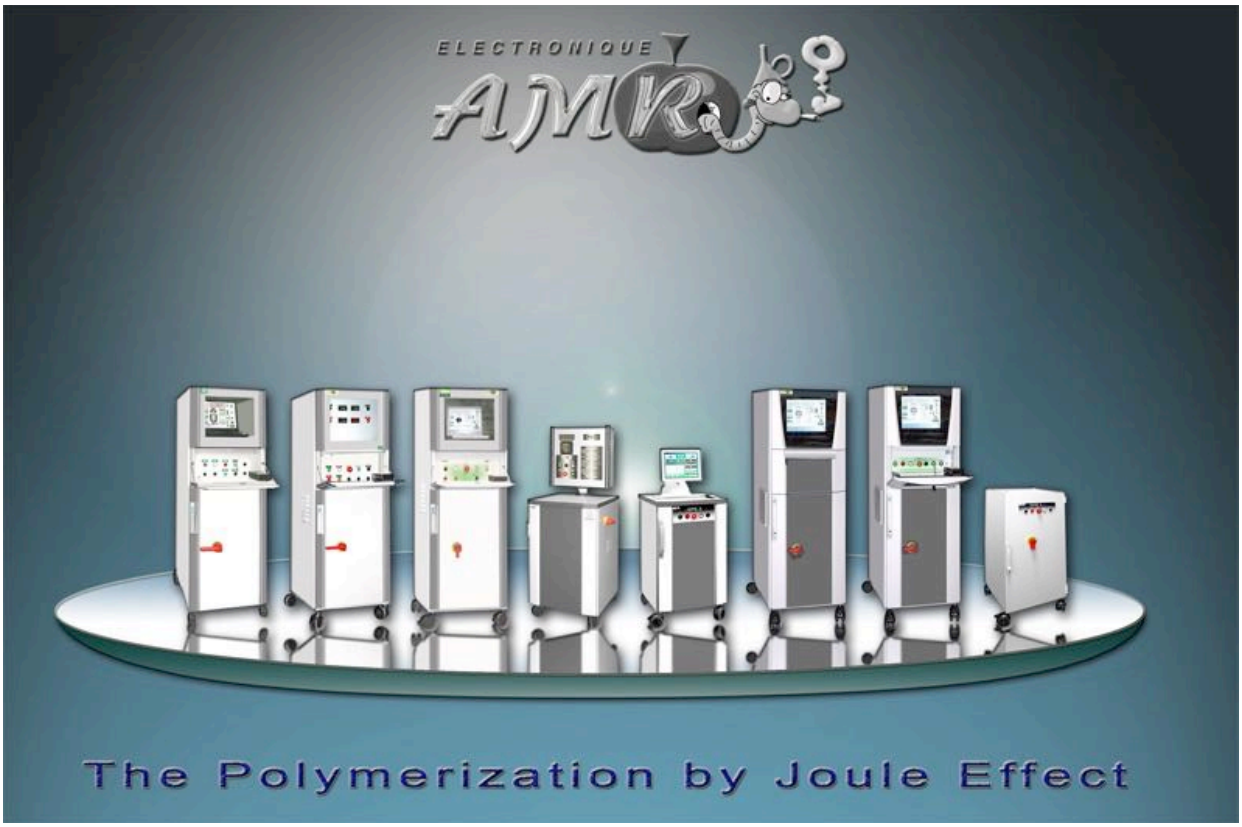
POLY

Polymerization by Joule effect

PRESENTATION

The high performance product machines reference as GPE IV, GPE III and i GPE 3 allow all winding wires polymerization types.

The range of polymerization devices allows the bonding process from small few oz copper coils (many hundreds of ohm) to over 100 Kg DC rotors or stators (less than 2 mΩ)
Each machine is customized to the user's needs for the best result of his winding, for the rate of production, the quality control, all the tests claimed, and the integration in a product line ...



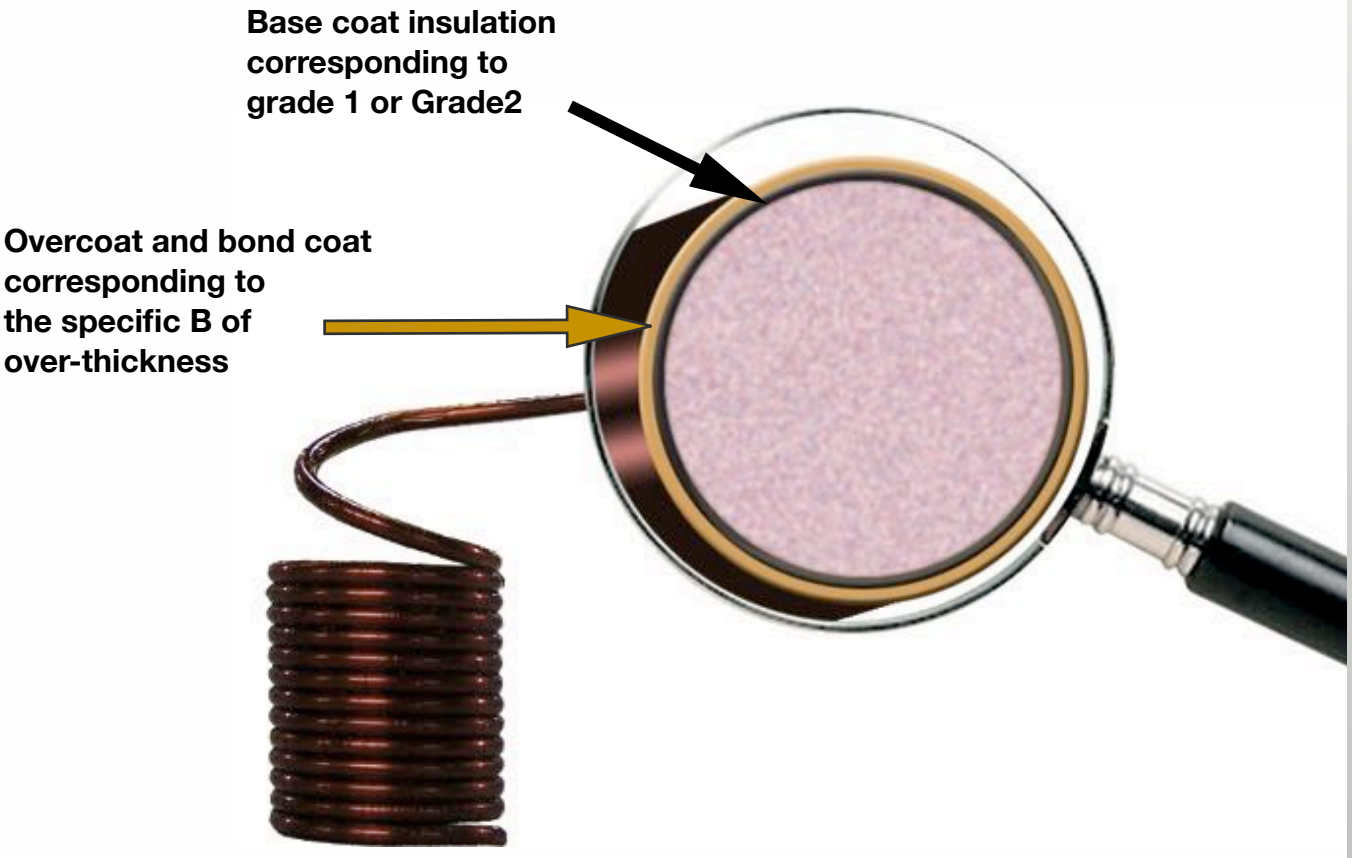
GPE IV are complying with multi-processor computers which provide a great temperature accuracy.
Different interfaces are use and allow easy operating without special training.
Several microprocessors allow interfacing with a product management and a production control system called «GESPROD»

PROCESS

The thermo-setting wire

The thermo-setting bonding wire (copper but also aluminium) is an enameled wire with a bonding final layer (also called bondcoat).

The thermo-setting bonding wire has the properties of being adhesive with heating and it is possible to obtain rigid components (with high resoftening temperatures) likes those obtain by standard impregnation ...



The thermo-setting wire allows the same characteristics like those obtained by impregnation, but the design of products, the process of industrialization and the new approach to the job need to be different.

PRESENTATION

BENEFITS

PRESENTATION

. Due to the polymerization by Joule Effect, it's possible to install more rational lines-product which can be completely automated.

. The needs of impregnation, cleaning or scratching manufactured pieces and tools, needs of drying and oven are suppressed.

. The coils are manufactured with low margins in the measures.

. The use of small molecular weight produce which can deteriorate the components insulation during its life time are suppressed (Removal of the Volatile Organic Components).

. The automation allows to reduce the rejects, the production is managed in real time.

. The financial costs are reduced by a falling of the work-in-progress and the varnish in stock.

. The first risks are reduced, the insurance premium expenses as well.

. Concern the environnement, it's possible to use polymerization lines without any problem in the town planning.

. Due to the Joule Effect Bonding, the electric consumption is reduced about 10 to 100, because Joule Effet allows the increase of temperature of the winding wire only and not the iron pieces and also in a very short times (30 s).

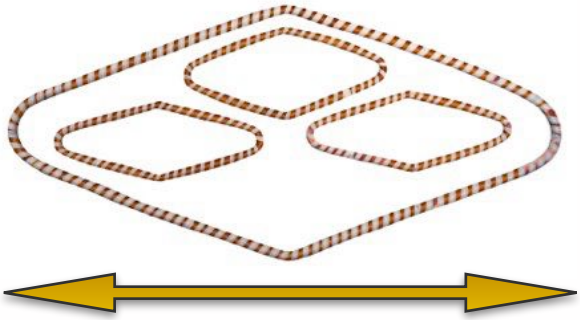
. « PLUG AND PLAY » industrialization.

APPLICATIONS

Mainly oriented to the electric motors, the Joule Effect bonding now comes in the non linear windings, transformers and every type of coils.

Products of 10 pieces to 5000 pieces per day

With Joules Effect flexibility, mass production as well as small production and can be managed.



Very large coils more than 5 meters

PRESENTATION

i GPE 3

MACHINE RANGE

PRODUCT

This machine allows the agglomeration of all types of thermo-setting bonding wires like copper, aluminium and wrapped wires

APPLICATION

Polymerization machine using Joule effect intended for small series of industrial production

OPERATION

Temperature measurement is provided by direct control of the product resistor variations. The speed of température increase is controlled to avoid thermal gradient

Permanent control of product & process parameters with continuous self-control of polymerization temperature with standard generator in complement of temperature calculator

The i GPE3 versatility allows the production of small windings of some hundreds g of copper (<1000 pieces per day) as well as windings of Kg of copper (< 100 pieces per Day)

Technical specifications	
Model	i GPE 3
Cycle duration	20 Sec up to 60 Sec
Range temperature	130°C to 300 °C
Power supply	400 V / 50 Hz and 440 V / 60 Hz
Max power	15 Kw
Dimension	Height : 1640 mm / Width : 680 mm / Depth : 680 mm

i GPE 3 LC

NEW

PRODUCT

This machine allows the agglomeration of all types of thermo-setting bonding wires like copper, aluminium and wrapped wires

APPLICATION

Polymerization machine using Joule effect intended for small series of industrial production

OPERATION

Temperature measurement is provided by direct control of the product resistor variations. The speed of temperature increase is controlled to avoid thermal gradient

Permanent control of product & process parameters with continuous self-control of polymerization temperature with standard generator in complement of temperature calculator

The i GPE3 versatility allows the production of small windings of some hundreds g of copper (<1000 pieces per day) as well as windings of Kg of copper (< 100 pieces per Day)

Technical specifications	
Model	i GPE 3
Cycle duration	20 Sec up to 60 Sec
Range temperature	130°C to 300 °C
Power supply	400 V / 50 Hz and 440 V / 60 Hz
Max power	15 Kw
Dimension	Height : 1640 mm / Width : 680 mm / Depth : 680 mm

MACHINE RANGE

i GPE 4

MACHINE RANGE

PRODUCT

This machine allows the agglomeration of all types of thermo-setting bonding wires like copper, aluminium and wrapped wires

APPLICATION

Polymerization machine using Joule effect intended for large scale industrial productions.

OPERATION

Temperature measurement is provided by direct control of the product resistor variations. The speed of temperature increase is controlled to avoid thermal gradient

Permanent control of product & process parameters with continuous self-control of polymerization temperature with standard generator in complement of temperature calculator

The i GPE4 versatility allows the production of small windings of some hundreds g of copper (< 3000 pieces per day) as well as windings of Kg of copper (< 100 pieces per Day)

Technical specifications	
Model	i GPE 4
Cycle duration	20 Sec up to 60 Sec
Range temperature	130°C to 300 °C
Power supply	400 V / 50 Hz and 440 V / 60 Hz
Max power	150 Kw
Dimension	Height : 1740 mm / Width : 650 mm / Depth : 850 mm

i GPE 4 iv

PRODUCT

This machine allows the agglomeration for direct induction of all types of thermo-setting bonding wires like copper, aluminium and wrapped wires

APPLICATION

Polymerization machine using Joule effect intended for small series of industrial production

OPERATION

Temperature measurement is provided by direct control of the product resistor variations. The speed of temperature increase is controlled to avoid thermal gradient

Permanent control of product & process parameters with continuous self-control of polymerization temperature with standard generator in complement of temperature calculator

The i GPE3 versatility allows the production of small windings of some hundreds g of copper (<1000 pieces per day) as well as windings of Kg of copper (< 100 pieces per Day)

Technical specifications	
Model	i GPE 4 iv
Cycle duration	20 Sec up to 60 Sec
Range temperature	130°C to 300 °C
Power supply	400 V / 50 Hz and 440 V / 60 Hz
Max power	15 Kw
Dimension	Height : 1740 mm / Width : 650 mm / Depth : 850 mm

MACHINE RANGE

GP 70

MACHINE RANGE

PRODUCT

This machine allows the agglomeration of all types of thermo-setting bonding wires like copper, aluminium and wrapped wires

APPLICATION

Polymerization machine using Joule effect intended for repair (Motor of 15 Kw max)

OPERATION

Temperature measurement is provided by direct control of the product resistor variations. The speed of temperature increase is controlled to avoid thermal gradients

Technical specifications	
Model	GP 70
Cycle duration	20 Sec up to 60 Sec
Range temperature	100°C to 300 °C
Power supply	400 V / 50 Hz and 440 V / 60 Hz
Range polymérisation	0,1 Ω up to 10 Ω
Dimension	Height : 310 mm / Width : 510 mm / Depth : 210 mm

GESPROD

Easy to use

The production control uses an interface with the GPE IV operating system.
The device called MCS 51 AMR allows the control and the production of the GPE IV and also with other micro-computers.
This program called « GESPROD » is special for this application which needs the customization for users.

Internet Compatibility

This program allows the internet connections for setting, repair or other informations about production.

DATE	REFERENCE	RTH DEBUT	RTH FIN	TOLERANCE DEBUT	TOLERANCE FIN	R MESURE DEBUT	R CLOUS DEBUT	R MESURE FIN	R CLOUS MAX	DEFAUT	DEFAUT CLOUS
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,00 mΩ	1,50 mΩ	33,99 mΩ	3,2 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,80 mΩ	1,40 mΩ	33,76 mΩ	2,8 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,90 mΩ	1,50 mΩ	33,76 mΩ	2,9 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,90 mΩ	1,30 mΩ	33,98 mΩ	3,1 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,70 mΩ	1,40 mΩ	33,63 mΩ	3,2 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,10 mΩ	1,60 mΩ	33,54 mΩ	2,9 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,70 mΩ	1,30 mΩ	33,56 mΩ	2,9 mΩ		
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11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,00 mΩ	1,60 mΩ	33,96 mΩ	3,3 mΩ		
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11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,00 mΩ	1,60 mΩ	33,85 mΩ	3 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,70 mΩ	1,40 mΩ	33,45 mΩ	2,8 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,10 mΩ	1,60 mΩ	33,76 mΩ	3,1 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,00 mΩ	1,50 mΩ	33,98 mΩ	2,9 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	**12,60 mΩ**				HORS TOL DEBUT	
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,90 mΩ	1,50 mΩ	33,76 mΩ	2,7 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,00 mΩ	1,60 mΩ	33,43 mΩ	3,2 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,80 mΩ	1,30 mΩ	33,54 mΩ	3,1 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,70 mΩ	1,50 mΩ	33,67 mΩ	3,3 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,70 mΩ	1,40 mΩ	33,54 mΩ	3,2 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	18,90 mΩ	1,30 mΩ	33,76 mΩ	2,8 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,10 mΩ	1,60 mΩ	33,74 mΩ	2,9 mΩ		
11/12/05	1897654	19,00 mΩ	34,20 mΩ	5,00%	5,50%	19,00 mΩ	1,50 mΩ	33,78 mΩ	3,1 mΩ		

FORMING TOOLS

EQUIPMENT

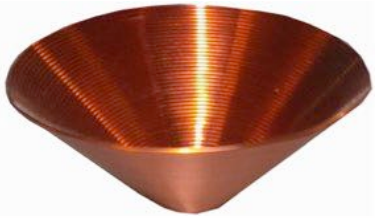
Endeless possibilities

Combined with a press forming the polymerization by effect joule provides a glimpse of the very complex coil geometry.

Geometric precision

The affected geometric precision is an order of 0,1 mm according to the type of coil.

This type of process also allows the manufacture of orthocyclic winding



INTEGRATION

AMR ACHIEVES THE INTEGRATION ACCORDING TO YOUR SPECIFICATION

- Manufacturing line production
- Integration of production line
- Unit design for small or medium series

EQUIPMENT

INTEGRATION

EQUIPMENT

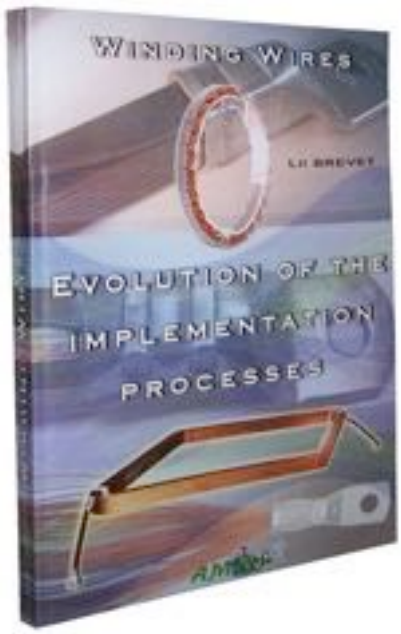
Example of Manufacturing line production

- For large production series
- Quality Controls
- Production Controls
- Operation of damaged parts
- https://www.youtube.com/watch?v=r0BuoI5t1dc

Example of Integration

WINDING WIRES

Evolution of the implementation processes



Editor : AMR ELECTRONIQUE

Collection / Série : Winding wires ; 1

215 pages ; 21 x 15 cm ;

ISBN 978-2-9519035-3-1

This collection is designed for Professionals winding.
It tries to present the state of the art and especially the evolution of products and processes in the coming years.

It shows some new production tools and the Industrial Quality Tools needed for different sectors.

The approach to these tools is pragmatic and some formulas and tables that illustrate these pages are given to indicate to the reader the orientation of its industrial development.
This book tries to debunk some assertions from the nature of things ... ... and ... habits...

Test resources

QUALIFICATION

AMR's Testing Laboratory allows automatic tests. (digital bench tests). Tests are driven according to the current norms or to customers specified needs, as well enamel behavior on copper and different bonding tests or dielectrique tests eat…

Tensile test

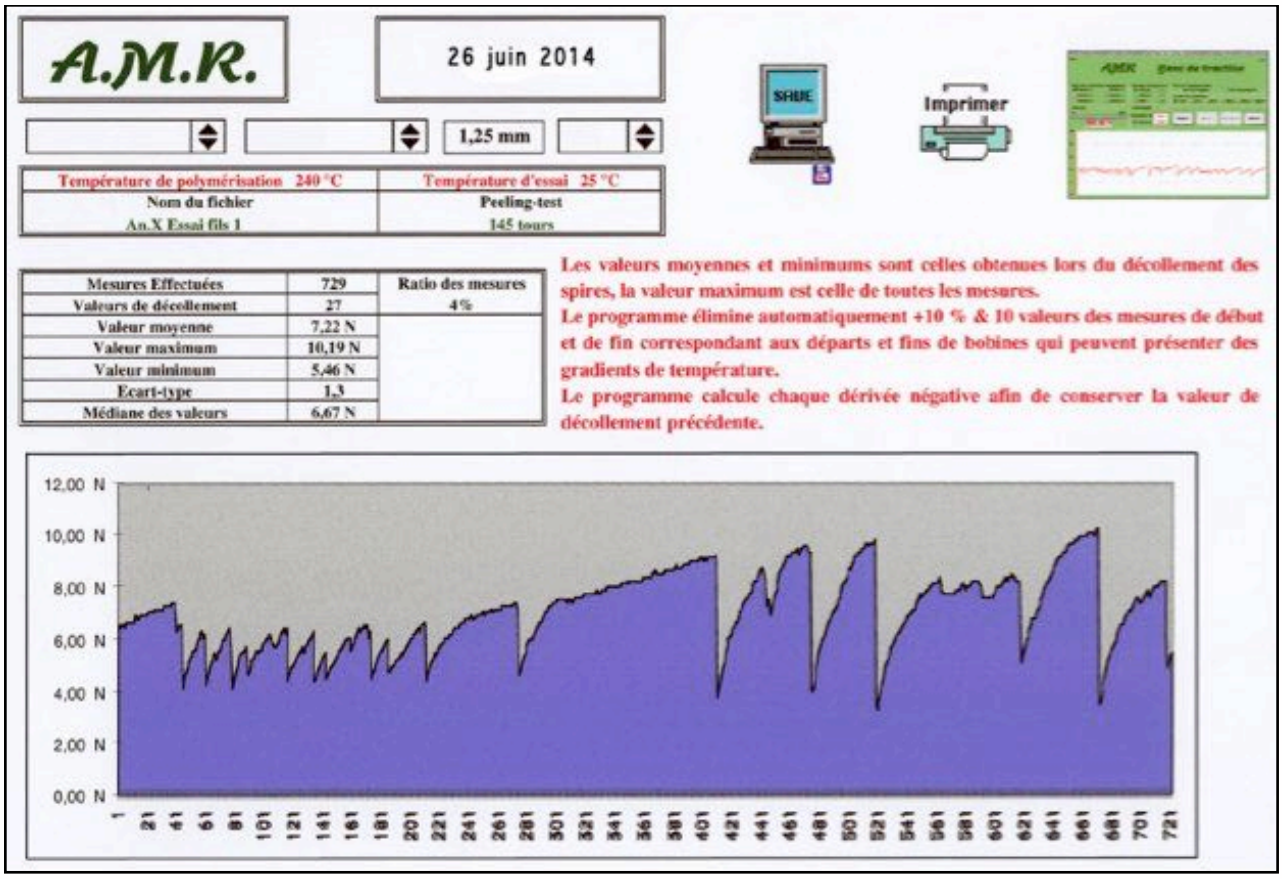
Technical specifications	
Model	BTE1
AMR number	AMR0123
Capacities	200 N
Range section	0,1 up to 1,5 mm2
Steamed system	20 °c up to 210 °C
Acquisition system	Force/ Time/ Temperature

Test resources

Why characterize a self bonding wire ?

Standard or not standard tests managed by wires manufacturers have shown their limitations as final customers can obviously notice.
Analysis and test processes must be defined in order to satisfy the different specific customers needs.
Test procedures can be managed with a confidentiality contact with final customers wires manufacturers asking for.

The protocol consists of putting five samples at each points of temperature (25°C,55 °C, 105 °C, 155 °C, 180°C, 210°C) and measure each separation point in order to draw a mini values, max and average.



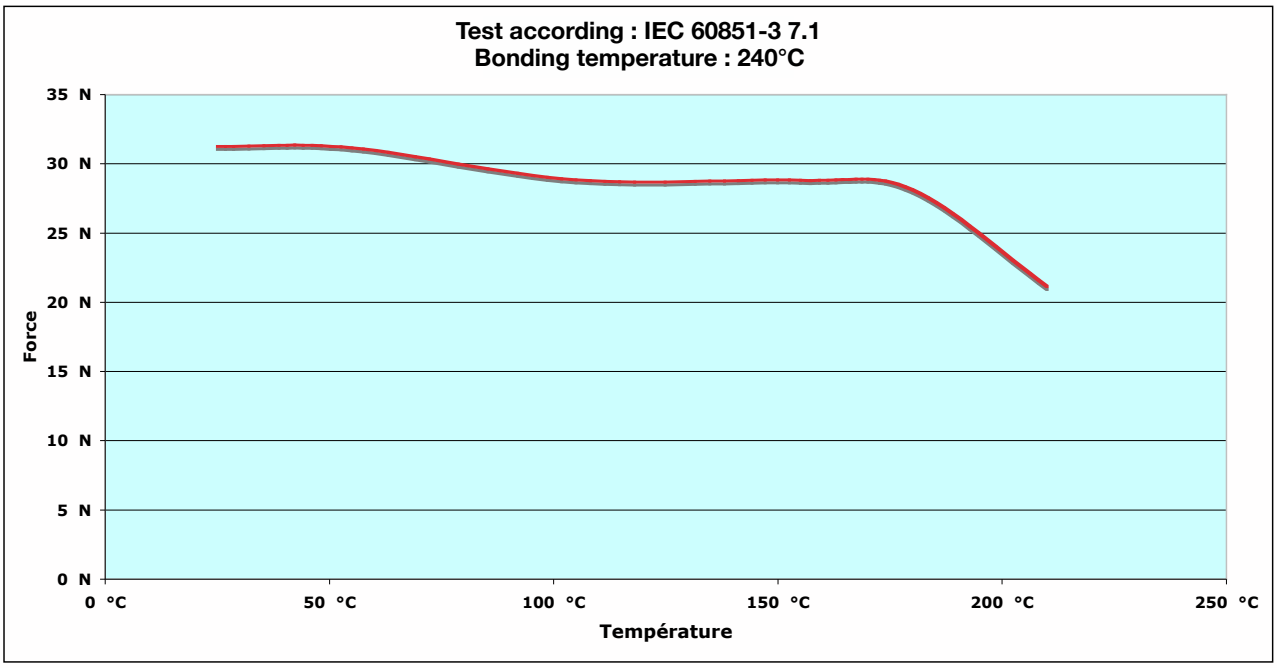
QUALIFICATION

Test resources

QUALIFICATION

Residual bonding curve

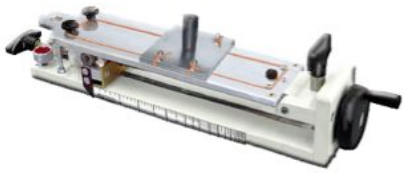
The previously collected values for characterizing a self bonding wire mechanical temperature resistance

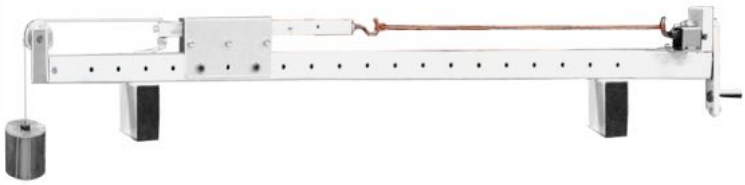


Test resources

Mechanical test

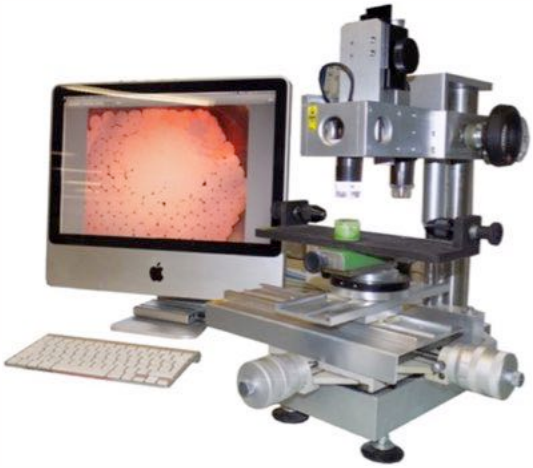
AMR has a set of enabling means of achieving the mechanical tests in the field of enameled wire. (Rupture test, Peel test, Springiness measures, Slide test.





Micro-photography

Optical measurement tools allow visualization of the qualification results.
Analysis wire Ø 0.01 mm



QUALIFICATION

SHOW

COMMUNICATION

→ Appointment in 2017 with our patner SOFILEC to attend the demonstration COSDEM.

→ Type of conductor, insulation system, working frequency, held dielectric, operating temperature, types of converters, efficient connector, connection and agglomeration process, we offer you solutions complete adapted to growing requirements for design your winding.

→ Find our demonstration video on you tube :
https://www.youtube.com/channel/UCqvJm5zm-OpFsiAPhH1AQEg

LOCALIZATION

COMMUNICATION

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Localization (GPS)

http://cosdem.com/Fr/Index.htm