

ESSEX ITALY

QUATTORDIO PLANTS



Quattordio 1



Quattordio 2



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Plants

Quattordio (AL) – Italy

Via Circonvallazione 2

(Quattordio 1)

Via Serra 3

(Quattordio 2)



essex italy	5
60 years of experience and development	6
essex italy factories	7
enamelled wires	8
special conductors	9
Quality policy	11
Product designation	12



ESSEX ITALY

Superior Essex Inc. is one of the largest wire and cable manufacturers in the world.

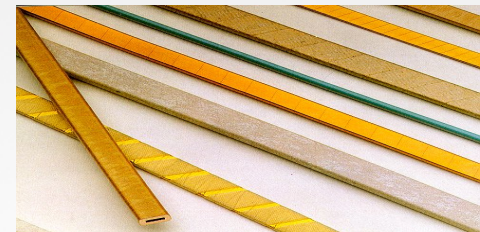
The Essex European Group is a world leader in the field of wires for electrical equipment windings.

The product range is exceptionally wide and ranges from fine enamel-coated wires to large conductors for transformers.

Its considerable industrial strength has been traditionally oriented towards the technological development and service to customers.

This effort is the strongest guarantee of an increasingly wider co-operation with customers and of a far-reaching international future.

ESSEX is internationally present through a wide marketing and distribution organisation, with the complete range of magnet wires and a well known record for products quality, process technology and customer service.



60 years of experience and development

ESSEX ITALY SpA was established in 2007, as result of the acquisition of INVEX SpA by Superior Essex Inc..

INVEX was established in 1948 at Quattordio (100 km from Milan) and began in short time a strong industrial development in the enamelled wires market, becoming Leader in Italy.



With a turnover greater than 200 million EURO and 50000 tons and two production plants in Italy, ESSEX ITALY contributes in significant way to the results of ESSEX EUROPE and then to Superior Essex, the world leader in the field of wires for electrical equipment windings.

In 1991 ESSEX ITALY Quality System was firstly certified ISO 9001 by third part (BVQI).

ESSEX ITALY SpA is certified now ISO/TS 16949:2002 for the activity of design and manufacturing of enamelled wires for Automotive. Certificate CSQ 9136/INV2 12.2.2007/11.2.2010.

This result is the conclusion of strong efforts in managing total quality during the past years and is the starting point for future improvements.

ISO9001:2000 certification has been reaffirmed for the production of transposed conductors and special covered conductors for electrical applications. Certificate CSQ 9136/INV2 2.3.2007/12.2.2010.

Environmental Management System is certified ISO14001:2004 by CSQ (certificate 9191.INVX and IQNET IT-31158 7.2.2007/9.5.2009 – first issue SGS January 2000).

These certificates last for three years.

ESSEX ITALY factories

Production activities in ESSEX ITALY are done in two plants, called Quattordio 1 (Q1) and Quattordio 2 (Q2).

Quattordio 1

Quattordio 1 is the first factory of ESSEX ITALY.

It is settled at Quattordio (AL) 100 km from Milan, Turin and Genoa on a surface of 78000 m² (approx. 30000 m² are covered).

This plant produces all type of round enamelled wires using modern machines, getting the highest productivity levels.

At Quattordio 1 are located the Managing Director and the Administration Control, the Information Systems Center, the Sales Offices for the Round Enamelled Wires Market and for the Transposed Conductors and other covered conductors market and the Sales Administration. At Quattordio 1 is also placed the Industrial Direction (Operation) with the production of round enamelled wires, the logistic, the Quality, the Research and Development and the Safety and Environment Service.

Quattordio 2

In this plant are produced transposed conductors, enamelled rectangular wires, covered conductors with special tapes and fiberglass, sector conductors for submarine power cables.

Superconductor cable insulation is also done in this factory.

Quattordio 2 is located at Quattordio (AL) on 24000 m² (approx. 12000 m² are covered).



Enamelled round wires

Enamelled wires produced by INVEX are essential for the functional operation of all devices using electromagnetic fields and particularly rotating magnetic fields.

All the marks in this catalogue are registered by ESSEX.

At the end of the catalogue a cross-reference between INVEX and ESSEX products designation is done.

Motors of all types and dimensions use MAGNETEMP CA-200 - TENVEX 200 enamelled wire with a temperature index greater than 200, while in the oil power transformers are used FORMVEX enamelled wires with temperature index of 120 or TENVEX 200 oil resistant.

For equipment that need good solderability we suggest to use SALDAVEX F (155 temperature index) with good solderability at 375° C.

MAGNESOL U-180 - SALDAVEX H (also UL approved) is available for class H, with good solderability at 390° C up to 1.00 mm.

Self-bonding wire is used when the heat bonding technique is needed for the winding, without any impregnation varnish.

In this case the product are MAGNEBOND AUTOVEX F, self-bonding at 150-170° C applied over a MAGNESOL U-155 - SALDAVEX F, and MAGNEBOND CAB-200 - AUTOVEX H, self-bonding at 180-210° C, applied over MAGNETEMP CA-200 - TENVEX 200.

For low bonding temperature without solderability requirement we suggest MAGNEBOND UL-180 - AUTOVEX F applied on MAGNETEMP CA-200 - TENVEX 200. Other combinations are available.

MAGNETEMP CA-200 - TENVEX 200 can be produced with a special lubrication for compressor motors in freon R134a. This product is called TENVEX 200 EC2.

MAGNETEMP CA-200 - TENVEX 200 IT 210 is the best choice for high temperature resistance wire at low price and good availability.

For very high thermal resistance MAGNETEMP A-220 - TENVEX 220 with polyamide-imide resins is possible to use.

All these products (excepted FORMVEX and AUTOVEX F) are approved by Underwriters Laboratories (U.L.) under the file E45523 of ESSEX ITALY SpA and E67139 of Essex SAS and are produced according to conformity certification agreement for some customers.

Special conductors

INVEX produces a wide range of special conductors for electrical machines windings.

They are generally conductors for the transformers market, for high power motors and generators.

The main product is the Transposed Conductor, multiple conductor composed by enamelled rectangular wires combined in continuous way in two stacks and transposed in order to give good windability on the winding core and reduced electrical losses.

For special applications we suggest the transposed conductor without paper, with a special arrangement, using a plastic wire resistant to transformer oils, also available with special insulation papers on the sides.

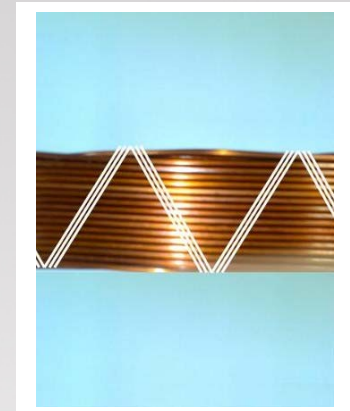
For the same market are produced single or multiple copper or aluminium strips, enamelled or not, generally covered with paper for electrical applications, aramidic paper, polyimide films.

Rectangular wires can be enamelled or/and covered with several types of tapes such as polyester, mica composed with glass or polyester, polyimide films for very high and very low temperatures, glass with impregnation of organic resins.

Rectangular wires can also be covered with fibreglass or fibreglass/polyester, impregnated with resins of different temperature indexes, for application such as traction motors, generators and other applications where a high mechanical resistance is required together with resistance to chemicals and high voltage.

Superconductor cables insulation is another activity of ESSEX ITALY, since many years, for particular market niches (magnets).

ESSEX ITALY produces under request other special conductors and develops with its major customers specific products used for special applications. ESSEX ITALY produces in Italy over 10000 tons per year of special conductors according to IEC Standards or according to customers specifications.



Special conductors

PRODUCT	RANGE mm	MAIN PROPERTIES AND APPLICATIONS
TRANPOSED CONDUCTORS (CTC)	Strands: width from 2.5 up to 12.5 mm, thickness from 1.1 up to 3.15 mm, ratio from 2.5 up to 6.5 CTC from 5 up to 85 strands - width from 5 up to 25 mm - height from 4 up to 80 mm - ratio less than 5	For transformers. Thermal index $\geq 120^{\circ}\text{C}$ for FORMVEX and FORMICEMENTEX strands for oil transformers and $\geq 200^{\circ}\text{C}$ for TENVEX 200 strands for air transformers. Soft copper or proof stress controlled copper according to EN 13601:2000 or other Standards. Aluminium available upon request. Up to 32 kraft paper tapes. Other papers available. For transformers without paper, polyester cord application is available.
PAPER COVERED RECTANGULAR WIRES	Strips from 2 up to 150 mm ² max width 25 mm ratio width/thickness 2-8.5	For oil transformers. Kraft papers 0.05 and 0.08
RECTANGULAR ENAMELLED WIRES	strips from 4 up to 60 mm ² min 1 x 4 max 1.8 x 20	Double coating polyester (imide) + polyamide-imide. Electric windings operating in class 200
COVERED CONDUCTORS	Strips from 2 up to 150 mm ² max width 25 mm ratio width/thickness 2-8.5	For different applications depending on the type of insulation. Special tapes available: mica/polyester, fibreglass, polyester, pre-pregs
NOMEX COVERED CONDUCTORS	Strips from 2 up to 150 mm ² max width 25 mm ratio width/thickness 2-8.5	For dry transformers winding. Copper rectangular wires covered with T 410 Nomex™ paper. Nominal overall insulation 0.25 mm with 0.05 mm paper in alternate direction. Other type of arrangements are available
TWIN AND MULTIPLE CONDUCTORS	Strips from 2 up to 150 mm ² max width 25 mm ratio width/thickness 2-8.5	For compact windings and high efficiency transformers. Different types of twin conductors are available. Single strip paper covered and twin conductor paper covered. Single strip enamelled and twin conductor paper covered. One strip paper covered and the other no covered, twin conductor paper covered.
SUPERCONDUCTORS INSULATION	Check for availability	According to customer requirements
CONCI - SECTORS	Check for availability	According to customer requirements
BARE RECTANGULAR WIRES	0.20 – 5.00 mm round wires - strips from 4 up to 60 mm ² max 1.8 x 20	Rectangular wires generally for automotive applications. Round wires for general applications.
FIBREGLASS COVERED CONDUCTORS	bare or enamelled strips 5-50 mm ²	For windings of electric motor stators, generators, special transformers, reactance and other applications where high chemical resistance and electrical insulation properties are required at high temperature



QUALITY POLICY

ESSEX ITALY QUALITY POLICY

is based on the following 4 principles

FULL CUSTOMER SATISFACTION

absolute priority

QUALITY FIRST OF ALL

Quality as strategic key factor

CONTINUOUS IMPROVEMENT

As main process for the whole company

TOTAL INVOLVEMENT OF ALL RESOURCES

the only possible way



Compliance with Quality Standards

- Essex Italy Quality System complies with ISO 9001:2000 and ISO/TS 16949:2002 standards, and is certified by:

- **ISO/TS 16949:2002 INVEX1**

Design and manufacturing of magnet wires for automotive

CSQ - Certificate no. 9136.INV2 13.11.2007/11.2.2010

- **ISO9001:2000 INVEX 2**

Design and manufacturing of transposed conductors and covered conductors for electrical applications

CSQ - Certificate no. 9125-PIR9 13.11.2007/11.2.2010

and IQNET - Certificate no. 8970

13.11.2007/11.2.2010

First issue of ISO certification by BVQI (26.3.91)



Environment & Safety

- Since 2000, Invex is certified **ISO 14001**
 - CSQ Certificate no. 9191.INVX IQNET IT-31158
13.11.2007/9.5.2009



Products Certification

ESSEX ITALY products are certified by



according to

UL OBMW2.E32638/E45523

Magnet Wire - Component



Families of products

Round wires

Magnetemp® - high temperature wire

Magnebond® - selfbonding wire

Magneform® - polivynilacetal wire for transformers

Magnesol® - solderable wire



Designation

CONDUCTOR	SIZE	INCREASE IN DIMENSIONS	TYPE	COLOUR
Copper: without details	mm bare wire	Grade 1/2/3: G1/G2/G3	Product designation	Colour-free: NAT
		Grade 1B: G1B		Green: GRN
Aluminium: AL		Grade 2B: G2B		Black: BLK
				Purple: PRL
				Red: RED
				Gold: GLD
Example:	0.60	G1B	Magnebond® CAB 200	NAT



Magnebond® CAB 200

C	A	B	← CAB	200
			CODE	TYPE OF VARNISH
			X	EPOXY
			N	POLYAMIDE
			L	POLYAMIDE ALIPHATIC
			B	POLYAMIDE AROMATIC
			R	POLYAMIDE AROMATIC ROTOR
			A	POLYAMIDE IMIDE
			K	POLYESTER
			P	POLYESTER THEIC
			D	POLYESTER AMIDE IMIDE
			E	POLYESTERIMIDE (solderable)
			C	POLYESTERIMIDE THEIC
			Y	POLYIMIDE
			U	POLYURETHANE
			V	POLYVINYL BUTYRAL
			F	POLYVINYL ACETAL
				BASE-COAT TEMPERATURE INDEX
				According to IEC/NEMA
				95
				105
				120
				130
				155
				180
				200
				220
				240

Bonding

Overcoat

Base-coat



Cross-reference

INVEX - ESSEX

INVEX	ESSEX	IEC	NEMA
AUTOVEX H	MAGNEBOND® CAB-200	60317-38	MW 102
AUTOVEX F	MAGNEBOND® UL-180	60317-35	
FORMVEX	MAGNEFORM® F-120	60317-12/18	MW 15, 18
SALDAVEX F	MAGNESOL® U-155	60317-20	MW 79
SALDAVEX H	MAGNESOL® U-180	60317-51	MW 82
SALDAVEX H NY	MAGNESOL® UN-180	60317-55	MW 83
TENVEX H	MAGNETEMP® C-180	60317-8	MW 30, 74
TENVEX H NY	MAGNETEMP® CN-180	60317-22	MW 76
TENVEX 200	MAGNETEMP® CA-200	60317-13/29	MW 35, 73, 36
TENVEX 200 EC2	MAGNETEMP® CA-200	60317-13	MW 73
TENVEX 200 IT210	MAGNETEMP® CA-200	60317-13	MW 35, 73
TENVEX 220	MAGNETEMP® A-220	60317-26	MW 81

Cross-reference

ESSEX-INVEX

ESSEX	INVEX	IEC	NEMA
MAGNEBOND® CAB-200	AUTOVEX H	60317-38	MW 102
MAGNEBOND® UL-180	AUTOVEX F	60317-35	
MAGNEFORM® F-120	FORMVEX	60317-12/18	MW 15, 18
MAGNESOL® U-155	SALDAVEX F	60317-20	MW 79
MAGNESOL® U-180	SALDAVEX H	60317-51	MW 82
MAGNESOL® UN-180	SALDAVEX H NY	60317-55	MW 83
MAGNETEMP® C-180	TENVEX H	60317-8	MW 30, 74
MAGNETEMP® CN-180	TENVEX H NY	60317-22	MW 76
MAGNETEMP® CA-200	TENVEX 200	60317-13/29	MW 35, 73, 36
MAGNETEMP® CA-200	TENVEX 200 EC2	60317-13	MW 73
MAGNETEMP® CA-200	TENVEX 200 IT210	60317-13	MW 35, 73
MAGNETEMP® A-220	TENVEX 220	60317-26	MW 81

Trafo Products

TRANSPOSED CONDUCTORS

PAPER COVERED or CORDEX (PAPERLESS)

PVA or PEI or SB PVA+EPOXY

SOFT – HARD – HARD PLUS

CU-ETP or CU alloy or CU-OF or Aluminium

COVERED CONDUCTORS

SINGLE BARE – SINGLE ENAMELLED

TWIN/TRIPLE BARE – ENAMELLED

SPECIAL TAPES (NOMEX, MYLAR, MICA, GLASS)

ENAMELLED FLAT WIRES

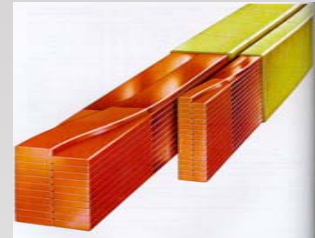
GLASS FIBER FLAT WIRES

SPECIAL BARE PROFILES (CONCI/KEYSTONE)



COPPER

Cu-ETP	From grade A Cathodes
Cu-OF	Oxygen free copper for konform line
Cu (0.1 Ag)	Silver bearing copper for hard plus CTC



ENAMEL

TYPE / TM REGISTERED	MATERIAL	THERMAL CLASS
FORMVEX-MAGNEFORM F-120	Polyvinylformol	130° C
TENVEX 200-MAGNETEMP CA-200	Polyester (-imide) + amide-imide	>200° C
TENVEX 200 SB – MAGNEBOND CAB-200	Polyester (-imide) + amide-imide + epoxy	>200° C
FORMICEMENTEX-MAGNEFORM FX1/2-130	Polyvinylformol + epoxy	>130° C

PAPER

TYPE	CHARACTERISTIC
Kraft	High purity
Kraft HD	High density and dielectric strength
Creped TUP HD	High mechanical and thermal characteristic
Kraft TU HD	Thermally upgraded high density
Kraft epoxy	Epoxy coated
Nomex	High temperature resistance



CORDEX

Cross-reference

INVEX - ESSEX

INVEX	ESSEX	IEC	NEMA
CAVO TRASPOSTO	TRANSPOSED CONDUCTOR	-----	-----
FORMVEX ®	MAGNEFORM® F-120	60317-18	MW18
FORMICEMENTEX ®	MAGNEFORM® F-120 + epoxy b-stage bonding coat	60317-18	MW18
TENVEX 200 ®	MAGNETEMP® CA-200	60317-29	MW 36
ELETTROVEX ® = TENVEX 200 + 1 / 2 VETRO	FIBERGLASS WRAPPED WIRE	60317-31-32-33	MW 52-53
PIATTINA CARTA	PAPER COVERED FLAT WIRE	60317-27	MW 33
PIATTINA MICA MYLAR	MICA/POLYESTER COVERED FLAT WIRE	----	-----
BINATA o TRINATA	TWIN or TRIPLE CONDUCTOR	-----	-----

Cross-reference

ESSEX - INVEX

INVEX	ESSEX	IEC	NEMA
TRANSPPOSED CONDUCTOR	CAVO TRASPOSTO	-----	-----
MAGNEFORM® F-120	FORMVEX ®	60317-18	MW18
MAGNEFORM® F-120 + epoxy b-stage bonding coat	FORMICEMENTEX ®	60317-18	MW18
MAGNETEMP® CA-200	TENVEX 200 ®	60317-29	MW 36
FIBERGLASS WRAPPED WIRE	ELETTROVEX ® = TENVEX 200 + 1 / 2 VETRO	60317-31-32- 33	MW 52-53
PAPER COVERED FLAT WIRE	PIATTINA CARTA	60317-27	MW 33
MICA/POLYESTER COVERED FLAT WIRE	PIATTINA MICA MYLAR	----	-----
TWIN or TRIPLE CONDUCTOR	BINATA o TRINATA	-----	-----