



INVEX CATALOGUE

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Stabilimenti

Quattordio (AL) – Italy

**Via Circonvallazione 2
(INVEX 1)**

**Via Serra 3
(INVEX 2)**

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INVEX



INVEX is a world leader in the field of wires for electrical equipment windings.

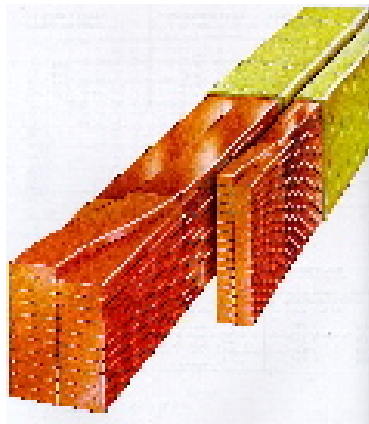
The product range is exceptionally wide and ranges from fine enamel-coated wires to large conductors for transformers.

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.

INVEX 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.



More than 50 years of experience and development

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, INVEX is one of the world leaders in the field of wires for electrical equipment windings.



In 1991 INVEX Quality System has been firstly certified ISO 9001 by third part (BVQI).

INVEX SPA is certified 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 12.2.2007/11.2.2010.

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.

Invex factories

Production activities in INVEX are done in two factories, called INVEX 1 and INVEX 2.



INVEX 1

INVEX1 is the first factory of INVEX.

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

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



INVEX 2

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

Superconductor cable insulation is also done in this factory.

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

Enamelled round wires

FORMVEX	Enamelled wires produced by INVEX ¹ are essential for the functional operation of all devices using electromagnetic fields and particularly rotating magnetic fields.
TENVEX 200	Motors of all types and dimensions use 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.
SALDAVEX H	SALDAVEX H (also UL approval) 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.
AUTOVEX	In this case the product are AUTOVEX F, self-bonding at 150-170°C applied on a SALDAVEX F, and AUTOVEX H, self-bonding at 180-210°C, applied on TENVEX 200. For low bonding temperature without solderability requirement we suggest AUTOVEX F applied on TENVEX 200. Other combinations are available. TENVEX 200 can be produced with a special lubrication for compressor motors in freon R134a. This product is called TENVEX 200 EC2. TENVEX 200 IT 210 is the best choice for high temperature resistance wire at low price and good availability. For very high thermal resistance is possible to use TENVEX 220 with polyamide-imide resins or INVEX ML with polyimide resins. All these products (excepted FORMVEX and AUTOVEX F) are approved by Underwriters Laboratories (U.L.) under the file E45523 for INVEX SpA and are produced according to conformity certification agreement for some customers. Some products are only available if required in sufficient quantity. Please ask our sales Dept. for the minimum available quantity. INVEX produces in Italy over 40000 t of enamelled wires per year in the range from 0.17 mm up to 6 mm according to IEC 60317-0-1 Standard or according to customer specification.
U.L. APPROVAL	

¹ All the marks in this catalogue are registered by INVEX SpA (®)

Enamelled round wires

Made in Italy

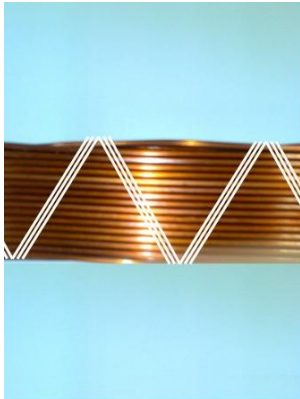
PRODUCT	RANGE mm	THERMAL INDEX	MAIN PROPERTIES
SALDAVEX F	0.20-1.50	155	Polyurethane resins, solderable at 375°C
SALDAVEX H	0.20-1.50	180	Modified polyurethane resins, solderable at 375°C
TENVEX H	0.20-5.00	180	Polyester (imide) resin, for class 180 applications
TENVEX 200	0.18-5.00	200	Double coating polyester (imide) resin plus polyamide-imide class 200
TENVEX 200 EC2	0.28-1.00 G2	200	Tenvex 200 for compressor motors R134a
TENVEX 200 IT210	0.224-3.55	210	Tenvex 200 for locked rotors test motors
TENVEX 220	0.25-0.45	220	Polyamide imide resin for high temperature applications
AUTOVEX H TENVEX 200	0.224-1.06	200	Overcoating aromatic polyamide bondable resin (190-210°C bonding temp.), over TENVEX 200 for motors

Available upon request:

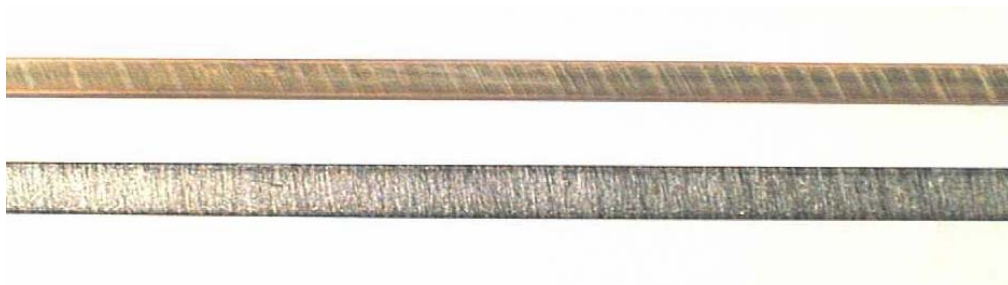
PRODUCT	RANGE mm	THERMAL INDEX	MAIN PROPERTIES
FORMVEX	0.45-5.00	130	Polyvinylformol resin, excellent resistance to transformers oils
AUTOVEX F SALDAVEX F	0.224-0.65	155	Overcoating polyamide bondable resin (160-190°C bonding temp.), over SALDAVEX F for small motors
AUTOVEX F TENVEX 200	0.224-1.06	200	Over TENVEX 200 for TV yokes and motors
AUTOVEX 200	0.224-0.65	200	TENVEX 200 overcoated with polyester bondable resin (210-230°C bonding temp.) for magnet coils

Special conductors

TRANSPOSED CONDUCTORS



COVERED 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 or aramidic paper.

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 INVEX, since many years, for particular market niches (magnets).

INVEX produces under request other special conductors and develops with its major customers specific products used for special applications. INVEX 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 TM 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	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

Other types of arrangements are available. For specific information please require technical cards.

The strong points

INVEX 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



EFFICIENCY

High efficiency of INVEX structure is the tool for getting these principles.

QUALITY

Product Quality is the direct consequence of the preventive management of problems, enabling to look forward to the variability effects of the industrial activities.

CUSTOMER SERVICE

INVEX is in the market with over 1000 customers, using a suitable network of agents and resellers in Italy and overall in the world.

CONTINUOUS IMPROVEMENT

Customer Service is the direct consequence of the logistic and organisation engagement, under delivery times agreed, with the involvement of all the INVEX personnel.

Customer requirements are satisfied due to the capacity to solve the problems for the use of products in a short time.

INVEX Quality System is based on the continuous improvement.

Improvement activities are done by working groups with the involvement of personnel of all the sectors, with positive commitment, turned to get the best.

Technology and research

DESIGN

INVEX confirms its central role in the progress of the industry. Superconductors cables insulated by INVEX have been used in projects of big synchrotrons, the HERA of the Desy Laboratory in Hamburg (Germany) and the LHC of the CERN in Geneva.

DEVELOPMENT

The high quality standard combined with the large process capability enables very tight tolerance limits to be used throughout the whole product range, from the round fine wires to the large transposed conductors.

INNOVATION

The traditional INVEX feeling towards industrial innovation has allowed the setting of new departments totally automated in the production, control, monitoring and servicing.

RESEARCH

INVEX has a research structure that develops new solutions for the market in general and specific for some customers with partnership agreement for technical co-operation.



ISO/TS 16949:2002

Quality system

CSQ
AUTO
www.imq.it

CERTIFICATE N. 9136.INV2

SI CERTIFICA CHE IL SISTEMA QUALITA' DI
WE HEREBY CERTIFY THAT THE QUALITY SYSTEM OPERATED BY
INVEX SPA
VIA CIRCONVALLAZIONE 2 - 15028 QUATTORDIO (AL)
UNITA' OPERATIVE
OPERATIVE UNITS
VIA CIRCONVALLAZIONE 2 - 15028 QUATTORDIO (AL)

E' CONFORME ALLA NORMA
IS IN COMPLIANCE WITH THE STANDARD
ISO/TS 16949:2002

PER LE SEGUENTI ATTIVITA'
FOR THE FOLLOWING ACTIVITIES
Progettazione e produzione di fili smaltati per Automotive
Design and manufacturing of magnet wires for Automotive

IL PRESENTE CERTIFICATO E' SOGGETTO AL RISPETTO DEL REGOLAMENTO
PER LA CERTIFICAZIONE DEI SISTEMI QUALITA' E DI GESTIONE DELLE AZIENDE
THE USE AND THE VALIDITY OF THE CERTIFICATE SHALL SATISFY THE REQUIREMENTS
OF THE RULES FOR THE CERTIFICATION OF COMPANY QUALITY AND MANAGEMENT SYSTEMS

Valutazione condotta secondo le "Regole dello schema di certificazione ISO/TS 16949:2002 - Seconda Edizione Maggio 2004"
Having been assessed in accordance with "ISO/TS 16949:2002 certification scheme rules - Second Edition May 2004"

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CISQ è la Federazione Italiana di
Organismi di Certificazione dei
sistemi di gestione aziendale
CISQ is the Italian Federation
of management system
Certification Bodies

 EA: 19 

Environmental system ISO 14001:2004



ISO 9001:2000 Quality System



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