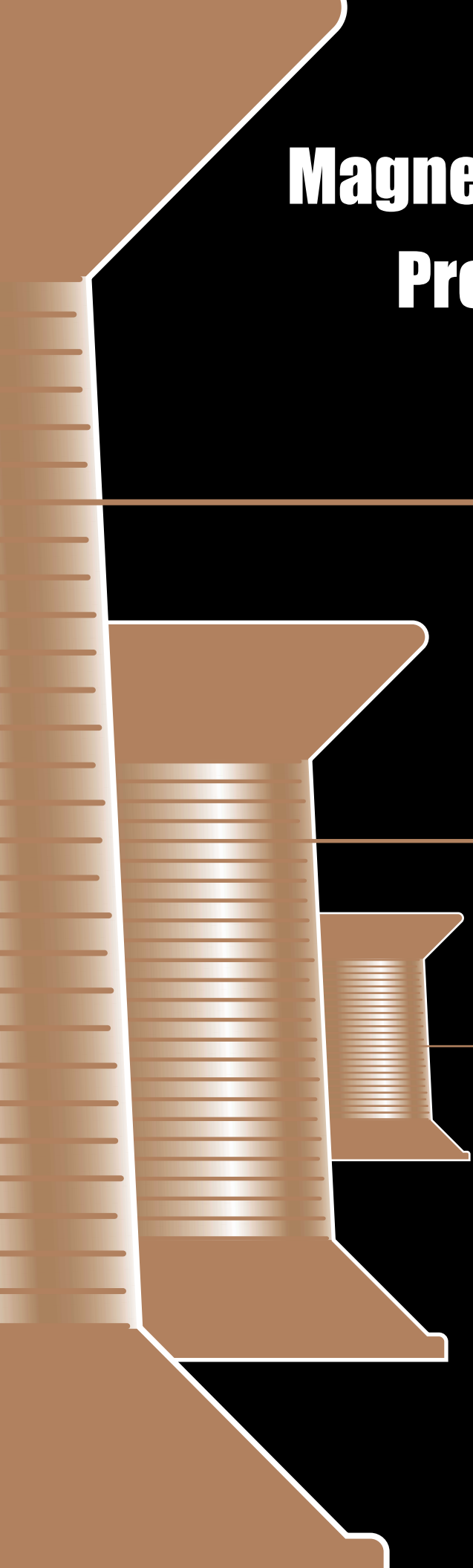


Magnet Wire / Winding Wire Product Application and Packaging Data



www.superioressex.com

Magnet Wire / Winding Wire and Packaging Selection

Thank you for your interest in SUPERIOR ESSEX Magnet Wire/Winding Wire! As the global leader in magnet wire/winding wire, it is our intent to provide our customers with the highest quality products available on the market. All of our magnet wire facilities have stringent quality standards that constantly strive to meet or exceed our customer's expectations of our products. The quality systems of all magnet wire manufacturing facilities have been registered as compliant to both ISO 9002 and QS-9000. As the design center for magnet wire products, the Fort Wayne, Indiana headquarters holds both ISO 9001 and QS-9000 registrations. Numerous awards related to SUPERIOR ESSEX products and service levels have been received from customers in a wide variety of industries.

This Product Application and Packaging Data Guide should be useful for evaluation of all of the various magnet wire insulations available at SUPERIOR ESSEX, as well as in the selection of the proper packaging to fit the application during the winding process.

The magnet wire properties governing proper selection not only require consideration of the end use conditions, but system compatibility and ease of use in production. Solderability, abrasion resistance, bondability, flexibility, insulation builds, etc., are all typical production and design considerations. Higher temperature requirements and more complex systems as well as regulatory requirements dictate the need for knowledgeable selectivity of magnet wire.

Please contact your SUPERIOR ESSEX Magnet Wire sales representative for additional information or specific questions about the products in this guide.

**NOTICE: All sales subject to Essex Group, Inc.
Standard Terms and Conditions of Sale.
See back cover.**

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FORMVAR

Formvar

Polyvinyl Acetal-Phenolic

Class 105

NEMA MW 15-C/A (Round)
MW 18-C/A (Square & Rectangular)

Typical Applications

- Oil-filled transformers
- Motors
- Random wound coils
- Solenoids

Sizes Available	Standard Type	Abbreviation
Round (14-23 AWG)	Single Build	S. FORM
(4-23 AWG)	Heavy Build	H. FORM
Square and Rectangular	Heavy Build	H. FORM

General Properties

Formvar is a synthetic enamel composed of polyvinyl acetal and phenolic resins.

Formvar's hot oil resistance sets it apart from all other magnet wire insulations. The flexibility, adhesion and abrasion scrape resistance of Formvar film is excellent. Its electrical properties are very good and it is resistant to common solvents. While Formvar has been replaced by GP/MR-200® and Nytherm® in many applications, Formvar continues to be the recommended film insulation most commonly used in oil-filled transformers.

SODERBOND® N

Polyurethane/Polyamide/Polyvinyl Acetate

Class 105

NEMA MW 29-C

Typical Applications

- Helical and toroidal coils
- Solenoid coils
- Voice coils

Sizes Available	Standard Type	Abbreviation
Round (16-31 AWG)	#1 Heavy Build Overall	SDBN-N #1
(18-28 AWG)	#2 Triple Build Overall	SDBN-N #2

General Properties

Soderbond® N uses a polyurethane basecoat and a polyamide topcoat followed by a bondcoat of polyvinyl acetate. This insulation system has a low temperature thermoplastic bondcoat which may be activated by heat or solvent (typically isopropyl alcohol). The electrical, chemical, physical and thermal properties of bondable wire are equivalent to those of the base insulation, except of course for the melting point or solvent resistance of the bondcoat. The bond strength is excellent at room temperatures. For applications requiring retention of bond strength at elevated temperatures, Polybondex® with type M or S bondcoat is recommended.

Soderon®/130

Soderon®/155

Polyurethane/Polyamide

UL Recognized Class 130/155 Product

NEMA MW 28-C (CLASS 130)
NEMA MW 80-C (CLASS 155)

Typical Applications

Soderon® has excellent solderability and the 130/155°C thermal class. It has wide use in coils and small motors. It is not recommended where severe overloads are experienced.

- Appliance motors
- Relays
- Timer and clock coils
- Encapsulated coils

Sizes Available	Standard Type	Abbreviation
Soderon/130		
Round (14-24 AWG)	Single Build	S. Sdn/130
(10-24 AWG)	Heavy Build	H. Sdn/130
Soderon/155		
Round (12-46 AWG)	Single Build	S. Sdn/155
(12-46 AWG)	Heavy Build	H. Sdn/155

General Properties

Soderon® combines the magnet wire insulation characteristics of Soderex® with the advantages of a nylon topcoat. With the nylon, Soderon is still readily solderable, yet the solvent resistance and thermal stability of the insulation is excellent. In addition, the nylon provides improvement in the windability and tolerates more severe winding operations. Soderon is an excellent choice for automatic winding machines.

Soderex®/155

Polyurethane

UL Recognized Class 155 Product

NEMA MW 79-C

Typical Applications:

Soderex®/155 is widely used in coils and motor windings where severe overloads are not experienced and where solderability is important.

- Small motors
- Relays
- Electronic coils

Sizes Available	Standard Type	Abbreviation
Round (35-46 AWG)	Single Build	S. Sdx/155
(35-46 AWG)	Heavy Build	H. Sdx/155

General Properties

Soderex®/155 is a polyurethane insulation which allows soldering without prior removal of the film from the wire. Soderex/155 has the equivalent physical and electrical properties of most other synthetic films. On heavier sizes the limitation of this film's flexibility and adhesion is approached. Soderex/155 has excellent resistance to moisture and resists most common solvents including those used in synthetic baking varnishes.

Soderex®/180

Polyurethane

UL Recognized Class 180 Product

NEMA MW 82-C

Typical Applications

Soderex®/180 magnet wire is designed for applications requiring both high thermal resistance and low soldering temperatures.

Care must be exercised in the application of Soderex/180 magnet wire since this material does not exhibit overload resistance properties of most non-solderable Class 105, 130, 155 and 180 resin systems.

- Relays
- Automotive Coils
- Specialty Power Transformers

Sizes Available	Standard Type	Abbreviation
Round (32-46 AWG)	Single Build	S. Sdx/180
(32-46 AWG)	Heavy Build	H. Sdx/180

General Properties

Thermoplastic flow (cut-through) temperature of Soderex®/180 magnet wire is in the 250°C plus range; well above maximum process conditions found in molded coil work, trickle impregnation processes and standard pre-heat varnish cycles specified for normal Class 130, 155 and 180 systems.

Soderex/180 magnet wire solder strips readily without excessive build up of solder dross associated with other solderable type resin coatings. It solders consistently at temperatures as low as 390°C.

Flexibility and adhesion properties of the Soderex/180 magnet wire film are more than adequate for all but the most severe fine wire winding applications.

Soderex/180 magnet wire insulation exhibits high dielectric strength retention under high humidity conditions. Also, the low dissipation factor of Soderex/180 magnet wire at high frequencies makes it a prime candidate for RF coil applications.

The solvent resistance properties of Soderex/180 are suitable for most Class 105, 130, 155, and 180 varnishes, encapsulants, and treating resins. It has improved salt water resistance compared to other solderable wires.

Soderon®/180

Polyurethane/Polyamide

UL Recognized Class 180 Product

NEMA MW 83-C

Typical Applications

Soderon®/180 magnet wire is designed for applications requiring high thermal resistance and low soldering temperatures.

Care must be exercised in the application of Soderon/180 magnet wire since this material does not exhibit overload resistance properties of most non-solderable Class 105, 130, 155 and 180 resin systems.

Soderon/180 may be considered for the following applications:

- Bobbin wound and paper section coils
- Molded and encapsulated coils
- Small motors, armatures and fields
- Automotive coils
- Toroidal coils
- Specialty power transformers

Sizes Available	Standard Type	Abbreviation
Round (25-46 AWG)	Single Build	S. Sdn/180
(25-46 AWG)	Heavy Build	H. Sdn/180

General Properties

Thermoplastic flow or cut-through temperature of Soderon®/180 magnet wire is in the 250°C plus range; well above maximum process conditions found in molded coil work, trickle impregnation processes and standard pre-heat varnish cycles specified for normal Class 130, 155 and 180 systems.

Soderon/180 magnet wire solder strips readily without excessive build up of solder dross associated with other solderable type resin coatings. It solders consistently at temperatures as low as 390°C.

Flexibility and adhesion properties of the Soderon/180 magnet wire film, because of its tough nylon topcoat, are more than adequate for most wire winding applications.

Soderon/180 magnet wire insulation exhibits high dielectric strength retention under high humidity conditions.

The solvent resistance properties of Soderon/180 are suitable for most Class 105, 130, 155, and 180 varnishes, encapsulants, and treating resins. It has improved salt water resistance compared to other solderable wires.

SOLIDEX®

Modified Polyester-imide

UL Recognized Class 180 Product

NEMA MW 77-C

Typical Applications

Solidex® is designed for those special coil applications where solderability is coupled with a need for high thermal resistance. Solidex is not recommended for in-slot motor windings or applications subject to high winding stresses.

Specific applications:

- Special transformer coils
- Shaded pole motor coils
- Automotive coils
- Electronic coils

Sizes Available	Standard Type	Abbreviation
Round (14-45 AWG)	Single Build	S. Solidex
(14-45 AWG)	Heavy Build	H. Solidex

General Properties

Solidex® magnet wire is produced by insulating the conductor with a sole coat of a solder strippable, modified polyester resin. Physical properties are adequate for most coil applications. More severe winding requirements such as in-slot stator windings are not recommended without thorough evaluation. The Solidex film may be readily stripped from the conductor by immersing in an 850°-950°F. solder pot; care must be exercised in preventing the film from overcuring due to poor immersion techniques.

SOLIDON®

Modified Polyester-imide/Polyamide

UL Recognized Class 180 Product

NEMA MW 78-C

Typical Applications

Solidon® is designed for those special coil applications where solderability is coupled with a need for high thermal resistance. The application potential for Solidon (compared to Solidex®) is enhanced by the addition of the polyamide overcoat to the high temperature modified polyester basecoat.

Specific applications:

- Shaded pole motor coils
- Special control coils
- Automotive coils

Sizes Available	Standard Type	Abbreviation
Round (14-45 AWG)	Single Build	S. Solidon
(33-45 AWG)	Heavy Build	H. Solidon

General Properties

Solidon® magnet wire consists of a nylon topcoat over a solderable, high temperature modified polyester-imide.

The solder stripping characteristic of the composite has been optimized for processing in a solder pot at 850°-950°F. Physical properties are adequate for most coil applications. More severe winding requirements such as in-slot stator winding are not recommended without thorough evaluation. The electrical properties are influenced slightly by the hygroscopic nature of the nylon topcoat.

Nytherm®

Polyester/Polyamide

UL Recognized Class 180 Product

NEMA MW 76-C/A

Typical Applications

Nytherm® is resistant to scrapes and has excellent windability. This makes it a logical choice for high speed automatic winding equipment. Nytherm also offers excellent hot staking characteristics as well as termination by flame welding and insulation piercing terminals.

- Fractional and integral horsepower motors
- Coils and relays
- Control and dry-type transformers
- Encapsulated coils
- DC field coils

Sizes Available	Standard Type	Abbreviation
Round (14-33 AWG)	Single Build	S. Nyth
(13-30 AWG)	Heavy Build	H Nyth

General Properties

Nytherm® is a film insulation with a modified polyester basecoat and a nylon topcoat. Typical of dual-coat construction, advantage is taken of the high thermal properties of the polyester and the mechanical properties of the nylon. Introduced to the motor industry by Essex® over three decades ago, it has become the standard of non-hermetic, fractional horsepower motors. This insulation offers the advantage of thermal endurance, high thermoplastic flow and excellent burnout performance. In the case of Nytherm, a 180°C thermal life and its outstanding burnout make it suitable for almost all motor applications except those operating in refrigerants or high moisture environments.

Polybondex®

Polyester/Polyamideimide/Bondcoat

UL Recognized Class 180 Product

NEMA MW 1000⁺

Typical Applications

- Clutch and brake coils
- Helical and toroidal coils
- Motor field coils
- Deflection yoke coils

Sizes Available*	Standard Type	Abbreviation
Round (13-32 AWG)	#1 Heavy Build Overall	PBX #1
(13-30 AWG)	#2 Triple Build Overall	PBX #2

*Polybondex G 13-27 AWG

Product Constructions Available

Tradename	Thermal Class	Insulation: Bondcoat
Polybondex T Bond M	180°C	Polyester: Epoxy (PBX-T Bond M)
Polybondex T Bond S	180°C	Polyester: Aromatic Polyamide (PBX-T Bond S)
Polybondex G Bond M	180°C	Polyester/amide-imide: Epoxy (PBX-G Bond M)
Polybondex G Bond S	180°C	Polyester/amide-imide: Aromatic Polyamide (PBX-G Bond S)

¹Referenced for dimensional data only.

General Properties

Polybondex® describes a number of possible constructions of bondable wire having a GP/MR-200® or Thermalex 200® base insulation with a thermoplastic bondcoat. The bondcoat may be epoxy or aromatic polyamide. The bond strength and “melt” temperatures required will define the proper bondcoat to use. Both bondcoats have excellent bond strength at room temperatures. Bond S should be used where bond strength is more critical at elevated temperatures. The type M bondcoat may be activated by solvent (typically methylethyl ketone) or heat while the type S bondcoat is heat activated. Only the Polybondex bondcoat allows the use of resistance, induction or radiant heating to flow the bond. The electrical, chemical, physical and thermal properties are equivalent to GP/MR-200 or Thermalex 200. Typically, the addition of the bondcoat adds one overall build level to the wire dimension.

GP/MR-200[®]

Polyester/Polyamideimide

UL Recognized Class 200 Product (Copper)

UL Recognized Class 220 Product (Aluminum)

NEMA MW 35-C/A (Round)
MW 36-C/A (Square & Rectangular)
MW 73-C/A (Hermetic Round)

Typical Applications

- Fractional and integral horsepower motors (hermetic and open)
- Automotive and power tool motors
- General purpose motors
- Dry-type transformers
- Large coil applications – unvarnished, varnished or encapsulated
- Electronic Coils

Sizes Available	Standard Type	Abbreviation
Round (14-36 AWG) (4-36 AWG)	Single Build Heavy Build	S. GP/MR-200 H. GP/MR-200
Square and Rectangular	Heavy Build	H. GP/MR-200

General Properties

GP/MR-200[®] is a multi-purpose film insulation which has a modified polyester basecoat and a polyamideimide topcoat. This combination provides a film insulation which has physical toughness, excellent dielectric properties, and superior chemical resistance to common solvents and refrigerants. Thermal properties of over 200°C qualify it for severe thermal overload applications. Compared to nylon overcoated polyester, the properties most improved are physical moisture, chemical and thermal resistance. GP/MR-200 is an extremely moisture resistant film insulation coating, suitable for many uses including open motor, high moisture application and hermetic applications. Other outstanding properties include thermal life, thermoplastic flow, burnout and heat shock.

This product is the standard of excellence for motor repair, maximum result, and minimum reject applications. It is impressive because it couples the extra advantages of high moisture resistance with ease of insertion.

Ultra Shield[™] Plus

Polyester/Polyamideimide

UL Recognized Class 200 Product

NEMA MW 35-C

Typical Applications

Ultra Shield[™] Plus magnet wire has been specifically designed for use in motors that may be subjected to higher voltage spikes present in inverter duty applications. The combination of the modified polyester basecoat and polyamideimide topcoat provides an insulation system with outstanding toughness and dielectric properties. Ultra Shield Plus magnet wire has improved voltage endurance and thermal properties compared to standard NEMA MW 35-C magnet wire, while retaining superior chemical resistance to common solvents and refrigerants. Ultra Shield Plus conforms to all of the requirements of NEMA MW 35-C.

Ultra Shield Plus magnet wire is recommended for various end uses as follows:

- Rotating Machines
Fractional and Integral HP Motors, Hermetic Motors, DC Motors, Power Tools, Automotive Alternators and Generators
- Transformers
All dry type, Class 105 through 200, Control Type
- Electronics
All types of coils, Class 105 through 200

Sizes Available	Standard Type	Abbreviation
Round (9-30 AWG)	Heavy Build	H. US PLUS

General Properties

Ultra Shield[™] Plus magnet wire has excellent thermoplastic flow (cut-thru) properties, with typical test values in excess of 390°C. Ultra Shield Plus magnet wire has been extensively wound in various motor applications and has been highly commended for its superior windability performance.

Voltage endurance is the area where Ultra Shield Plus magnet wire really excels. Testing with sinusoidal and with inverter waveshapes shows that Ultra Shield Plus magnet wire lasts many times longer than standard NEMA MW 35-C insulation. While no standards for this type of testing have been universally accepted, our testing shows dramatic improvement in insulation life, especially under severe duty applications at higher temperatures.

Ultra Shield Plus magnet wire has been tested for resistance to R-22 refrigerant and the results show it to be compatible for hermetic systems. Insulation piercing, hot staking, and flame welding processes can all be used successfully with Ultra Shield Plus magnet wire. If the connection is to be soldered the insulation must be removed prior to soldering.

Thermalex 200®

Polyester

UL Recognized Class 200 Product

NEMA MW 74-C/A

Typical Applications

The principal application of Thermalex 200® polyester is in fine wire where a Class 200 construction is desired and solderability is not a requirement.

- Small appliance and power tool motors
- Continuous operation coils
- Encapsulated coils
- Sub-fractional instrument and servo-motors

Sizes Available	Standard Type	Abbreviation
Round (33-45 AWG)	Single Build	S. Thermalex 200
(33-45 AWG)	Heavy Build	H. Thermalex 200

General Properties

Thermalex 200® is a Class 200 insulated fine and ultra-fine magnet wire. This wire is manufactured with a thermally stable, modified polyester film and has excellent physical, chemical and electrical properties for small coils operating at high temperature.

The physical properties of flexibility, abrasion resistance, and adhesion compare favorably with Formvar.

Allex®

Aromatic Polyimide

UL Recognized Class 240 Product

**NEMA MW 16-C (Round)
MW 20-C (Square & Rectangular)**

Typical Applications

Whenever high temperatures and extreme overload or ambient conditions are required, Allex® magnet wire may be used.

- Fractional and integral horsepower motors
- High temperature continuous duty coils and relays
- Hermetic and sealed units
- Heavy duty hand tool motors
- Encapsulated coils

Sizes Available	Standard Type	Abbreviation
Round (14-33 AWG)	Single Build	S. Allex
(4-33 AWG)	Heavy Build	H. Allex
Square and Rectangular	Heavy Build	H. Allex

General Properties

Allex® is a film-coated magnet wire made with aromatic polyimide resin. It is a Class 240 insulation with exceptional resistance to chemical solvents and burn-out. It will operate at temperatures in excess of 240°C for intermittent duty. The outstanding thermo-plastic flow of over 400°C and its ability to withstand excessive overloads extends the use of magnet wire in extreme conditions. Allex is unaffected by prolonged exposure to varnish solvents and is compatible with most systems.

GLASS FIBERS

Glass Fibers

Glass and Dacron®*

CLASS 155 Epoxy Varnish
CLASS 180 Polyester Varnish
CLASS 200 Silicone Varnish

NEMA MW 41-C thru MW 48-C
MW 50-C thru MW 53-C

Sizes Available	Standard Type	Abbreviation Glass – Dacron Glass	
Round (1/0-20 AWG)	Single Build	SG	SDG
	Double Build	DG	DDG
Square and Rectangular	Single Build	SG	SDG
	Double Build	DG	DDG

General Properties

Both glass and Dacron®* glass can be served on either the bare magnet wire conductor or film construction. Dacron glass is available as fused unvarnished, while glass or Dacron glass is available varnished with epoxy (as standard), hi-temp. organic polyester, or silicone varnish. The glass is a continuous filament glass yarn and the Dacron glass is a combination of glass and polyester fibers. The advantage of the glass is its high resistance to overload burnout and the advantage of the Dacron glass is its abrasion resistance and increased flexibility.

®* DuPont Registered Trademark

NOMEX®* TYPE 910

Nomex®* Type 910

Aromatic Polyamide Paper

NEMA To be established

Typical Applications

Nomex®* Type 910 paper, a newer product, is not UL-recognized and is designed specifically for the following applications:

- Liquid-immersed transformers with fluid temperatures up to 160°C

Sizes Available	Standard Type	Abbreviation
Square and Rectangular	0.0015 Nomex with 50% Lap	NMX

General Properties

Nomex®* Type 910 may be helically wrapped around magnet wire conductor of copper or aluminum in the same manner as conventional paper. A 1.5 mil thick tape applied with a 50% overlap is the most popular and recommended construction.

Nomex type 910 paper has been tested and provides excellent abrasion resistance compared to paper of the same weight basis.

The dielectric strength of the unimpregnated paper is superior to conventional paper products in both AC and impulse conditions.

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NOMEX®* TYPE 410

Nomex®* Type 410

Aromatic Polyamide Paper

Class 220

NEMA MW 60-C/A (Square & Rectangular)
MW 61-C/A (Round)

Typical Applications

- Dry-type or oil-filled transformers
- Lifting magnets
- Form wound coils

Sizes Available	Standard Type	Abbreviation
Round (1/0-9 AWG)	0.002 NOMEX	NMX
Square and Rectangular	50% lap	

General Properties

Nomex®* paper has the outstanding combination of physical toughness, chemical and moisture resistance as well as excellent high temperature dielectric breakdown strength. It is often used as a replacement for conventional paper where temperature requirements have increased. Nomex paper has a higher thermal rating than other papers and insulations of this type with the exception of Polyimide tape or Kapton®* polyimide fused tape. Nomex paper will retain at least 300 v/mil dielectric breakdown strength and 50% of its initial tensile strength after 10 years at 250°C.

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POLYIMIDE TAPE

Polyimide Tape / Kapton®*

Polyimide Tape, Fused

Class 220

Typical Applications

- Submersible oil well pump motors
- Traction motors
- Alternator/motor off-highway construction units
- Rolling mill motors
- Lift truck motors

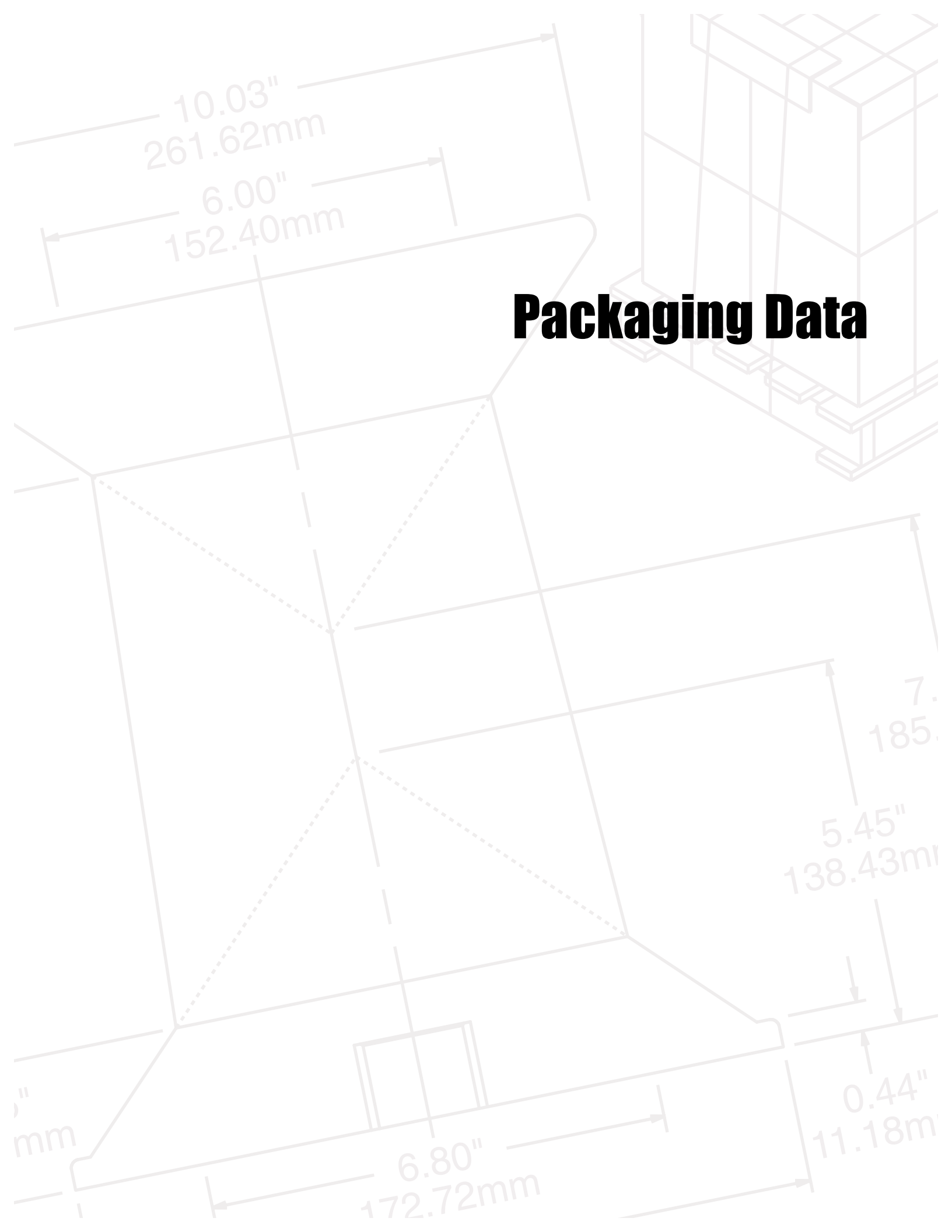
Sizes Available*	Standard Type
Round (2-10AWG)	1 mil Polyimide Tape with 1/2 mil FEP adhesive
Square and Rectangular	50% lap

General Properties

Polyimide tape is covered with a thin coating of Fluorinated Ethylene Polymer (FEP) on either one or both sides of the film to provide adhesion. The principal advantages of this served tape insulation is its uniform, pinhole-free covering and thermal stability. It has exceptional thermoplastic flow (cut-thru) resistance under extreme temperature and pressure conditions. This tightly sealed polyimide tape insulation offers excellent moisture protection and because it is smooth and thin, it has a space advantage over glass, Dacron®* glass, paper or fiber over film constructions. It is compatible with most standard varnishes and is highly resistant to solvent attack.

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Packaging Data



PACKAGING REFERENCE GUIDE

Packaging Reference Guide

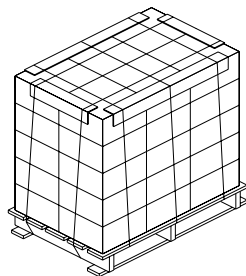
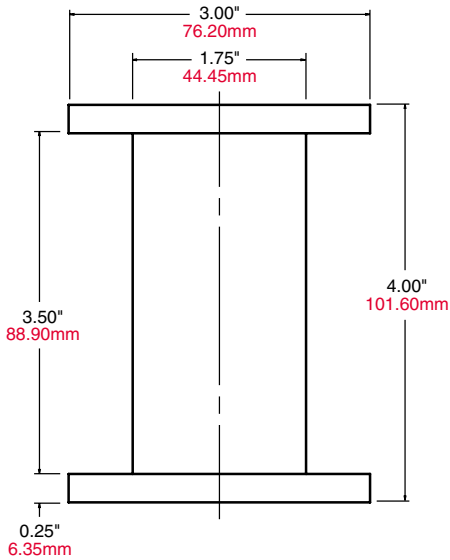
Package	Package Code	Size Copper	Range Aluminum	Nom. Capacity Lbs. Copper – Aluminum		No. Spools/Reels Per Carton	No. Pkgs. or Cases/Pallet	Approx. Net (lbs.) Weight/Pallet
3" x 3 ½" Spool	03	34 – 45	–	2	–	24	30	1440 Copper
4 ¾" x 3 ½" Spool	04	34 – 44	–	5	–	8	20	800 Copper
6" x 3 ½" Spool Box	06	12 – 44	–	8	–	6	30	1440 Copper
6" x 3 ½" Spool Bulk Pack	76	31 – 44	–	8	–	6	42	2016 Copper
6" x 6" Spool Box	05	12 – 43	–	12	–	4	20	960 Copper
6" x 6" Spool Bulk Pack	75	31 – 44	–	12	–	6	30	2160 Copper
DIN 160/45 Spool	10	40 – 44	–	13	–	4	30	1560 Copper
8" x 6" Reel	02	31 – 40	–	25	–	2	24	1200 Copper
DIN 200/45 Spool	11	40 – 44	–	25	–	2	30	1500 Copper
8 ½" x 9 ¼" Taper Reel	8	25 – 36	–	45	–	1	16	720 Copper
Taper Flange TF® 80 In Pail	13	11 – 34	14 – 28	75	25	1	12	900 Copper 300 Aluminum
Taper Flange TF® 80 In Box	81	11 – 34	14 – 28	75	25	1	12	900 Copper 300 Aluminum
10" x 11" x 12" Taper Reel	21	11 – 34	14 – 28	75	25	1	12	900 Copper 300 Aluminum
12" x 7" Reel	12	8 – 30	8 – 27	80	26	No-CTN	18	1440 Copper 468 Aluminum
24" Reel/8 Pack	24	1/0 – 14 Rd., Sq., Rect.	2/0 – 14 Rd., Sq., Rect.	250	75	No-CTN	8	2000 Copper 600 Aluminum
24" Reel/4 Pack	24	1/0 – 14 Rd., Sq., Rect.	2/0 – 14 Rd., Sq., Rect.	250	75	No-CTN	4	1000 Copper 300 Aluminum
Reel-Pak 250	25	8 – 10	12 – 23	250	75	No-CTN	5	1250 Copper 375 Aluminum
Taper Flange TF® 600	60	11 – 22	8 – 20	600	180	No-CTN	4	2400 Copper 720 Aluminum
Taper Flange TF® 1000	52	14 – 20	12 – 20	1000	300	No-CTN	4	4000 Copper 1200 Aluminum

3" SPOOL

Essex® 3" Spool

For heavy, intermediate and fine sizes of round copper magnet wire

Package Code: 03
Spool Identification: 3" Spool
Nominal Wire Weight: 2 lbs.
Spools per Carton: 24
Cartons per Pallet: 30
Pallet Dimension: 26" x 42"

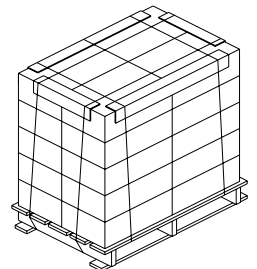
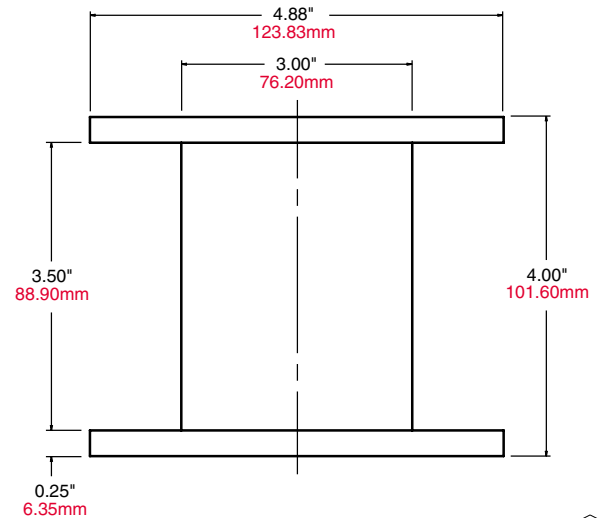


4 7/8" SPOOL

Essex® 4 7/8" Spool

For heavy, intermediate and fine sizes of round copper magnet wire

Package Code: 04
Spool Identification: 4 7/8" Spool
Nominal Wire Weight: 5 lbs.
Spools per carton: 8
Cartons per Pallet: 20
Pallet Dimension: 26" x 42"



6" x 3 1/2" BOX

Essex® 6" x 3 1/2" Box

For heavy, intermediate and fine sizes of round copper magnet wire

Package Code: 06

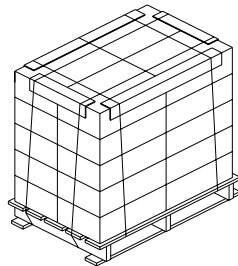
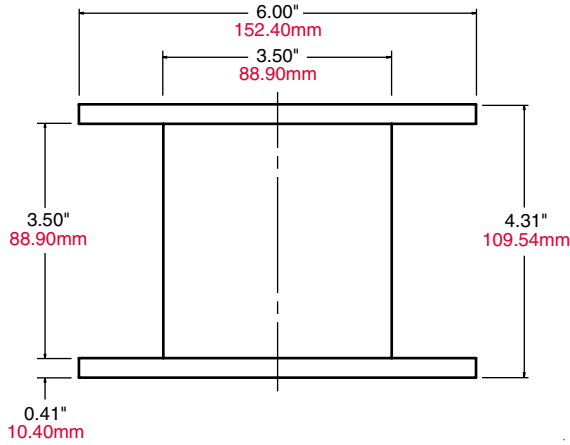
Spool Identification: 6" Spool

Nominal Wire Weight: 8 lbs.

Spools per Carton: 6

Cartons per Pallet: 30

Pallet Dimension: 26" x 42"



6" x 3 1/2" BULK

Essex® 6" x 3 1/2" Bulk Pack

For heavy, intermediate and fine sizes of round copper magnet wire

Package Code: 76

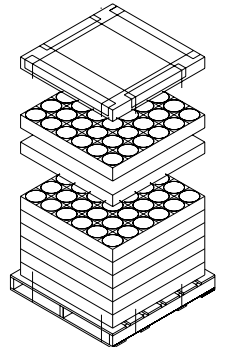
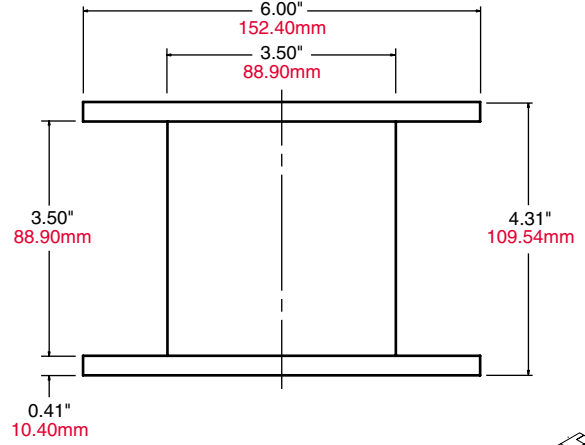
Spool Identification: 6" Spool

Nominal Wire Weight: 8 lbs.

Spools per Carton: 6

Cartons per Pallet: 42

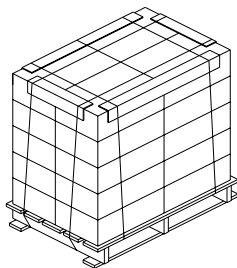
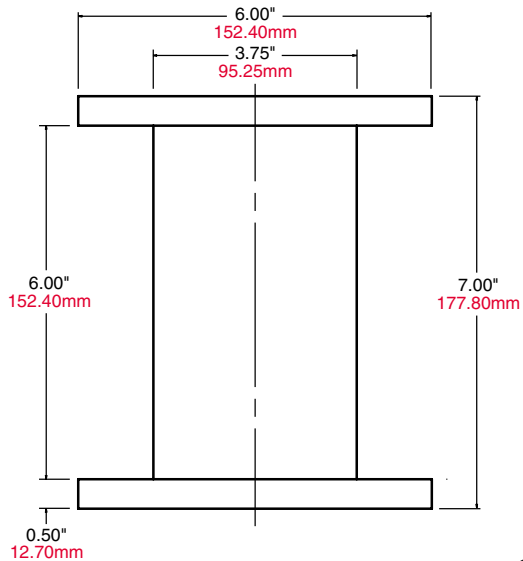
Pallet Dimension: 26" x 42"



Essex® 6" x 6" Box

For heavy, intermediate and fine sizes of round copper magnet wire

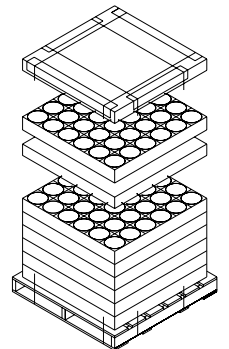
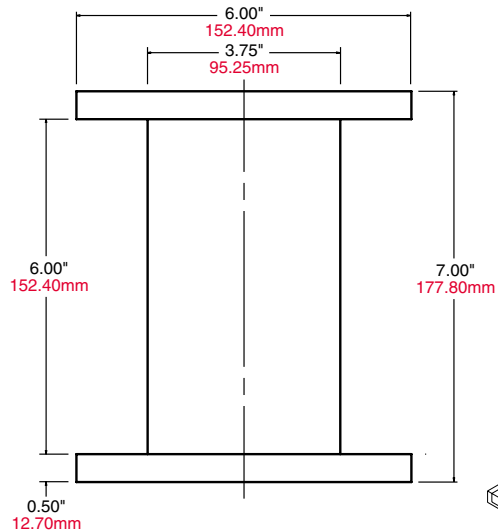
Package Code: 05
 Spool Identification: 6" x 6" Spool
 Nominal Wire Weight: 12 lbs.
 Spools per Carton: 4
 Cartons per Pallet: 20
 Spools Dimension: 26" x 42"



Essex® 6" x 6" Bulk Pack

For intermediate and fine sizes of round copper magnet wire

Package Code: 75
 Spool Identification: 6" x 6" Spool
 Nominal Wire Weight: 12 lbs.
 Spools per Carton: 6
 Cartons per Pallet: 30
 Pallet Dimension: 42" x 42"



Essex® DIN 160/45 Spool

For fine sizes of round copper magnet wire

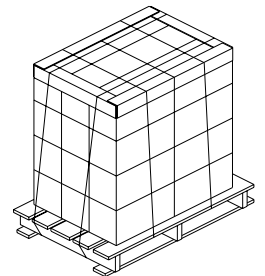
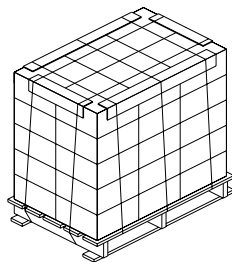
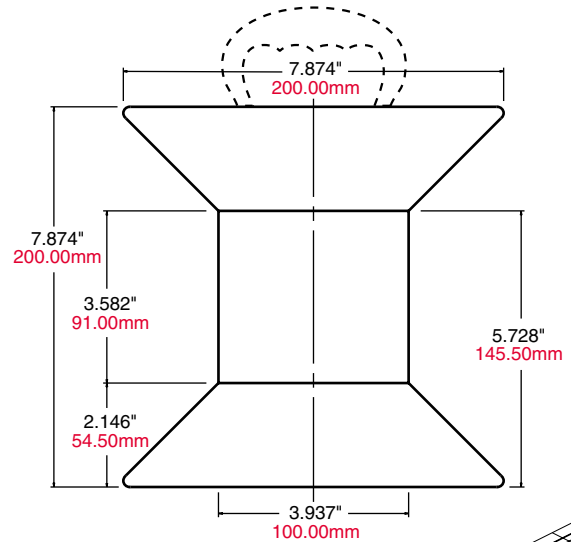
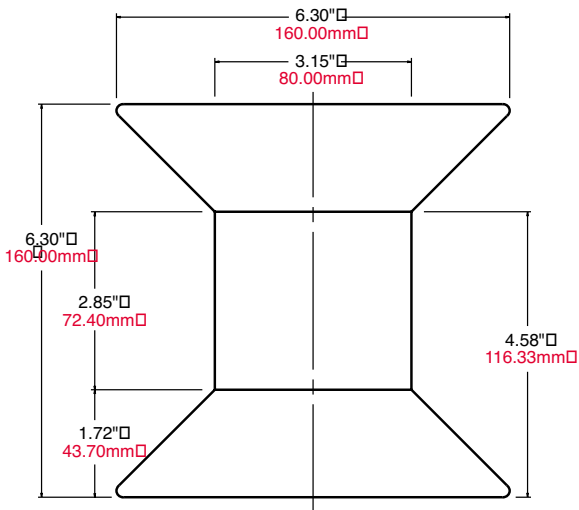
Package Code: 10
 Spool Identification: DIN 160/45
 Nominal Wire Weight: 13 lbs.
 Spools per Carton: 4
 Cartons per Pallet: 30
 Pallet Dimension: 26" x 42"



Essex® DIN 200/45 Spool

For fine sizes of round copper magnet wire

Package Code: 11
 Spool Identification: DIN 200/45
 Nominal Wire Weight: 25 lbs.
 Spools per Carton: 2
 Cartons per Pallet: 30
 Pallet Dimension: 26" x 42"

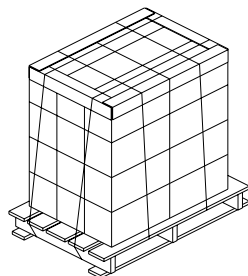
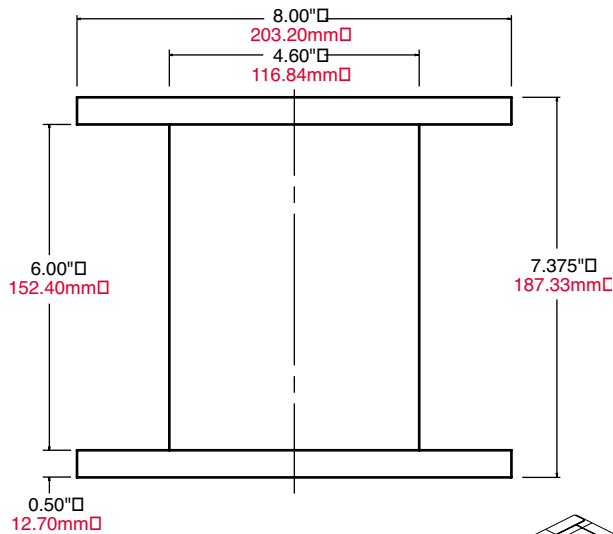


8" x 6" REEL

Essex® 8" x 6" Reel

For intermediate and fine sizes of round copper and aluminum magnet wire

Package Code: 02
 Reel Identification: 8" x 6" Reel
 Nominal Wire Weight: 25 lbs. CU
 Reels per Carton: 2
 Cartons per Pallet: 24
 Pallet Dimension: 26" x 42"

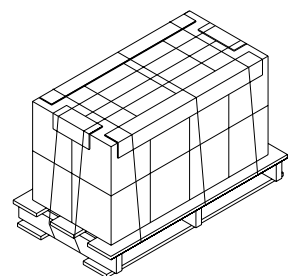
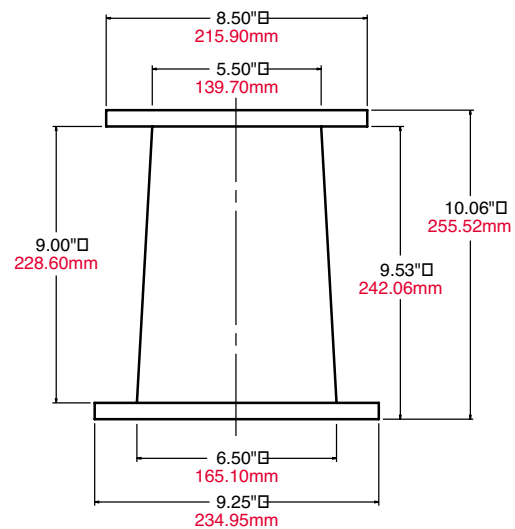


8 1/2" x 9 1/4" REEL

Essex® 8 1/2" x 9 1/4" Reel

For intermediate and fine sizes of round copper magnet wire

Package Code: 08
 Reel Identification: 8 1/2" x 9 1/4" Taper Reel
 Nominal Wire Weight: 45 lbs. CU
 Reels per Carton: 1
 Cartons per Pallet: 16
 Pallet Dimension: 24" x 42"



Essex® TF® 80 Box

For heavy and intermediate sizes of round copper and aluminum magnet wire

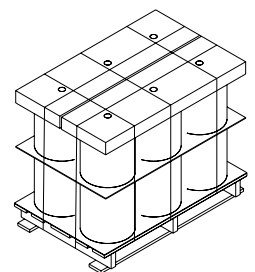
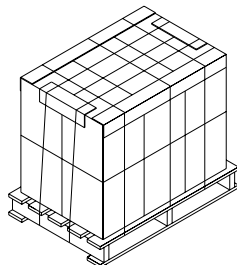
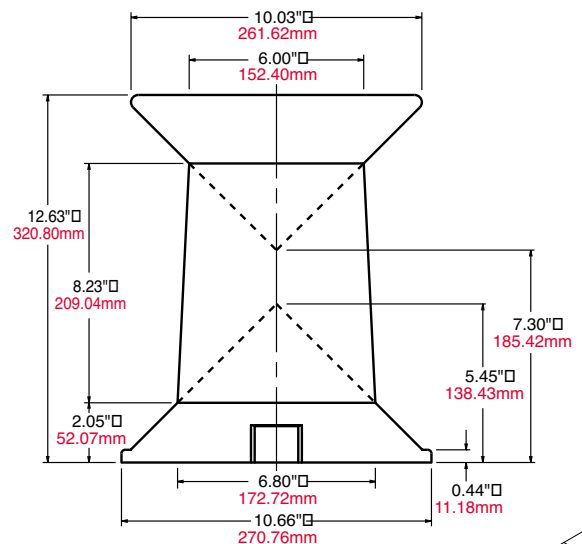
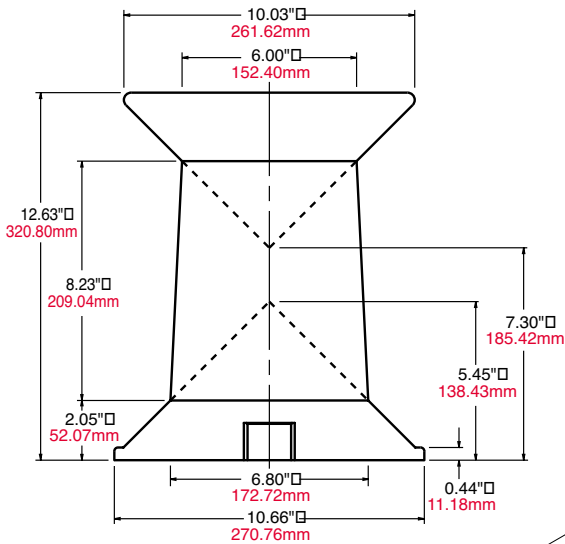
Package Code: 81
 Reel Identification: Taper Flange TF 80
 Nominal Wire Weight: 75 lbs. CU/25 lbs. AL
 Reels per Carton: 1
 Cartons per Pallet: 12
 Pallet Dimension: 26" x 42"



Essex® TF® 80 Pail

For heavy and intermediate sizes of round copper and aluminum magnet wire

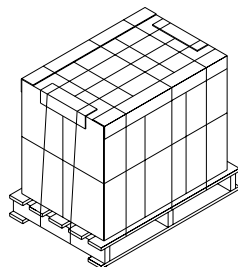
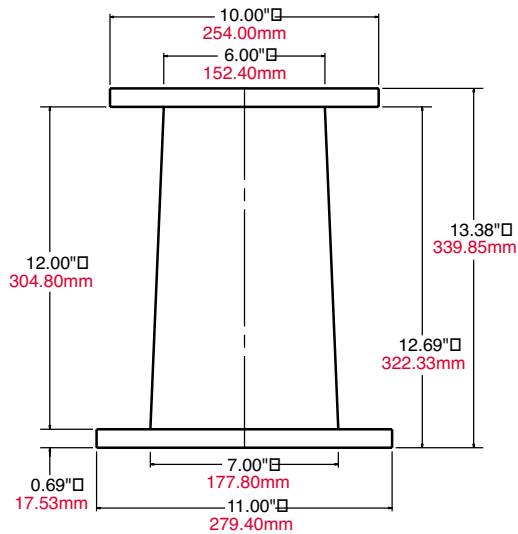
Package Code: 13
 Reel Identification: Taper Flange TF 80
 Nominal Wire Weight: 75 lbs. CU/25 lbs. AL
 Reels per Carton: 1
 Cartons per Pallet: 12
 Pallet Dimension: 26" x 42"



Essex® 10" x 11" x 12" Reel

For heavy and intermediate sizes of round copper and aluminum magnet wire

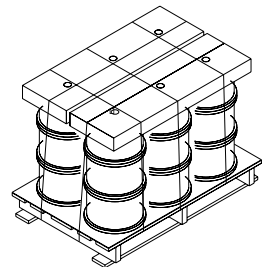
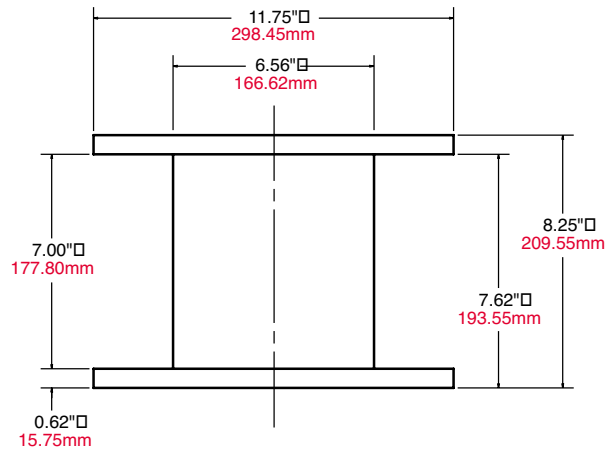
Package Code: 21
 Reel Identification: 10"x11"x12" Taper Reel
 Nominal Wire Weight: 75 lbs. CU/25 lbs. AL
 Reels per Carton: 1
 Cartons per Pallet: 12
 Pallet Dimension: 26" x 42"



Essex® 12" x 7" Reel

For heavy and intermediate sizes of round copper and Aluminum magnet wire.

Package Code: 12
 Reel Identification: 12" x 7" Reel
 Nominal Wire Weight: 75 lbs. CU/25 lbs. AL
 Reels per Pallet: 18
 Pallet Dimension: 26" x 42"



Essex® 24" Reel – 8 & 4 Pack

For heavy sizes of round and shaped copper and aluminum magnet wire

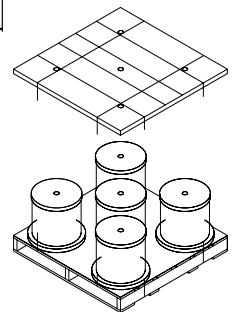
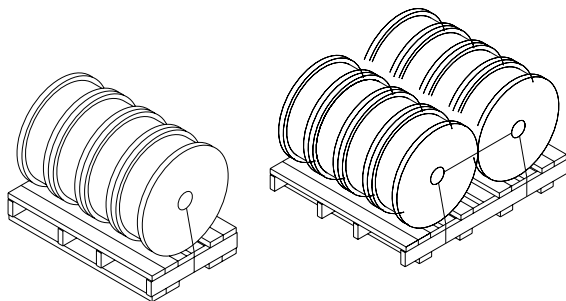
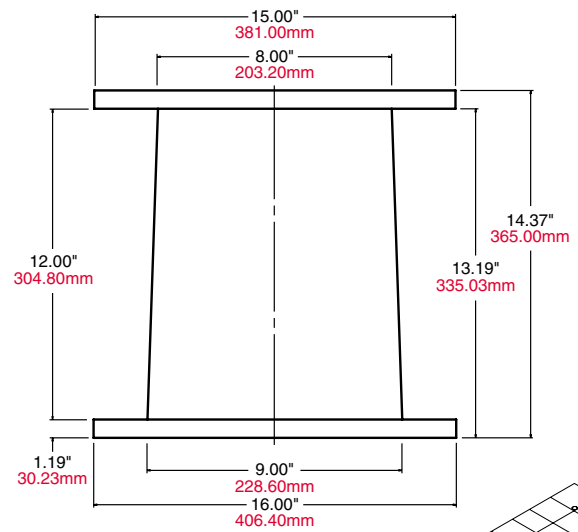
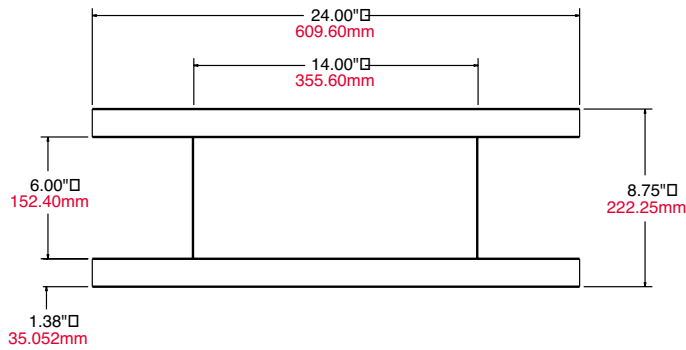
Package Code: 24
 Reel Identification: 24" Reel
 Nominal Wire Weight: 250 lbs. CU/75 lbs. AL
 Reels per Pallet: 4 or 8
 Pallet Dimension: 4 Reels – 24"x40"x30"
 8 Reels – 48"x40"x30"



Essex® 25RP Reel

For heavy and intermediate sizes of round copper and Aluminum magnet wire.

Package Code: 25
 Reel Identification: REEL-PAK 250
 Nominal Wire Weight: 250 lbs. CU/75 lbs. AL
 Reels per Pallet: 5
 Pallet Dimension:42" x 42"



Essex® TF® 600 Reel

For heavy sizes of round copper and aluminum magnet wire

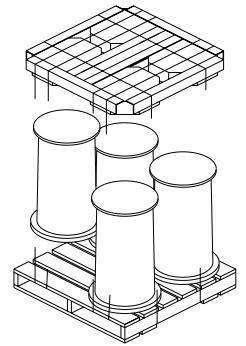
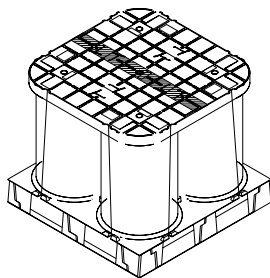
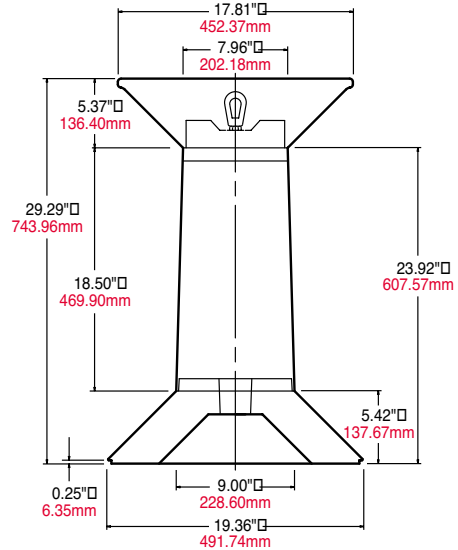
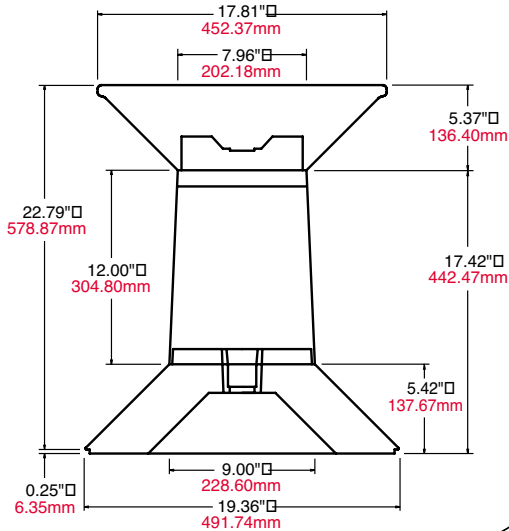
Package Code: 60
 Reel Identification: Taper Flange TF 600
 Nominal Wire Weight: 600 lbs. CU/180 lbs. AL
 Reels per Pallet: 4
 Pallet Dimension: 42" x 42"



Essex® TF® 1000 Reel

For heavy sizes of round copper and aluminum magnet wire.

Package Code: 52
 Reel Identification: Taper Flange TF 1000
 Nominal Wire Weight: 1,000 lbs. CU/300 lbs. AL
 Reels per Pallet: 4
 Pallet Dimension: 42" x 42"



Standard Terms and Conditions of Sale

1. ACCEPTANCE, WAIVER, MODIFICATION, INTERPRETATION AND CONSTRUCTION

Orders which are accepted, and contracts that are formed, are accepted or formed at Seller's offices on the basis of and strictly limited to the Seller's standard terms and conditions of sale, which Buyer is deemed to consent to as a condition there-to and which shall control over any contrary or additional terms and conditions on any purchase order or other document of Buyer, which additional terms and conditions are hereby objected to and to which Seller shall not be bound. Waiver of any term or condition of sale shall not constitute waiver of any other term or condition or legal remedy of Seller. Any act by Buyer of confirmation of any transaction contemplated hereby, including any order issued in response to a quote of Seller, shall constitute Buyer's acceptance of Seller's terms and conditions. No modification of any order or contract shall be binding unless in writing signed by both parties hereto. Orders and contracts shall be interpreted in accordance with, and the construction here-of shall be governed by, the laws of the State of Indian, United States of America. Captions as used herein are for convenience or reference only and shall not be deemed or construed as in any way limiting or extending the meaning of any terms and conditions.

2. TITLE, DELIVERY, RISK OF LOSS AND SHIPPING

Title to and risk of loss of all goods sold hereunder shall pass to Buyer upon their delivery, F.O.B. Seller's factory (unless a different F.O.B. point is otherwise agreed to and accepted) to any agent of Buyer, including a common carrier or warehouse, as hereinafter provided. Wherever transportation rates and carrier's liability for damage depend upon the value of the shipment as declared by shipper, Seller will declare such value as will entitle Buyer to have goods shipped at the lowest permissible transportation rates unless otherwise instructed in writing by Buyer. Buyer will furnish written destination instructions for all goods as promptly as possible. Seller shall for the account and at the expense and risk of Buyer arrange for shipment of the goods by a carrier of its own selection to Buyer's destination. In the absence of destination instructions, Seller may at Buyer's expense and with notice to Buyer, warehouse the goods in a reasonably suitable manner. Seller shall not be liable for loss or damage attributed to negligence either in selection of the carrier or the warehouse or in agreeing with either of them to contract terms on Buyer's behalf.

All shipments will be at shipper's option. Customer requested premium cost freight routing, including airfreight will be shipped F.O.B. shipping point, freight collect to the customer.

The promised shipping date is the Seller's best estimate and will not operate to bind Seller to ship or make deliveries on the date indicated on quotation or order acknowledgment.

3. PRICE AND PAYMENT

Unless otherwise specified, all orders or contracts accepted will be invoiced at Seller's prices in effect on the date of shipment, which Buyer agrees to pay. Unless otherwise specified, payment terms are net 30 days, and overdue accounts shall accrue charges at a rate of 1.5% (.015) per month or the maximum legal rate, whichever is less. Credit and delivery shall be subject to Seller's approval and Seller reserves the right to alter the terms and fix a limit of credit. Each order or contract shall be treated as a distinct contract but if Buyer shall fail to fulfill the terms of payment, Seller may without prejudice to any other lawful remedy defer further shipments, and/or cancel any order or contract. Buyer shall be liable to Seller for all costs and fees, including attorneys' fees, which Seller may reasonably incur in any actions by Seller taken to collect on any overdue account of Buyer.

Unanticipated cost increases created by circumstances such as, but not limited to, changes in government energy policies, metal premium charges or raw materials price increases are not covered by the price quoted. Any order accepted requiring special manufacturing processes, inspection, specified weight, packaging, test results, certification, etc., is subject to additional charges.

4. INSPECTION

If upon receipt of the goods by Buyer at destination the same shall appear not to conform to this order or contract, Buyer shall within thirty (30) days after receipt thereof notify Seller of such condition and afford Seller a reasonable opportunity to inspect the goods and make any appropriate adjustment or replacement. The remedies afforded Buyer under the paragraph hereof entitled "LIMITED WARRANTIES, REMEDIES AND LIMITATIONS" shall be the exclusive remedies for defective goods whether or not discovered upon inspection by Buyer. Buyer shall not delay payment for the goods pending their inspection.

5. LIMITED WARRANTIES, REMEDIES AND LIMITATIONS

a. Defective Goods

Seller warrants to Buyer that at the time of delivery the goods sold hereunder will be free from defects in design, material and manufacture and will conform substantially to Seller's applicable specifications as stipulated in the order or contract. Seller's liability and Buyer's remedy under this warranty are strictly limited to the refund of purchase price, repair or replacement, at Seller's sole option, of goods or materials sold which are returned to Seller and which are shown to Seller's reasonable satisfaction to have been defective provided that written notice of the defect shall have been given by Buyer to Seller within sixty (60) days of delivery of such goods by the Seller. Transportation charges to and from Seller's location for the return of defective goods to Seller and their re-shipment to Buyer and the risk of loss thereof will be borne by Buyer. If services or data are to be furnished hereunder, Seller warrants to Buyer that such services will be performed or such data prepared in a good workmanlike manner. Seller's liability and Buyer's remedy under this warranty are limited to the correction of such services or data as are shown to Seller's reasonable satisfaction to have been defective, provided that written notice of such defective services or data shall have been given by Buyer to Seller within thirty (30) days after the performance of such services or delivery of such data by Seller.

b. Title

Seller warrants to Buyer that it will convey good title to the property sold. Seller's liability and Buyer's remedy under this warranty are strictly limited to the removal of any title defect or, at the sole option of the Seller, to the replacement of the goods or parts thereof which are defective in title; provided however, that the rights and remedies of the parties with respect to patent infringement shall be limited to the provisions of subparagraph c. below.

c. Patent Infringement

Seller shall conduct, at its own expense, the entire defense of any claim, suit or action alleging that, without further combination, the use or resale by Buyer or any subsequent purchaser or user of the goods delivered hereunder, directly infringes any United States patent, but only on the conditions that, (1) Seller receives prompt written notice of such claim, suit or action, full opportunity and authority to assume the sole defense thereof including settlement and appeals, and all information available to Buyer and defendant for such defense, (2) said goods are made according to a specification or design furnished by Seller, or if a process patent is involved, the process performed by the goods is recommended in writing by Seller, and (3) the claim, suit or action is brought against Buyer or one expressly indemnified by Buyer. Provided all three of the foregoing conditions have been met, Seller shall, at its own expense, either settle said claim, suit or action or shall pay all damages excluding consequential damages and costs awarded by the court therein and, if the use or resale of such goods is finally enjoined, Seller shall, at Seller's option, procure for defendant the right to use or resell the goods, replace them with equivalent non-infringing goods, modify them so they become non-infringing but equivalent, or remove them and refund the purchase price (less a reasonable allowance for use, damage or obsolescence). No indemnity is granted by Seller under the patents of any nation other than that specified above, nor with respect to any of the goods or components thereof manufactured according to a specification or design of anyone other than Seller. If a claim, suit or action is based on a specification or design furnished by Buyer or on the performance of a process not recommended in writing by Seller, or on the use or sale of the goods delivered hereunder in combination with other goods not delivered to Buyer by Seller, Buyer shall indemnify and save Seller harmless therefrom.

d. Exclusive Warranties and Remedies

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE GIVEN AND ACCEPTED IN LIEU OF (a) ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ARISING OUT OF THE CONDUCT OF THE PARTIES, AND (b) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM OR REMEDY FOR SELLERS NEGLIGENCE, ACTUAL OR IMPUTED. The remedies of the Buyer for breach of any warranty arising hereby, expressed or implied, or by operation of law, or for breach of any duty of Seller, expressed or implied or arising out of any conduct of the parties, shall be strictly limited to those provided herein to the exclusion of any and all other remedies including, without limitation, claims for incidental or consequential damages. No agreement varying or extending the foregoing warranties, remedies or these limitations will be binding upon Seller unless in writing, signed by a duly authorized executive officer of Seller.

6. EXCUSABLE DELAYS

Buyer acknowledges that the goods and/or services called for hereunder are to be manufactured or provided by or for Seller to fulfill this order or contract and that the delivery date(s) is (are) based on the assumption that there will be no delay due to causes beyond the reasonable control of Seller. Seller shall not be charged with any liability for delay or nondelivery when due to delays of suppliers, acts of God or the public enemy, compliance in good faith with any applicable foreign or domestic governmental regulation or order, whether or not it proves to be invalid, fires, riots, labor disputes, unusually severe weather or any other cause beyond the reasonable control of Seller. To the extent such causes actually retard deliveries on the part of the Seller, the time for performance shall be extended for as many days beyond the date thereof as is required to obtain removal of such causes. This provision shall not, however relieve Seller from using its best efforts to avoid or remove such causes, and continue performance with reasonable dispatch whenever such causes are removed.

7. TAXES

In addition to the agreed purchase price of the goods and/or services called for hereunder any and all taxes (not including any U.S. income or excess profit taxes attributable to Seller) which may be imposed by any taxing authority, arising from the sale, delivery or use of the goods and/or the furnishing of the services hereunder and for which Seller may be held responsible for collection or payment, either on its own behalf or that of Buyer, shall be paid by Buyer to Seller upon Seller's demand.

8. FINANCIAL RESPONSIBILITY OF BUYER

If before completion of performance of any order or contract by Seller, a receiver or trustee is appointed for any of Buyer's property, or Buyer be adjudicated or voluntarily becomes a bankrupt under any bankruptcy, dissolution or re-organization laws or similar legislation, or if Buyer becomes insolvent or makes an assignment for the benefit of creditors, or an execution be issued pursuant to a judgement rendered against Buyer, or should Buyer be unable or refuse to make payment to Seller in accordance with any of its obligations to Seller, Seller may at its option in any of such events terminate any order or contract by giving to Buyer a written notice of its intention so to do and Seller shall thereupon be relieved of any further obligation to Buyer and Buyer shall reimburse Seller for its termination costs and expenses and a reasonable allowance for profit.

9. CANCELLATIONS AND RETURNS

Orders may be canceled, and goods may be returned for credit, only upon the prior approval of Seller and upon terms protecting Seller from loss.

Due to raw material and manufacturing plant scheduling, all orders once placed with and accepted by Seller are non-cancelable thirty (30) days prior to the scheduled ship date.

Seller will issue a formal RETURN MATERIAL AUTHORIZATION tag to support all authorized returns. For any credit, this document must denote the Buyer's order number, Seller's invoice number, description, and quantity of item to be returned, and reason for request. Stock items are returnable at invoice price less 20% restocking charge. Freight prepaid to plant of manufacture. Non-stock items and/or special items are not subject to return. All material must be returned to Seller on the original pallets and in the original packaging.

10. CHANGES

Seller may at its option modify Buyer's order where necessary by making any of the following changes: (a) substituting the latest or correct part number or part description for the part number or part description set forth on the order; (b) substituting Seller's prices in effect as applicable to the order for the prices set forth in Buyer's order; (c) substituting an estimated delivery schedule which is reasonable (considering Seller's stock availability and lead time) for the delivery schedule set forth on the order; (d) correcting any stenographical or typographical error on any document.

11. COMPLIANCE WITH FAIR LABOR STANDARDS ACT

Seller hereby certifies that all goods sold hereunder which are produced or manufactured in the United States of America are produced in compliance with the Fair Labor Standards Act of 1938, as amended (29 U.S. Code 201-219). All requirements as to the certificate contemplated in the October 26, 1949 amendment to the Fair Labor Standards Act of 1938 shall be considered as satisfied by this certification.

12. APPENDICES

Any appendix or other terms and conditions of the Seller as may be attached hereto, be on the reverse hereof, and/or be identified herewith are hereby incorporated and made a part of these terms and conditions. All orders or contracts shall be subject to such additional terms and conditions which shall control over any inconsistency with the terms and conditions stated herein.

13. ENTIRE AGREEMENT

The terms and conditions of this order or contract constitute the entire agreement between the parties hereto and shall supersede all previous communications, representations or agreements, either oral or written between the parties hereto with respect to the subject matter hereof.

14. CHANGES — PROCESS, MATERIAL AND PRODUCT DESIGN

Seller continually develops and uses new processes, materials and product designs in an effort to improve its products, while maintaining conformity to specifications. If your applications of our products rely upon any performance, dimensional or content criteria other than as required by the applicable specifications, you must conduct regular testing or evaluation of those specific products. Seller makes no warranty or representation of any nature that any material shipped conforms to any material of like product description as may have previously been delivered to you, except as to the applicable specifications.

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