EREZ
TECHNICAL TEXTILES

THE ULTIMATE GUIDE TO

WELDING METHODS FOR TECHNICAL TEXTILES

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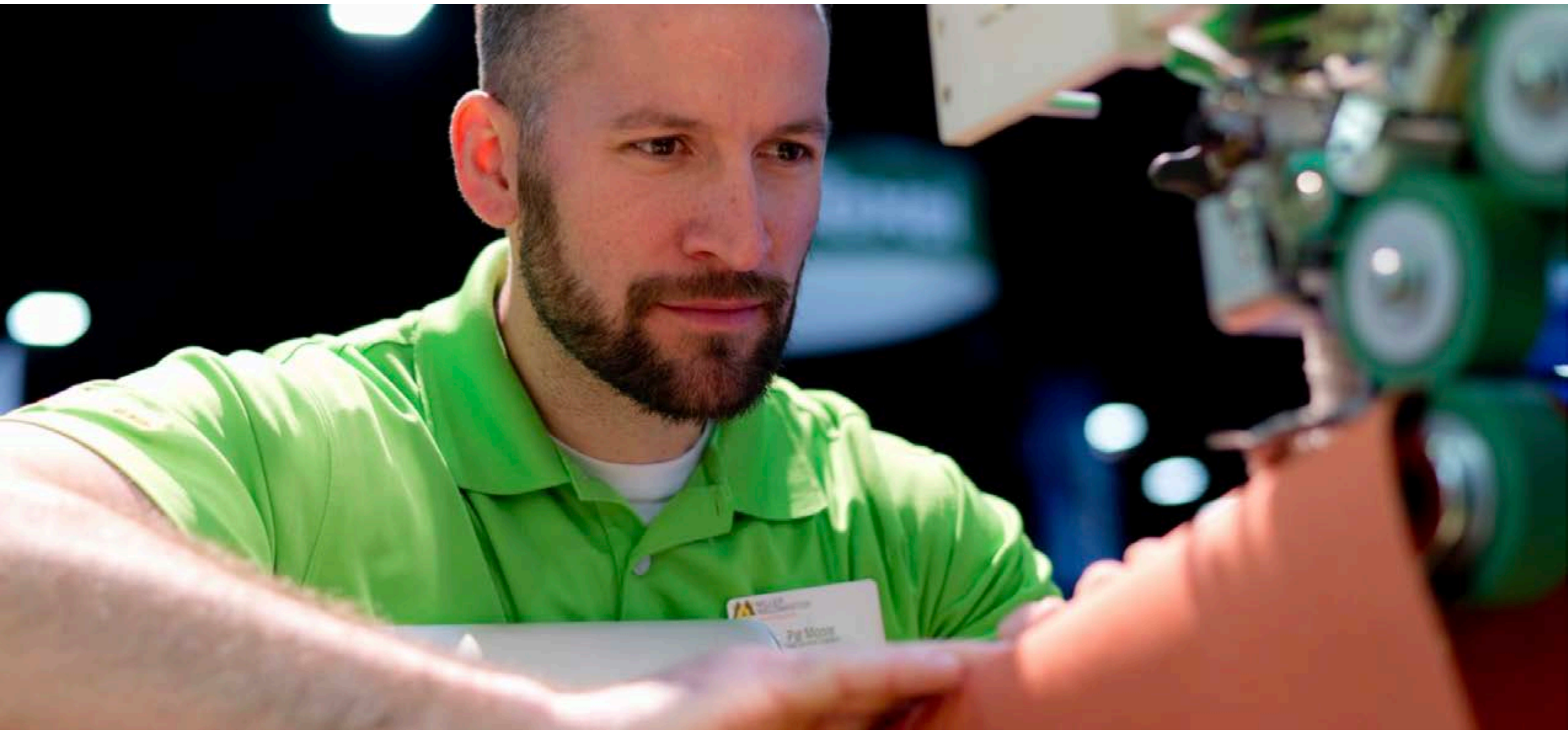
01 INTRODUCTION

Welding is a widely used form of material joining in the technical textile industry. It is used on thermoplastic-coated textiles, i.e., textiles with a polymer coating that melts under heat. There is a huge variety of thermoplastics, but the ones most used in the technical textile industry for coating include: PU, TPU, TPO, PVC, and various alloys. Manufacturers of products made of these materials need to be informed of the various technologies and their relative advantages and disadvantages for their applications. In this report, we'll take a look of some of the major welding technologies used in the industry and their uses.

Special thanks to our partners at:

FIAB **for images and content contributions related to High Frequency (HF) welding.**

MILLER WELDMASTER **for images and content contributions related to Hot Air and Hot Wedge welding.**



Courtesy of Miller Weldmaster

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ABOUT EREZ

Founded in 1982 to introduce advanced polymer technologies in coated industrial textiles, Erez has been committed to innovation and proven performance from the beginning. Over the years research and product developments have earned Erez a reputation as a global leader in coated technical textiles.

Through pioneering technologies and new breakthroughs in polymer blending Erez has produced a comprehensive family of high performance, long-lasting, multipurpose membranes. Light yet stable, with superior welding advantages, these membranes are capable of withstanding both extensive wear and environmental stress across hundreds of end product applications. Erez textiles are certified by all top international standards, making them the perfect choice for manufacturers who produce or export on a global scale.

Erez has decades of global experience and can help you with material selection, new product strategy and development, and existing product line improvement. Erez understands and will work together with you to ensure your project is a success from the idea through to implementation.

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03 PROCESS

To make sense of the different welding methods, it is important to first understand what is happening during the welding process in general. The process for all thermoplastic welding is comprised of the same basic elements: heat, pressure, speed and time. The thermoplastic coating of two pieces of coated materials is heated at the weld point until it melts. Pressure is regularly used throughout the heating and cooling stages. This helps improve the melt flow (molecular interchange) across the faying surfaces and keeps the materials properly aligned.

Material properties, of both the thermoplastic coating and to a lesser extent the base material, play pivotal roles in determining which welding process can be successfully used. Some properties aid welding and some properties, such as certain additives and the presence of moisture, can have a negative impact. Critical material properties that need to be considered are:

- E-module: promotes sound conduction and determines coupling
- Damping: promotes heat generation
- Melting point: determines the heat requirement
- Viscosity of the melt: high viscous melts can be kept within the joining area more easily, the process sequence is more uniform

04 THE ADVANTAGES OF WELDING IN PRODUCTION

Design

Thermoplastic welding presents many substantial benefits for the technical textile industries. Welds offer:

- Light weight and less bulky seams,
- High strength,
- Design flexibility, and
- Low processing costs.

Because welds do not puncture the material like sewing, they provide more reliable leak-proof seams and do not introduce foreign materials, like glue or thread, that may affect product performance.

Permanence

Thermoplastic welding lasts indefinitely. The process of welding fuses two like-coated materials together, so there is no adhesive interface to fail as with gluing. Glue is subject to softening over time and will eventually fail. Welded lap seams are stronger in shear than the original fabric. While glue is too, it will weaken over time and a weld will not. Plus, the use of adhesives adds another chemical compound to the mix that can possibly compromise the properties or strength of the material it is gluing. This is not a concern with welding.

Speed

Welding is fast and can increase production-line speed over sewing and gluing. Depending on the material and type of welding process, welding speeds of up to 30 feet per minute (9 meters per minute) can be attained.

Reliable and Efficient

Welded seams are more reliable than glued or sewn seams. Not only is glue failure not an issue, but technical textile welding is usually accomplished by automated machinery that controls heat, angle, speed, and frequently material tracking (aligning). This leaves less room for human error. Welding machines with built-in tracking systems align material as it processes and can be operated by a single person. This can free up employees and potentially reduce labor costs.

Easy Installation and Use

Most welding systems are easy to install and can be readily incorporated into your current production line. Some are even portable or handheld. The majority of welding machines are capable of producing many styles of welds and are user friendly. Depending on the type, systems can be noiseless and can help create a quieter more pleasant working environment. Ultrasonic welders, in particular, are silent and do not emit any toxic smoke like hot-air welders.

High-quality Sealed Edges

Welding provides a consistent and permanent air-tight seal at edges and seams. The result is reliable, long-lasting air and liquid retention. Welded seams are as abrasion resistant as the original material and maintain their integrity indefinitely. Sewn seams can suffer tension failure in the thread and glue will fatigue over time.

Welding easily handles connection issues like thickness variation in the fabric and joining tight or small corners. Also, since there are no stitch holes into the fabric, welding creates smooth seams that can make the product more aesthetically appealing.

Cost Effective

With welding, usually no additional material is required, and no waste is generated like that associated with gluing and sewing. Welding machines are comparatively inexpensive to buy and operate. This reduces costs as compared to other joining methods. And for the end user, welded seams mean reduced maintenance costs.

05
IS WELDING RIGHT FOR MY APPLICATION?

Nearly all thermoplastics can be welded without difficulty, though TPU can be slightly more challenging. As a general rule, only identical thermoplastic materials can be welded homogeneously.

Materials and Factors Influencing Weldability

The major categories of material construction of thermoplastic textiles and films are: wovens, nonwovens, knits, films, coated materials, and laminates. Each category has different factors that influence their relative weldability[1].

Wovens - Textiles formed by the regular interweaving of filaments or yarns.

- Factors Influencing Weldability: Yarn density, thermoplastic content, tightness of weave, uniformity of material thickness. Weld strength may vary according to the orientation of yarns or filaments.

Nonwovens - Textiles formed by bonding and/or interlocking fibers, yarns, or filaments by mechanical, thermal, or chemical means.

- Factors Influencing Weldability: Uniformity of material thickness and thermoplastic content. Random orientation of fibers gives nonwovens excellent strength.

Knits - Textiles formed by interconnecting continuous loops of filaments or yarns.

- Factors Influencing Weldability: Style of knit, thermoplastic content, and elasticity of construction.

Films - Thermoplastic material that has been cast, extruded or blown into a film, generally under 0.010" (0.254 mm) thick.

[1] Branson: http://eventurestudio.com/eventuresites/200/img/pdf_files/bransonfilmtextilebondingChar.pdf

- Factors Influencing Weldability: Film thickness (at least 0.0005" [0.013 mm] thick), density, and thermoplastic type.

Coated Materials - Textiles covered with a layer of thermoplastic, such as PVC, polypropylene , or urethane and alloys .

- Factors Influencing Weldability: Coating material, thickness, and substrate characteristics.

Laminates - Textiles and films consisting of two or more layers in a sandwich form.

- Factors Influencing Weldability: Thermoplastic type and content.

Regardless of the material, to ensure successful welding, the faying surface should be at least 65% thermoplastic content (minimum) and of a uniform thickness. Usually these conditions are easily met in the technical textile industry.

Courtesy of FIAB

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WELDING CONSIDERATIONS AND OPTIONS FOR MANUFACTURERS

Welding Considerations

With technical textiles, the differences between brands, coatings, composition, textures, and environmental factors mean that each material and environment require a different combination of speed, temperature, and pressure to achieve a good weld. Always obtain a product data brief from the fabric manufacturer to help find the appropriate welding parameters and minimize the number of test welds required.

Weld Type

Most thermoplastic-coated textiles are easily weldable by nearly any method. So, when companies consider welding options for their technical textile operations, most often it is the application that will determine which type of weld process to use. Some methods cannot accommodate curves, some are faster than others, and some produce more reliable leak-proof seals. In addition, most manufacturers are typically trying to reduce labor costs while speeding up production. They also seek to improve quality. Features of some welding machines like material tables, cutters, and installations in line with current production operations can help with these issues.

Size

Most welding machines are small—about the size of a sewing machine and can be placed in line with production. However, automated installations can be much larger. Some, like hot air welders, are even handheld. Like a sewing machine, the point of the weld is usually readily visible. If the machine does not have a material table, one or two additional workers may be needed to guide the material during the process.

Infrastructure

Most welding machines do not require any special infrastructure and are world-power-friendly. That said, some types of welding may require ventilation or protection for workers close to an operating machine, e.g., HF welders. Many HF welders come with a shield for the radio wave generator that helps with human exposure issues.

Training

Most thermoplastic welding is easy and straightforward, especially once the welder is set up for its intended use. Usually, one day is sufficient to cover most of what operators need to know. A few hours of practice will give operators a chance to learn the nuances of the process and get them on the production line. Welding machine manufacturers will provide free training on their machines at your location.

Training usually covers the technology and how it is applied, including:

- Review of the machine parts
- Start-up and welding, settings, and review of how the heat source, pressure and time affect the welding results
- Tools and the connection between the heat source and welding surface, if any
- Any software
- Material handling
- Quality testing
- Work environment and safety
- Basic machine care and maintenance
- Troubleshooting, adjustments, and repair

ROI (Return on Investment)

Finally, companies may consider ROI when investing in welding equipment. ROI is typically determined by the speed of production and the amount of labor required. As products lines are diverse and the technologies are different, it is impossible to set expectations here. However, due to the relative low cost of welding machines, manufacturers often see favorable returns in short periods of time. For instance, hot air welding, especially in an automated format, is the fastest welding technology available in the world. Most purchasers of this type of welder will pay off their machines in under 18 months.

High Frequency (HF) Welding

Courtesy of FIAB

The Science

High frequency (HF) Welding, also radio frequency (RF) or dielectric welding, is the method of joining two or more layers of polar dielectric thermoplastic material together. Method uses a high frequency electromagnetic energy to excite the polar molecules (dipoles) in dielectric materials. Usually it is 27.12 MHz. The layers of fabric are placed between top and bottom electrodes, a rapidly alternating electric field is applied at the joint area (see Figure 1). Dipole polarization process starts by changing the orientation of dipoles (dipoles attempt to flip around and try to align with a new field orientation ca. 27 million times if the frequency is 27.12 MHz). The temperature inside the fabric is increasing due to the internal molecular friction heating. Pressure all the time is applied at the joint by the bars until the material cools. During this process, the chains of molecules from both materials are intermingled by the diffusion process and a weld is formed. The resulting weld can be as strong as the original materials.

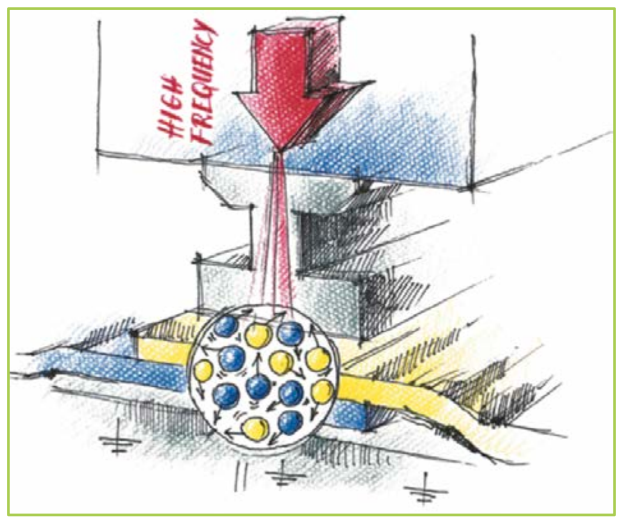

Figure 1. Courtesy of FIAB

The temperature parameter plays an important role in high frequency welding method. It can be distinguished two major types of polymer's molecular structures: amorphous or semi- crystalline. When the amorphous polymer (i.e. PVC) reaches its glass transition temperature, the polymer will soften with tendency to retain its shape. The glass transition temperature is a temperature range where the polymer changes from a rigid glassy material to a high-elastic state. Below the glass transition temperature the available energy is insufficient to allow the molecules to move. In glass transition temperature the movement of chains of polymers occurs. On further heating, the temperature will continue to increase above the glass transition temperature where the polymer will start to melt reaching the flow temperature. For amorphous polymers the flow temperature is not sharply defined, it is a range of temperatures which may be understand as a processing temperature. To get a good quality joint of two layers of welded material, temperature of thermoplastic must exceed the required flow temperature so as to intermingle chains of molecules freely among the both layers of fabric. It is important to be aware of this fact in connection with high frequency welding. One of the best methods for checking the quality and integrity of weld seam is performing of various strength tests. The complete analysis should consist of following testing methods: shear resistance, peel adhesion and tensile strength test. For semi-crystalline polymers (i.e. polyamide, polyolefins) the melting temperature is more constricted as a melting point.

HF welding only works with thermoplastics that have polar groups and a high dielectric constant, a factor determined by the molecule's geometry and dipole moment. Non or weak polar polymers are not compatible with this method because there is no molecular motion responsible for the rapid reversing electric field. Molecules of materials with a low dielectric constant do not flip quickly or at all. Consequently, they will not generate the required heat to form a weld.

HF Welding Machines

A HF welding machine (dielectric heater) consists of the following:

- a high frequency generator with a special power tuning plates unit,
- a pneumatic press,
- an electrode that transfers the radio frequency current to the material that is being welded.
- a welding table that holds the material in place under the press system.

The operator adjusts the field strength by setting a required anode current value depending on the material being welded, size of the electrode etc. In accordance to the frequency bands designed for ISM (industrial, science and medical) use, the permitted frequencies for dielectric

heaters are 13.56 MHz ± 7 kHz, 27.12 MHz ± 163 kHz, and 40.68 MHz ± 20 kHz. The frequency restrictions are to prevent interference with communications equipment. The most commonly used operating frequency is 27.12MHz.

Operator Safety

The side effect of HF welding machine's working is the electromagnetic field emission, which affects the worker. RF electromagnetic radiation is classed as non-ionizing radiation which refers to any type of electromagnetic radiation that does not normally have sufficient energy to produce ionization in matter. To cause a biological response, the electromagnetic field must penetrate the exposed biological system and induce internal electromagnetic fields. Radio frequency absorption depends on field parameters, zone of exposure (near field or far field), characteristic of the exposed object and absorption or scattering effects of objects near the exposed body. Near-field and far-field exposures may occur depending on the frequency of the incident field and the distance of the exposed person from the radiating source. The most recognized effect of RF radiation in biological systems is tissue heating. Non-thermal effects are not directly related to an increase temperature in tissue, but rather to other changes that occur in the tissue as a result of exposure to electromagnetic fields. In many countries recommendations and mandatory legal regulations to limit exposure to non-ionizing radiation exist. Dielectric welding machines are often operated manually, usually in a distance of approx. 50 – 60 cm from the source of emission. Operator exposure can be reduced by keeping the operator's body as far as practical from the dielectric welding machine. Maximizing the distance

between the heater and operator can be effective in reducing exposures, because the radiation decreases with the distance. Hazard to operators can arise when contact is made with the metallic parts of the machine. It is recommended to avoid metal buttons in HF welding machine design, etc. Shielding of HF welding machines, grounding and other protective measures can reduce worker exposure to acceptable levels. Good shielding design should interfere as little as possible with the normal operating procedures and production requirements.

Advantages

Fast, high quality welding process.

- No wrinkles and puckers on the welded material.
- Decorative appearances or embossing on the welded items are possible by engraving or profiling the plates.
- By incorporating a cutting edge adjacent to the welding surface, the process of welding and cutting of material can be performed simultaneously. This is often called “tear-seal welding” because the cutting edge compresses the hot plastic sufficiently to allow the excess scrap material to be torn off.
- HF welding focuses the heat at the weld target so that the surrounding material does not have to be super-heated and risk burning in order to achieve target temperature at the joint.
- Energy-saving process by transmitting the HF energy only during welding time in a single cycle, with no initial energy-consuming process.
- When the material can remain under the pressure without introducing more energy, it is possible to cool the material under compression thus increasing the weld strength.
- Possibility to automate the production.

Training

To operate dielectric heaters safely, operators must receive thorough training from experienced in-house personnel or manufacturers, representatives. An investment in more in-depth knowledge pays off quickly through increased production quality, reduced shutdown time, reduced repair costs, and increased employee safety.

Applications

Typical HF weld cycle times range from two to five seconds depending on the type of fabric,its thickness and number of layers to bond. The thickness of one layer usually is between 0.10mm – 1.00 mm. Sometimes it is recommended to choose another frequency from ISM bands than usual 27.12 MHz, especially to thinner materials welding. With many other types of welding, if the materials are too thick, they will not bond in the middle because the core will not melt, while the outside layers can become overheated or burned. HF welding, on the other hand, heats from the inside out and is the best method for forming airtight seams. In the technical textile industry, the technique is used on materials coated with PVC, EVA copolymer, TPU, and polyurethanes (PU). HF welding is a possible method to join other polymers, including nylon, PET, PET-G, A-PET and some ABS resins, but special conditions are required. For example, nylon and PET are HF weldable if the welding bars are preheated. HF welding is generally not suitable for some types of thermoplastic materials, i.e. polytetrafluoroethylene (PTFE), polycarbonate, polystyrene, polyethylene or polypropylene due to their non-polar molecular structures. HF welding is commonly used to manufacture medical supplies, many of which use TPU-coated nylon, PVC or less commonly polyester. Applications include: body fluids bags, protective clothing, gel- and foam-filled cushions, lumbar support, hydration reservoirs, and medical air and water mattresses, as well as covers for stretchers and beds. Industrial applications include: flexible storage tanks, inflatable life jackets (PFDs), flexible ducting, bellows, curtains, conveyor belts, water weights, lifting bags, and conveyor belts. HF welding is well suited to the TPU-, PVC-, EVA-, and PU-coated materials used in inflatable boats, life jackets, life rafts, and other buoyancy equipment. HF welding is also used in the construction of tents, temporary inflatable structures and in many others.

Courtesy of FIAB

Hot Air and Extrusion Welding

Courtesy of Miller Weldmaster

The Science

Hot air welders generate the heat required for welding by blowing compressed air (most common) across electrical heat elements. The air is heated up to 750°C (1382°F). The resulting hot air is precisely injected at the welding point between the fabrics and is the only thing that touches the material to be welded. When the surface of the thermoplastic melts, immediately, a roller applies pressure to the layers using the table below for support. The molecules intermingle and a weld to develops as the thermoplastic cools. Successful hot air welds can sometimes require multiple passes.

Hot Air Welding Machines

The hot air welding apparatus consists of the following:

- an air supply.
- either a fan or compressed air.
- a handle or support for the apparatus.
- a heating chamber which contains the electrical elements that produces the hot air.
- a temperature control.
- a nozzle that focuses the heated air as it leaves the welding gun.

The exiting material is pressed between a roller and the work table to form the weld. For large operations, the welding nozzle is mounted on a single or two-axis gantry system that moves the nozzle over a flat table. This allows large or continuous pieces of material to be welded.

Advantages

An advantage of some hot air welders is that the equipment can be portable. This makes welding possible virtually anywhere and field repairs are easier. Handheld welding can be slow, though, and the weld quality depends on the skill level of the operator. However, automated or fixed location welders can process materials rapidly and can make hot air welding one of the fastest techniques available.

Applications

As with most types of welding, machine designs can enable hot air welding of many different shapes, including curves. Hot air is ideal to use when the weld width needs to change often or when repeated starting and stopping is required throughout the welding process. Hot air welding is generally used on thermoplastic materials that have a thickness of 0.2 – 2mm or more.

Hot air welding is widely used to construct inflatable products, especially products that are curved, like Inflatable boats and kayaks, inflatable dams, and other curved products made out of TPU-, PVC, EVA and PU-coated materials. Industrial applications include: flexible storage tanks, flexible ducting, bellows, curtains, conveyor belts, water weights, lifting bags, and conveyor belts.

Hot-air welding can be very fast with straight-seamed products like oil booms, flood and spill controls, awnings, marine and roof covers, tents, and tarpaulins. Applications that require hems and pockets, like signs, finishing banners, and advertising often use this method as well.

Extrusion Welders

A related method is extrusion welding. It uses hot air or halogen to heat the substrate while laying down a molten rod of matching polymer at the connection point. Multiple welding heads can be used simultaneously. Extrusion welding is more cost effective for welds in thick materials because the joints can be made more quickly than with hot air welding.

Though extrusion welders are more expensive than hot air welders, they only require one pass versus several passes for hot-air speed runs. With a skilled operator, extrusion welding can increase output and produce faster turn-round times than hot air welding. The process is used typically for assembly of large fabrications such as chemical storage vessels with wall thicknesses up to 50 mm.

Hot Wedge (HW) or Bar Welding

Courtesy of Miller Weldmaster

The Science

HW welding uses a heated metal wedge to provide the required heat. The fabric is pulled from each side of a precisely positioned heated wedge that concentrates the heat on the weld points. The textile is then pressed together with two pinch rollers to form the weld. Tightly controlled wedge temperatures can range from 370C to 490°C (700°F to 920°F).

HW Welding Machines

A HW welder consists of the following:

- a temperature-controlled wedge,
- a welding bench that holds the material in place,
- a handle or support for the apparatus,
- a temperature control, and
- pinch rollers.

The set up is very much like that of hot air welders with the exception of the set of pinch rollers that enable these welders to operate without a table.

Advantages

Hot wedge welders are versatile and easy to use and can form many different styles of welds with the proper equipment. As a result of the machine design, material can be pulled through the machine unsupported by a tracking system. This allows HW welders to operate on soft or uneven surfaces, not just hard work tables. Many machines are portable as well and perfect for field work. When automated, weld times can be rapid, processing up to 6 to 9 meters (20' to 30' feet) a minute depending on the material. HW welding produces smooth seams. Though HW machines can be set up for curved work, they are best on straight seams. It is the technique of choice when more than two layers need to be welded or when welding thin films where air flow from hot air welding can cause the material to flutter affecting weld quality.

Because HW machines do not have high-frequency generators or fans creating high-speed air flow, they are silent and nearly smokeless, creating a quiet, safe work environment.

Disadvantages

Because weld quality is dependent on temperature and speed, when changing welding speeds care must be taken to adjust the temperature. For example, when welding around a curve, the rate is usually slowed. Slower speeds require slightly lower welding temperatures to accommodate the longer exposure times. If this is not done, the material can burn. With HW welding, the wedge temperature cannot be altered quickly.

Applications

HW welding is most often used with thermoplastic films with a thickness from 0.2 – 2mm, but usually less than 0.5mm, or with very thick coated geotextiles like HDPE sheet materials, especially for field welding. It is especially suited for PVC, and TPU- and PVC-coated materials.

HW is used to manufacture smaller tents, temporary inflatable structures, and to apply tape to sewn seams. It is also used in flexible storage tanks. HW welding is not suitable for nonwoven geotextiles. Nonwoven geotextiles will only be tacked when HW welding is used. So, other welding methods should be used for more permanent seams.

07

EREZ – TECHNICAL TEXTILES AND SUPPORT

Erez is a global leader in the manufacture of high-performance technical textiles that are capable of withstanding both extensive wear and environmental stressors. We manufacture more variety of coated textiles than anyone else, and can meet the needs of a full range of industries and end-product applications. All of our textiles are certified to international standards, making them the perfect choice for manufacturers who produce or export on a global scale. With offices and warehouses throughout the world, we can usually deliver in-stock product within a few days no matter where you are.

Erez textile coatings are light, yet stable, with superior welding advantages. And our dedicated research laboratory is constantly pioneering new breakthroughs in polymer blending. With over 30 years in the business, Erez has an extensive collection of formulas in stock. But if needed, our research team is ready to formulate custom coatings to meet specific needs. Plus, we specialize in small batch runs.

Your choice of a coated textile can have a significant impact on your end product. Erez has decades of global experience and can help you with material selection, new product strategy and development, and existing product line improvement. Erez understands and will work together with you to ensure your project is a success from the idea through to implementation.

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08
DEFINITIONS AND ABBREVIATIONS

Damping: any effect that tends to reduce the amplitude of vibrations.

Dielectric: transmitting electric force without conduction; insulating.

Dielectric constant: a quantity that measures the ability of a substance to store electrical energy in an electric field when compared to air.

Dipole moment: a number calculated by multiplying the magnitude of the electrical charge of systems which have ends containing positive and negative charges (e.g., molecule) by the distance between the polarized ends.

E-module: elastic modulus (also known as modulus of elasticity). The ability of a material to deform under stress.

Faying surface: the surface that is in contact at a joint .

HF: also HRF. See RF.

Friction: the resistance that one surface or object encounters when moving over another.

Inertia: a tendency to do nothing or to remain unchanged.

Melting point: temperature at which a substance goes from a solid state to a liquid state.

Ultrasonic: high-frequency, acoustic, electromagnetic waves above the level of human hearing. With regard to welding, an energy source used to create heat and molecular fluidity.

PE: polyethylene.

Polymer: a molecule composed of repeating subunits.

PU: polyurethane.

RF: radio frequency. With regard to welding, an energy source using high-frequency electromagnetic waves to create heat and thus molecular fluidity. Also, called HF or HRF.

Shear: shear stress. Tendency of a material to slip in a plane parallel to the direction of the stress.

Thermoset: polymers that form an irreversible bond when cured (usually under heat) and will not re-melt when exposed to heat.

Thermoplastic: polymers that melt under heat and will re-melt when re-exposed to heat.

TPO: thermoplastic olefin.

TPU: thermoplastic polyurethane.

PVC: polyvinyl chloride.

Welding: the process of connecting materials by causing a molecular bond (usually via heat and pressure) either directly between the materials themselves or by introducing additional material that will bond with both surfaces.

Viscosity: a liquid's resistance to flow.

TECHNICAL TEXTILES FOR THE MODERN WORLD

Erez is your partner in coated technical fabric solutions for industries across the globe. At Erez, our key values are innovation, proven performance, guidance, and social responsibility. Erez coated textiles undergo rigorous testing and meet standards set by major certification bodies internationally. We believe in providing expert guidance to our customers in all industries, and to work together with them to build the best products. We make sure our fabrics perform so that you can create products that help make the world a safer and better place.

Our singular mission is to help you manufacture the top products in your industry. Consider Erez your coated technical textile expert.

For More Information:

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Erez representatives are available 24/7, from local offices in 6 countries, and with easily accessible stock in warehouses on 4 continents. Wherever you are, Erez is ready to serve you.

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