



PITTSBURGH ELECTRICAL INSULATION
MANUFACTURER | CONVERTER | DISTRIBUTOR

800 Martha Street, Munhall, PA 15120

TECHNICAL DATA

Polyglas™ Resin Glass Banding Tape

Quality Through Research

PEI Polyglas™ Banding Tape

Polyglas™ Glass Banding Tapes are constructed of high tensile glass yarn laid and bonded with specially formulated fully catalyzed thermosetting resins. It is not a woven tape, thus it utilizes the maximum tensile strength of the glass, resulting in a high tensile, high modulus, low elongation, high impact strength band.

Polyglas™ banding tape is in itself an insulation and requires no underlying insulation pad, thus eliminating insulation and creepage problems experienced with steel banding.

This tape is supplied in the "B" stage (semi-cured) forming a soft well-balanced flat ribbon, assuring that each yarn strand bears an equal share of the load.

"B" stage resin is a special resin formula used to insulate each individual glass yarn, thereby preventing cutting and shearing.

The thermosetting formulated resins have been checked to rigorous standards through laboratory tests and many years of extensive and continuous service in the motor industry.

In the "C" stage (completely cured) the glass band is formed into a hard, high tensile homogenous mixture of glass and resin which is void of air spaces, this mass greatly improves heat dissipation factors.

Polyglas™ tape resins are the result of extensive research and development, bringing the user the most advanced resin system available in the market.

PEI banding tape is made with a specially formulated in-house polyester resin. Our standard banding tape formulation is supplied in two standard resin content levels. Standard, and most commonly used, is 27% with a higher percentage of 32% available where higher resin flows are required. Custom percentages are also available.

During the cure cycle, the resin contained in the tape flows and forms the bands into a homogenous structure. The resin also flows and penetrates between coil openings, etc. The banding tape assists in anchoring the coils against movement and adding insulation between the coils. This greatly adds to the overall stability under all conditions.

These bands have very high arc resistance and the attempts to induce flash over failures in 20 cycles have not been successful, however, steel bands consistently fail in two or three cycles.

Polyglas™ result in cooler coils than the steel bands system affords in many cases.

Calculated correctly and properly applied, Polyglas™ Tape Bands have not failed under continuous operating conditions of high humidity and acid fumes including temperatures in excess of 180 C° (365 F°). Evidence indicates these bands performed where the other insulation materials on underlying coils has burned and charred.

Polyglas™ tapes have successfully replaced steel wire on all types of armatures including traction motors, large generators, and industrial DC motors, including severe duty motor.

Polyglas™ banding tape is popular with winders because of its ease of application, elimination of underlying insulation, and the removal of the hazard present in applying steel bands which may break and lash during the banding process.

The older acrylic family has its own value on banding and meets the Nema Class H (180 C°) temperature requirements. However, due to advances in technologies, the polyester family now meets and exceeds the U.L. 220 C° temperature requirements.

The polyester resin formulation can be used in cold or hot banding processes observing good banding practices during the banding operation.

EXAMPLE:

A wire band for a rotor known to have been in continuous service exposed to moisture and acid fumes:

$W = 69014 \text{ lbs.}, R = 7.05", N = 3600 \text{ rpm.}$

$f = \frac{69.4 \times 7.05 \times 3600 \times 3600}{12 \times 2933 \times 2 \times 3.1416} = 28,700 \text{ lbs. due to wt. copper.}$

$12 \times 2933 \times 2 \times 3.1416$

$f = \text{for insulation on coils etc.} \quad 2,100 \text{ lbs.}$

$f = \text{for wt. of metal band wire} \quad \underline{16,000 \text{ lbs.}}$

46,800 lbs. total bursting force

Do to the conditions under which this motor was to operate, phosphor bronze banding wire was used.

Tensile strength of wire 120,000 psi

Wire diameter 102"

Area of wire 00818 sq. in.

Wt. of 324 turns 34.58 lbs.

$f = 34.58 \times 7.9 \times 3600 \times 3600 = 16,000 \text{ lbs. bursting due to weight of wire } 12 \times 2933 \times 2 \times 3.1416$

Tension in band due total bursting pressure of 46,800 lbs.

$\frac{46,800}{.00818 \times 324} = 17,650 \text{ lbs.}$

Strength $\frac{120,000 \text{ lbs.}}{17,650} = 6.4 \text{ factor of safety}$

If Polyester Banding Tape were to be used on this job, 120 bands of 3/4" width would weigh about 4 lbs., which when substituted for the weight of the wire in the formula would reduce the 16,000 bursting pressure to 1,800 lbs. and the total bursting pressure to 32,600 lbs.

3/4" tape has a tensile of 1,000 lbs.

$1,100 \times 120 \text{ turns} = 132,000 \text{ lbs. total}$

$\frac{132,000}{32,600} = 4 \text{ factor of safety}$

32,600

For most applications, a factor of safety between 3 and 5 is very satisfactory and also conservative. The recommendations, test results, and suggestions are offered herein as a guide in the use of these materials and are not a guarantee to their performance. The above properties are typical values and are not intended for specification use.

Banding with Polyglas™

Once the coils have been seated, the function of the band is to hold them in that position under all operation conditions. To accomplish this the band must be able to exert a force at all times greater than the centrifugal forces created by the rotating armature.

In all cases the true test of a cured band is the tensile strength it will withstand under the stress of operation at continuous duty. Often the engineer has calculated the maximum centrifugal forces expected under operation conditions and used a safety factor in accord with good engineering practice. The banding process is easy, safe, and in many cases reliable beyond the expected life of the machine.

Glass, unlike steel, does not "set" under stress and its ultimate tensile and elastic limit are identical. Whereas steel has a 30% lower elastic limit than its ultimate tensile. Glass bands have a built in safety factor when compared to the matching value of a steel band.

Polyglas™ Edging Tapes

Polyglas™ edging tapes assist in forming good glass band edges. Supplied in various beads and widths, these tapes make banding easier, when the angle or incline is extreme on the armature yolk.

SIZE ET-5 – Approximate Dimensions:	Bead Diameter 1/8"	Width: 1"
SIZE ET-10 – Approximate Dimensions:	Bead Diameter 5/32"	Width: 1"
SIZE ET-12 – Approximate Dimensions:	Bead Diameter 3/16"	Width: 1 1/2"
SIZE ET-16 – Approximate Dimensions:	Bead Diameter 1/4"	Width: 2"

Special bead and width sizes available on request.