

Tech Table: Vacuum bagging supplies

By Grace Nehls / Assistant Editor

» The impregnation and consolidation of composite laminates via atmospheric pressure in the vacuum infusion process (VIP) is a well-established procedure for the production of high-quality components and structures, and has been adopted by many composites fabricators for several reasons:

- Removes air trapped between plies
- Compacts fiber layers and prevents shifting of fiber orientation during cure
- Extracts moisture, solvents and volatiles from curing composites
- Achieves a higher fiber-to-resin ratio
- Is a cleaner, less wasteful and more efficient process compared to hand layup

- Helps in producing low volumes of large structures minus an autoclave
 - Allows for the use of a variety of molds and custom shapes
- As a result, vacuum infusion continues to show promise for end markets such as wind, aerospace, automotive and marine.
- However, VIP is also, arguably, a complex process, and involves a variety of processing materials and steps for proper implementation, including the use of release film or peel ply, a bleeder, separator and breather layer, various tapes for sealing and vacuum pumps to remove air from the laminate. With it comes an equally complex range of suppliers and distributors that offer customers a variety of products.

Company	Release Films and Peel Ply				Bleeders		Breather Layers		Breather Yarns/Cloths		Flash Tape	Sealant Tape			Bagging Film			Reusable Vacuum Bags	Vacuum Ports
	Peel ply material type(s) available	Nonporous (NP) or porous (P)	Release film material type(s) available	Perforated release films: Diameter and spacing of the holes	Material type(s) available	Thickness and weight offered	Breather woven/nonwoven fabric type(s)	Amount of pressure (psi) that can be exerted upon it	Breather yarn/cloth(s) roll size(s) available (in)	Recommended working temp		Material type(s) available	Material type(s) available	Material temp range (°F/°C)	Film type(s) available	Film material ranges (°F/°C)	Potential applications		
Aerovac - Composites One	Nylon, polyester, teflon and silicone-coated glass, aramid fabrics. Available in a wide range of weights, widths and operating parameters	NP	Polyolefins, fluoropolymers, polyimides	Available in all industry-standard spacing and diameters. Hot and hot perforated in 14 spacing and diameter options	Nonwoven nylon, polyester and various fabrics such as fiberglass	Wide range of industry-standard weights and widths	Nylon, polyester and various fabrics such as fiberglass	Varies by type of material, temp, thickness, weight and other factors	N/A	N/A	Available in a variety of substrates, include nylon, fluoropolymers, polyimides, multilayer co-polymer films. Bagging formats include sheet stock, tubular, precut and fold configurations. Custom kitting and precut formats available	Butyl rubber and silicone types	Up to 752/400	Construction options include nylon, fluoropolymers, polyimides, multilayer co-polymer films. Bagging formats include sheet stock, tubular, precut and fold configurations. Custom kitting and precut formats available	Temp ranges up to 800/427	Aerospace, marine, wind, glass lamination, automotive, sports and recreation	Cured and uncured silicone, Viton sheet stock and metric measurement vacuum fittings and ports	All standard imperial and metric measurement vacuum fittings and ports	Minimum quantity of 1
Airtch International	Nylons, polyester, fiberglass with PTFE or silicone coating and aramid	NP	Polyolefins, fluoropolymers, polyimides	All industry-standard perforations	Polyester, nylon, fiberglass	A range of weights, thicknesses	Polyester, nylon, fiberglass	Depending on density and cure temperature, polyester and nylon breather can withstand 100-200 psi. Fiberglass breathers available for higher temperatures, pressures.	N/A	N/A	Flashbreaker tapes in polyester with silicone, rubber and acrylic PSA. Other substrate types available: PTFE, fluoropolymers, nylon and polyimide	Butyl rubber and silicone types	RT to 8-00/427	Nylon, multilayers, fluoropolymers, polyimide	Spectrum of RT to 800/427 for all applications	Wet layup, infusion prepreg, RT, oven and autoclave cure and vacuum press applications. Scale of application ranges from test panels to large scale (i.e., aircraft wings, fuselage, boats and wind blades)	Silicone, Viton, latex	0.25" and larger	16 port types in multiple sizes
Angeloni Groups SpA	T-077 80 gsm Nylon fabric with red tracers	NP	FLD 120 25my PP HD low-temp; FLD 170 30my medium/high-temp; FLD HT-500 13my/25my FEP high-temp	P310 mm centers, size 0.5 mm ± 0.2 mm; P315 mm centers, size 0.5 mm ± 0.2 mm	Polyester	POLY-FLEX TF12 120 gsm 1.3 mm; POLY-FLEX TF15 150 gsm 1.6 mm; POLY-FLEX TF20 200 gsm, 2.0 mm; and POLY-FLEX TF30 300 gsm 2.7 mm	N/A	N/A	N/A	N/A	N/A	AN-3 Gray, max temp 284/140; AN-3 yellow, max temp 410/210	Nylon/polyolefin co-extruded films	FLM 120 75my low-temp vacuum bag films; FLM 170 50my high-temp vacuum bag films; TBL 170 50my high-temp vacuum tubulars; TBL 170 75my high-temp vacuum tubulars; TBL 200 50my high-temp vacuum tubulars; TBLAD 170 70my high-temp self-releasing vacuum tubulars	FLM120 for infusion, hand lamination; FLM/TBL 170 for oven and autoclave processes; TBL 200 for oven and autoclave; TBLAD 170 oven and autoclave	N/A	N/A	N/A	
ATL Composites	ATL offers a range of Airtch International brand products for the vacuum bagging and vacuum infusing process, including release films and peel ply, bleeders/breathers, flash and sealant tape, as well as bagging films and other specialty items. Please reference this company's website for specific product details.																		

This table of vacuum bagging supplies has been built with data provided by suppliers, and is intended to provide a representation of the products they offer. To further simplify the table, CW only focuses on the basic categories of materials for vacuum bagging for conventional out-of-autoclave (OOA), wet and prepreg layup processes; additional bagging and plumbing provisions are not detailed.

Moreover, while CW was unable to receive data from all vacuum bag suppliers, prom-

inent companies unlisted — but which should be distinguished in this area — include Aerontec, AeroWindTech, Fibretex Nonwovens A/S, Guarniflon SpA, Gurit USA, Haufler Composites GmbH, Hawkeye International, Smooth-On Inc., Wacker Chemie AG and Warm Industrial Nonwovens. The vacuum bagging Tech Table is available as a downloadable PDF and can be accessed online at short.compositesworld.com/VIPTechTable. CW

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Company	Release Films and Peel Ply				Bleeders		Breather Layers		Breather Yarns/Cloths		Flash Tape	Sealant Tape		Bagging Film			Reusable Vacuum Bags	Vacuum Ports	
	Peel ply material type(s) available	Nonporous (NP) or porous (P)	Release film material type(s) available	Perforated release films: Diameter and spacing of the holes	Material type(s) available	Thickness and weight offered	Breather woven/nonwoven fabric type(s)	Amount of pressure (psi) that can be exerted upon it	Breather yarn/cloth(s) roll size(s) available (in)	Recommended working temp		Material type(s) available	Material type(s) available	Material temp range (°F/°C)	Film type(s) available	Film material ranges (°F/°C)			Potential applications
Diatex SAS	Polyester, polyamid and adhesive peel ply; peel ply for structural bonding (approved by Airbus and Boeing)	NP	284-752°F/120-400°C, perforated or not	500µ or 800µ diameters; 5-10 mm spacing	Polyester	150-440 gsm	Woven glass and nonwoven polyester fabrics	N/A	N/A	N/A	Polyester/acrylic; polyester/silicon; PTFE/silicon; polyimide/silicon	Low-temp sealant tape (infusion process); high-temp (vacuum molding and in/out of autoclave); very high-temp (thermoplastic)	RT to 752/400	Tubular, v-sheet, sheets, kits	Multilayer bagging film; polyamide film; high-elongation film	Marine industry (up to 32 m wide); aeronautics; wind energy; sport and leisure	RTV sprayable silicon 20 short and 49 short for infusion or autoclave applications; HTV silicone for bladders and autoclave	50 mm (1.97") and 65 mm (2.56")	1
Fibre Glast Developments Inc.	Econostitch, nylon release, polyester, PTFE-coated fiberglass	N/A	Medium-temp copolymer, high-temp fluoropolymer	N/A	Polyester	0.125", 4 oz (-115g) and 7 oz (-198g)	Nonwoven	4 oz up to 40 psi; 7 oz up to 85 psi	N/A	N/A	Polyester	Synthetic rubber	Up to 400/204	Polyethylene, Stretchlon, nylon	Up to 400/200	Films available for low-conform and high-conform applications. Stretchlon 200 Film available in flat 60"-wide sheet, and a 120"-wide sheet. Nylon bagging film suitable for use with temperatures <300°F and usable in variety of styles: nylon bagging film, >300°F available in a 60"-wide flat sheet, which can be heat-seamed to shape requirements or to create larger sheets	N/A	For use with 0.5" tubing	1
HEATCON Composite Systems	Nylon	P	High-temp, tough fluoropolymer and Teflon	0.381 mm diameters on staggered, 0.25" centers; 1.143 mm diameters on 2" centers; and 1.143 mm diameters with 3.5" centers	Polyethylene perforated material and Teflon porous material	1 and 2 mils	N/A	N/A	N/A	N/A	1" and 2" polyester backing	Dark gray and light gray	450/232	2 mil 60V fold and 30" tube, 5 mil thickness option	Nylon (5, 10 and full rolls available)	Aerospace, wind energy, marine, automotive, etc.	N/A	0.25"	1
Lavender CE	Lavender CE offers a range of products for the vacuum bagging process, including release films and peel ply, bleeders, breathers, flash and sealant tape, as well as bagging film and vacuum ports. Please reference this company's website for specific product details.																		
National Aerospace Supply Co.	Peel Ply A, B and F	N/A	FEP and ETFE	0.015 and 0.045	Polyester	2.2, 4, 10	N/A	N/A	N/A	N/A	Polyester, acrylic	NA350	Up to 400/204	Nylon	Up to 400/204	N/A	N/A		
Smartech International	N/A	N/A	N/A	N/A	N/A	N/A	PTFE-coated glass fiber breather mesh (variable sizes available)	Can sustain perfect negative pressure of 13 psi, and withstand temps of nearly 500°F/260°C	N/A	N/A	N/A	Not required	N/A	N/A	N/A	N/A	High-strength silicone materials that can sustain negative pressure and withstand temps up to 392°F/200°C	Vertical and horizontal vacuum ports are offered; 1/4 NPT with/without air hose quick connect	Minimum of one required, depending on application and/or bag size
SWORL Reusable Vacuum Bags	SWORL reportedly eliminates the need for most of the items mentioned above such as sealant tape, bagging film, breather fabrics, peel ply and release films, bleeders, breathers and flash tape. SWORL is being used in a broad range of intricate and/or high-volume applications such as marine, industrial, architectural, and aerospace applications. SWORL is used in a wide variety of process applications including infusion, oven cures, autoclave cures and as well as OOA and over a wide variety of resins such as prepregs, PE, VE PUR, phenolics and epoxies.																		
TORR Technologies	N/A	N/A	N/A	N/A	N/A	N/A	PTFE-coated Kevlar screen/beltting	200 psi	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Silicone rubber, EPDM	0.25, 0.375 and 0.5" male BSP, adapters for JIC, SAE and larger NPT connections	1