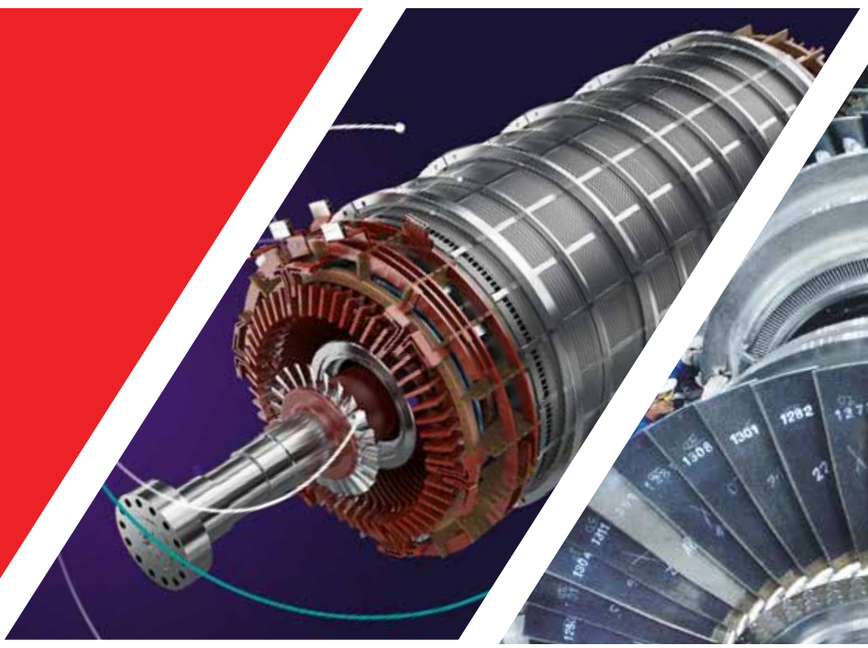
DRIVEN BY **INNOVATION,**
INSPIRED BY **POSSIBILITIES,**
BUILT FOR A **DIFFERENCE.**

COMPOSITES THAT MAKE
A DIFFERENCE

samcomposites.com



WHAT'S **INSIDE**

Revolutionizing the
World through **INNOVATION**.

SAM has over **30** years of experience in advanced composites.

ABOUT **US**

At SAM Composites, we use over 30 years of experience to help solve problems for people who are themselves world builders. Our innovative composite solutions are built using cutting-edge continuous manufacturing technologies, which provides benefits for customers across different industries worldwide. You can find our products used in applications from railways, aerospace, defence, steel furnace, hydraulic, space and energy.

What sets us apart from the crowd is our collaborative approach and extensive global reach. We use our expertise to deliver successful and innovative design, manufacturing, and maintenance solutions to consumers all over the world. We want to be the top pick when it comes to sustainable composite solutions.

We are a driven set of individuals on a mission to make the world stronger and more secure.

OUR MISSION

To deliver the world stronger durable and committed in delivering precised innovative product to last for a lifetime.

OUR VISION

To make the world a strong and safer place by providing strong foundations and solutions built on innovation to the true architects of the world

We believe in the power of community and want to deliver on our strengths of manufacturing & design for our clients.

Muzammil Rawoot

MANAGING DIRECTOR

QUALITY & **ACCREDITATIONS**

Quality first. Always!

Quality and consistency are two of the most important things to our business. We always aim to deliver high-quality products that meet or exceed our customer's expectations. Our products are often integrated into our customers' products, so we understand that even the small details can make a big difference.

ISO **CERTIFICATIONS**

Here at our company, we make it a priority to stay up-to-date with industry conversations about the environment, technology, and regulations. We want to be sure that we are always compliant with national environmental regulations and are always working to improve our manufacturing processes and be compliant with major regulations, and we comply with ISO 9001:2015; ISO 14001:2015, and ISO 45001:2017.

RESEARCH & DEVELOPMENT:
Our Product design approach takes into consideration customer feedback and innovation together and our R&D team comprises of industry's best technicians and scientists. Through thorough experimentation and sampling, we create products that just fit right without the customer's demand and are ready to use just out of the production batch.

PRECISION AND QUALITY CHECKS:
Keeping in mind these nuances, We undertake regular audits both internally and externally so that our promise of quality and transparency can be reinforced. Our production process also uses the latest technology and we have a yearly review for all our machines so that we never have to compromise on quality a bit.

CUSTOMER-CENTRIC APPROACH:
We have a dedicated team just to ensure a smooth experience for our customers at every stage. We have built a multiple-check quality assurance mechanism that ranges from product design to product delivery and thereafter.

QUALITY **CONTROL**

Quality and consistency are two of the most important things to our business. We at SAM have managed to integrate the two into our processes to create the best-in-class products for our customers. We always aim to deliver high-quality products that meet or exceed our customer's expectations. Our products are often integrated into our customers' products, so we understand that even the small details can make a big difference.

> Quality
> is not act.
> It is a habit.
> ~Aristotle

OIL & GAS

- Tufflam F636 / F 637CR
- Tufflam P1
- Tufflam F700
- G10-SS

DEFENCE

- Tufflam F636 / F 637CR
- Tufflam F700
- Tufflam FR 764
- TUFFLAM CARBON ITE
- Tufflam P3
- Tufflam F3

AEROSPACE

- Tufflam F636 / F 637CR
- Tufflam F700
- Tufflam FR 764
- TUFFLAM CARBON ITE

METALS PROCESSING

- Tufflam H805
- Tufflam F636 / F 637CR
- Tufflam SG 737
- Tufflam GPO3
- Tufflam F2
- Tufflam Muscovite
- Tufflam Phlgophite

INDUSTRIES WE **SERVE:**

COMPOSITES

MOTOR

- Tufflam Muscovite
- Tufflam Phlgophite
- Tufflam G3
- Tufflam GPO1
- Tufflam GPO3
- Tufflam FR 764
- Tufflam F2

SWITCHGEAR

- Tufflam GPO1
- Tufflam GPO3
- Tufflam FR 764
- Tufflam F636 / F 637CR

GENERATOR

- Tufflam F636 / F 637CR
- Tufflam F700
- Tufflam H805
- Tufflam GPO1
- Tufflam GPO3
- Tufflam SG 204

DRY TYPE TRANSFORMERS

- Tufflam GPO3
- Tufflam SG 204
- Tufflam GPO1
- Tufflam F636 / F 637CR

A WHOLE NEW WORLD OF **ENGINEERED COMPOSITES**

Thermoset rigid composite is a type of composite material that belongs to the "plastics" family of materials. Plastic materials can either be thermoset or thermoplastic in general. Thermoset materials, by definition, maintain dimensional stability at high temperatures, while thermoplastic materials melt (or lose dimensional stability) at high temperatures.

Thermoset composite materials are suitable for electrical insulating applications because they maintain their dimensional stability at high temperatures. Due to the concentration of electrical wiring in a small space, electrical equipment tends to generate a lot of heat. Due to the resistance offered by aluminium or copper to the passage of electrons through their valence structures, the passage of electricity through electrical wires generates thermal energy or heat. As a result the materials used to insulate the copper or aluminium conductors must be able to withstand the generated thermal energy without deforming or melting. Therefore As a result, thermoset materials are extensively used in electrical equipment and other applications that require dimensional stability at high temperatures.

Various types of reinforcement materials are used like :

- Cellulose paper, Mica papers
- Fabrics: Cotton, Glass, Carbon, Polyester, Synthetic Fiber Fabrics, Aramid, Carbon

The most commonly used types of resins are:

- Polyester, Epoxy, Phenolic, Polyimide, Silicone, Vinylester

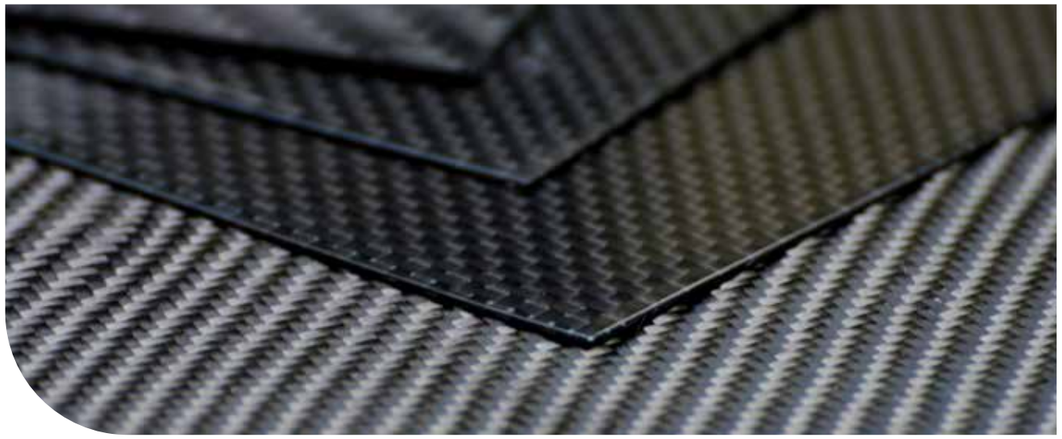
The selection and adapted formulation of resins and how they are combined with the various reinforcement layers available enable a wide range of industrial composites to be created, each with different mechanical, electrical, and thermal properties. Composite materials are available in different forms:

- Prepregs
- Sheets and cut to size panels
- Tubes and Cylinders
- Machined Parts

GLASS FABRIC **LAMINATES**

As our core offering, the glass fabric laminates come in all combinations of resin and reinforcement fabrics. Our most sought-after products in this category are the Glass Epoxy Laminates, which are known for their high electrical, mechanical and thermal properties.

Our Glass Fabric Laminates are of topmost quality, and we also allow the customer to select the appropriate range of temperature, electrical resistance, mechanical strength, etc. to give them the best cost-effective fit for their business. Tufflam®-Rigid Laminates are formed using several substrates and matrices. The process produces outstanding mechanical strength, especially in compression. High-pressure laminates also have excellent dielectric strength and electrical properties. Each combination of substrate and resin provides a different set of properties.



TUFFLAM IEC	CHARACTERISTICS
EPGC 201	Low Temperature with medium strength material. Cryogenic grade available upon request.
EPGC 203	Mechanical and Electrical applications at high temperature.
EPGC 202	High Mechanical, Electrical, Electronics applications. UL94V-0
EPGC 205	Low smoke emission and toxicity tracking resistant I1F1. UL94V-0
EPGC 306/308	Excellent mechanical properties at high temperatures.

EPGC 203/308	High mechanical properties at high temperatures. Highly chemical resistant.
EPGC 205	High tracking and excellent mechanical properties at high temperatures.
MG 267	Use as magnetic wedges in low and high voltage rotating machines to improve the electro-magnetic performance.
NEMA G7	High Temperature upto 220 Deg. C. UL94V-0. High tracking resistance.
NEMA G30	High Temperature upto 220 Excellent mechanical properties at high temperatures.
CARBONLAM	Low weight, high modulus of elasticity, excellent abrasion resistance and dimension stability

GLASS FABRIC **LAMINATES**

Series			Tufflam F636 / F 637 CR	Tufflam F700	Tufflam FR 764	Tufflam FR H805	Tufflam H805	Tufflam EP308	Tufflam WR 205	Tufflam MG 267	Tufflam SG 737	Tufflam PI301	Tufflam Carbonite
Matrix			Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Epoxy	Iron Powder	Silicone	Polyamide	Modified Epoxy
Reinforcement			Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Glass Fabric	Carbon Fabric
IEC (Eur)	IEC 60893		EPGC 201	EPGC 203	EPGC 202	EPGC 205	EPGC 306/308	EPGC 203/ 308	EPGC 205		SIGC 202	PIGC 301	-
NEMA America	NEMA LI-1		NEMA G10	NEMA G11	NEMA FR4	NEMA FR5	NEMA G11	NEMA G11	NEMA G11		NEMA G7	NEMA G30	-
Military	MILITARY		MIL-I-24768/2	MIL-I-24768/3	MIL-I-24768/27	MIL-I-24768/28	MIL-I-24768/28	MIL-I-24768/28	MIL-I-24768/28				-
Sizes (in mm)			1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440	980 x 480	610 x 610	1220 x 1220	1220 x 1020
			1220 x 2040/3050	1500 x 1500	1220 x 2135	1220 x 1020	1220 x 1830	1220 x 1830	1220 x 2700	1220 x 1020	1220 x 1020	1220 x 1830	1020 x 1020
Special sizes upon request			600 x 8000	2000 x 2000	1220 x 3660	2000 x 2000	2000 x 2000	2000 x 2000	1220 x 3660			1220 x 2440	
Thickness Range			0.2mm - 130mm	0.2mm - 130mm	0.2mm - 130mm	0.2mm - 130mm	0.2mm - 130mm	0.2mm - 130mm	2mm - 150mm	2mm - 8mm	1mm - 25mm	0.2mm - 130mm	0.5mm - 25mm
Standard Color			Green / Yellow / Black	Green / Yellow / Black / Brown	Green / Yellow / Black	Beige	Green / Yellow / Black	Beige	Deep Green	Graphite Black	Pure White	Ironoxide Brown	Black
Engineering Properties		**Units**	**Values**										
Mechanical													
Tensile Strength	ASTM D-638	psi (MPA)											
LW			40000 (275)	40000 (275)	40000 (275)	45000 (310)	50000 (345)	52000 (358)	50000 (345)	28000 (193)	23000 (158)	50000 (345)	101500 (700)
CW			35000 (240)	35000 (240)	32000 (220)	35000 (240)	40000 (275)	45000 (310)	40000 (275)	22000 (151)	18500 (127)	40000 (275)	-
Flexural Strength	ASTM D-790	psi											
Flatwise			27000 (186)	28000 (193)	27000 (186)	28000 (193)	30000 (206)	30000 (206)	28000 (193)	21700 (148)	14000 (96)	30000 (206)	
Edgewise			22000 (152)	23000 (158)	22000 (152)	23000 (158)	25000 (172)	25000 (172)	23000 (158)	20000 (137)	12000 (83)	25000 (172)	
Compressive Strength	ASTM D-695	psi											
Flatwise			60000 (413)	60000 (413)	60000 (413)	60000 (413)	60000 (413)	60000 (413)	60000 (413)	50000 (345)	45000 (310)	60000 (413)	
Edgewise			35000 (240)	35000 (240)	35000 (240)	35000 (240)	40000 (275)	40000 (275)	35000 (240)	35000 (240)	14000 (96)	40000 (275)	
Rockwell Hardness	ASTM - D785	M Scale	M111	M112	M111	M112	M115	M115	M115	M110	M100	M115	
Deformation & Shrinkage		percent	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.2	0.3	0.25	
Cold Flow at 4000 psi													
Electrical Characterstics													
Electric Strength	ASTM D-149	kV/mm	14	16	16	16	16	16	14	12		16	
Dielectric strength perpendicular	ASTM D-149	V/mil											
Short time test		1/8 in.	550	550	550	550	650	650	550	650	350	650	
Step by Step test		1/8 in.	350	350	350	350	450	450	350	350	250	450	
Impact Strength (Izod)	ASTM D-256	ft.lb/in	7	7	7	5	6	6	5	--	6.5	6	
Bonding Strength	ASTM D-229	lb	2000	1800	1600	1800	1800	1800	1600	--	--	1800	
Permittivity		at 1 MHz	5.4	--	5.4	5.4	5.4	5.4	--	--	4.2	5.4	
Dissipation factor		at 1 MHz	0.35	0.35	--	--	0.35	0.3	--	--	0.003	0.35	
Breakdown Voltage	ASTM D-149	KV	40	45	45	45	45	45	40	35	32	45	
Comparative Tracking index	ASTM D-695	CTI	>300	>600	390	>600	>600	>600	>600	400	415	>600	
Insulation Resistance		ohm	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2000000	2500	2000000	
Physical & Thermal													
Specific Gravity	ASTM D-792	G/cm^3	1.9 +/- 0.1	1.9 +/- 0.1	1.9 +/- 0.1	1.9 +/- 0.1	1.9 +/- 0.1	1.9 +/- 0.1	2 +/- 0.1	3.2 +/- 0.2	2.2 +/- 0.2	1.9 +/- 0.1	1.5 +/- 0.15
Specific Volume		in^3/lb	15.3	15.3	14.9	14.9	14.9	15.3	15.3	14.9	16.5	14.9	
Thermal Expansion		cm/cm. C	0.000009	0.000009	0.00001	0.000009	0.000009	0.000009	0.000009	0.000009	0.000015	0.000009	
Thermal conductivity		$Cal.cm/s.cm^2$. C	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0012	0.0007	
Specific Heat		cal/g.C	0.35 to 0.40	0.35 to 0.40	0.35 - 0.40	0.35 - 0.40	0.35 - 0.40	0.35 - 0.40	0.35 - 0.40	0.35 - 0.40	0.25	0.35 - 0.40	
Moisture / Water Absorbtion	ASTM D-570	% max	0.02	0.1	0.1	0.1	0.1	0.1	0.2	1		0.15	0.05
Temperature Index	NEMA	C	135	155	135	180	180	180	155	180	220	220	180
Insulation Class			B	F	B	F/H	H	H	F	B/F/H	C	R	H
Flammability	UL 94		V1	V1	V0	V0	V1	V1	V1	V2	V0	V1	V1
Convolute Tubing			Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	No	Yes
Highlights			Low Temperature with medium strength materia. Cryogenic grade available upon request.	Mechanical and Electrical applications at high temperature.	High Mechanical, Electrical, Electronics applications. UL94V-0	Low smoke emission and toxicity tracking resistant. UL94V-0	Excellent mechanical properties at high temperatures.	High mechanical properties at high temperatures. Highly chemical resistant.	High tracking and excellent mechanical properties at high temperatures.	Use as magnetic wedges in low- and high-voltage rotating machines to improve the electro-magnetic performance.	High Temperature upto 220 Deg. C. UL94V-0. High tracking resistance.	High Temperature upto 220 Excellent mechanical properties at high temperatures.	Low weight, high modulus of elasticity, excellent abrasion resistance and dimension stability.

GLASS MAT LAMINATES - **METALAM**

Glass mat laminates are produced with low-pressure techniques and are characterised by the use of primarily glass mat or chopped glass as a reinforcement material bonded with a polyester or epoxy resin system. Fillers and other chemical additives are used to achieve desired combination of properties. METALAM® is a trademark that is used to distinguish all-glass mat laminates. When choosing the right METALAM® laminate grade, take into consideration various electrical and mechanical requirements, as well as the expected life span and safety protocols.

The following table shows comparative values for a selected list of METALAM® grades which have been tested in our laboratories and used successfully worldwide. These are low-pressure laminates manufactured using glass mat or chop-strand mat reinforcement and made using low-pressure techniques. Our products, specifically the fibreglass chop-strand components are available in different types of widths and textures, depending on the use in the electrical or mechanical industries. METALAM® GPO-3 remains our finest product in this category. We have laminates from special resins prepared in-house for high temperatures up to 250˚ Celcius.

Series / Brand Names	Test Methods	Units	Tufflam GPO1	Tufflam GPO2	Tufflam GPO3	Tufflam SG 204	Tufflam HT 230/ 276
Matrix			Polyester	Polyester	Polyester	Polyester	Polyester
Reinforcement			Glass Matt	Glass Matt	Glass Matt	Glass Matt	Glass Matt
Specifications			UPGM 201 MIL-I-24768/4	UPGM 202 MIL-I-24768/5	UPGM203 / 205 MIL-I-24768/6	GPO1 UPGM 201	UPGM-204/ 205, GPO2, UPGM 201
Sizes (in mm)		mm	1220 x 1020	1220 x 1020	1220 x 1020	1220 x 1020	1220 x 1020
Color			Red , White , Yellow, Black	Red, White, Yellow	Red, White	Beige	Brown
Specific Gravity	ASTM D792	g/cc	1.8 -/+ 0.1	1.8 -/+ 0.1	1.8 -/+ 0.1	1.75 -/+ 0.1	1.8 / 2.7 -/+ 0.1
Tensile Strength	Lw - ASTM D638	psi	40000	40000	40500	41000	44950
	Cw - ASTM D638	psi	--	38000	35000	35000	38000
Compressive Strength	ASTM D695	psi	43000	43000	45500	37000	72500
Flexural Strength	LW - ASTM D790	psi	40000	45000	49800	51600	62300
Shear Strength	ASTM D732	psi	10000	10000	11000	11000	15900
Izod Impact Strength	ASTM D256	ft-lb/in	6.5	6.5	8.5	10	10
Bonding Strength	ASTM D229	lb	850	850	850	850	850
Rockwell Hardness	ASTM D785	M Scale	100	95	100	90	110
Arc Resistance	ASTM D495	Sec	180	180	190	180	200
Dielectric Strength	ASTM D149	VPM	450	450	450	550	550
Breakdown Voltage	ASTM D149	kV	40	40	45	50	55
Comparative Trackin Index (Min)	ASTM D419		>600	>600	>600	>600	>600
Water Absorption	ASTM D570	%	0.25	0.25	0.25	0.25	0.26
Relative Temp.	UL-7468	c	130	155	155	220	270
Flame Resistance	UL94		HB	HB	V-0	HB	HB
Thermal Class	NEMA		B	F	F	C	R

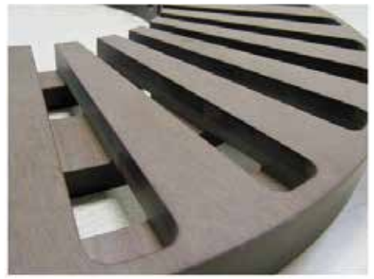
PHENOLIC
LAMINATE

The range of phenolic cotton laminates comprises several grades, each having specific properties and most of which are remarkable for their abrasion resistance and wear properties as well as good level of flexibility and very low level of water absorption.

Machined parts made from Tufflam Phenolite / Phenolam substantially extend the life of machines and mechanically stressed components, thereby resulting in excellent cost savings.

The range encompasses a group of cellulose paper-based laminates that are either phenolic- or epoxy-bonded. All of these laminates comply with precise standards and/or specific requirements such as flame retardancy or high-tension resistance.

Besides the well-known standard grades, we offer several special grades.

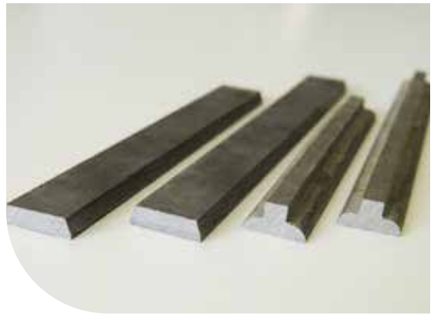


Series	Units	Tufflam P1	Tufflam P2	Tufflam P3	Tufflam P4	Tufflam G3
	IEC 60893-3	PFCP 201	PFCP 207	PF CP 203	PF CP 204	PF GC 201
	NEMA	NEMA X, XP	NEMA XPC	NEMA XX	NEMA XXXP	NEMA G3
	MIL-I-	MIL-I-24768/12	MIL-I-24768/20	MIL-I-24768/11	MIL-I-24768/23	MIL-I-23768/18
Sizes (in mm)		1220 x 1220	1220 x 1220	1220 x 1220	1220 x 1220	1220 x 1220
		1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440
PROPERTIES	Units	Values				
Tensile Strength	Psi	13000	12000	11000	10000	23000
Modulous of elasticity (in Tension)	Psi	120000	110000	900000	700000	200000
Modulous of elasticity (in flexure)	Psi	120000	100000	900000	680000	150000
compressive strength	Psi	25000	25000	20000	20000	50000
Rockwell Hardness	M Scale	M-110	M-100	M-95	M-95	M-100
Electric Strength	kV	40	30	25	15	--
Dielectric strength perpendicular	V/mil					
short time test	1/8 in.	650	550	500	470	600
Step by step test	1/8 in.	350	325	300	320	450
Breakdown Voltage		40 Min	40 Min	45 Min	45 Min	NA
Izod Impact Strength	ft-lb/in	0.55	0.5	0.45	0.4	6.5
Bonding Strength	lb	800	800	750	900	850
Permittivity	at 1 MHz	6	5.7	5.2	4.8	--
Dissipaton factor	at 1 MHz	0.4	0.4	0.4	0.4	--
Comparative Tracking index	pt. electrodes	340	300	250	199	190
Specific Gravity	G/C^3	1.5	1.5	1.5	1.5	1.7
Specific Volume	kV/mm	20.4	20.4	20.4	20.4	16.8
Thermal Expansion	cm/cm. C	20 x 10 ^-6	21 x 10 ^-6	22 x 10 ^-6	23 x 10 ^-6	1.8
Thermal conductivity	Cal.cm/s.cm2. C	7 x 10 ^-4	8 x 10 ^-4	9 x 10 ^-4	10 x 10 ^-4	7
Specific Heat	cal/g.C	0.35 - 0.40	0.35 - 0.40	0.35 - 0.40	0.35 - 0.40	0.35
Temperature Index	C	155	155	155	155	170

Series	Units	Tufflam F2	Tufflam F3	Tufflam F4	Tufflam F5
	IEC 60893-3	PF CC 202 /305	PF CC 203	PF CC 204	PF CC 204
	NEMA	NEMA CE	NEMA C	NEMA L	NEMA LE
	MIL-I-	MIL-I-24768/14	MIL-I-24768/16	MIL-I-24768/15	MIL-I-24768/13
Sizes (in mm)		1220 x 1220	1220 x 1220	1220 x 1220	1220 x 1220
		1220 x 2440	1220 x 2440	1220 x 2440	1220 x 2440
PROPERTIES	Units				
Tensile Strength	Psi	13000	12000	12000	90000
Modulous of elasticity (in Tension)	Psi	135000	120000	100000	800000
Modulous of elasticity (in flexure)	Psi	120000	100000	800000	700000
compressive strength	Psi	39000	37000	35000	30000
Rockwell Hardness	M Scale	M-110	M-105	M-90	M-90
Electric Strength	kV	40	30	20	20
Dielectric strength perpendicular	V/mil				
short time test	1/8 in.	360	350	--	--
Step by step test	1/8 in.	220	220	--	--
Breakdown Voltage		17	15	12	10
Izod Impact Strength	ft-lb/in	1.9	1.6	1.35	1.25
Bonding Strength	lb	1850	1800	1650	1600
Permittivity	at 1 MHz	6	5.8	--	--
Dissipaton factor	at 1 MHz	0.07	0.055	--	--
Comparative Tracking index	pt. electrodes	190	190	175	170
Specific Gravity	G/C^3	1.5	1.5	1.5	1.5
Specific Volume	kV/mm	20.4	20.4	20.4	20.4
Thermal Expansion	cm/cm. C	20 x 10 ^-6	20 x 10 ^-6	20 x 10 ^-6	20 x 10 ^-6
Thermal conductivity	Cal.cm/s.cm2. C	7	7	7	7
Specific Heat	cal/g.C	0.4	0.4	0.4	0.4
Temperature Index	C	155	155	155	155

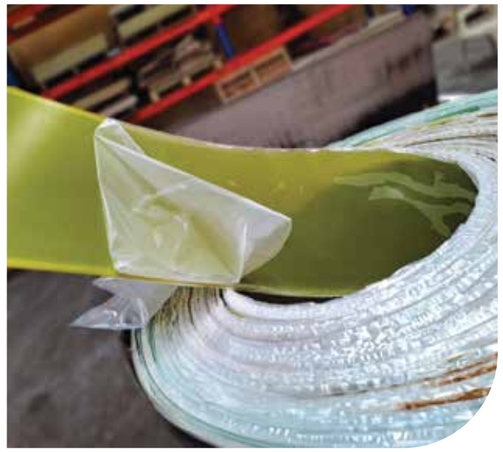
MAGNETIC **LAMINATES**

Tufflam MG267 is a special laminate based on epoxy resin and glass fabric with high content of iron powder for use as magnetic wedges in low and high-voltage rotating machines to improve electromagnetic performance. Tufflam MG267 is available in standard F class and H class versions and could be delivered in cut to size panels or machined slot wedges according to drawing.



DR. BLADE FOR PAPER **INDUSTRIES**

Doctor blades are thin composite coils designed for use in paper-making equipment. Blades are used on cylinders to remove continuously accumulating organic and inorganic residues. These contaminants can build up excessively, leading to defects when they are released onto the paper. Based on different reinforcement materials (glass, carbon, and cotton) with specific fillers, (abrasive, graphite) and resin systems, doctor blades manufactured by Tufflam® provide the solution to various problems relating to corrosion resistance, temperature resistance, wear and softness for paper machine cylinders. Doctor blade products are manufactured in rolls up to 150 meters in length, and in various thickness's regularly up to 2.80 millimetres. Coils can be chamfered or routed.

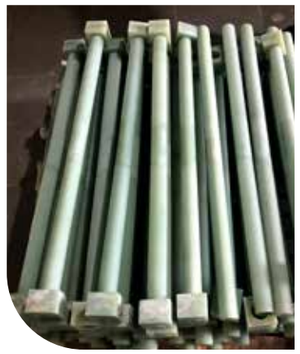


TUBES AND **CYLINDERS**

Tufflam MG267 is a special laminate based on epoxy resin and glass fabric with high content of iron powder for use as magnetic wedges in low and high-voltage rotating machines to improve electromagnetic performance. Tufflam MG267 is available in standard F class and H class versions and could be delivered in cut to size panels or machined slot wedges according to drawing.

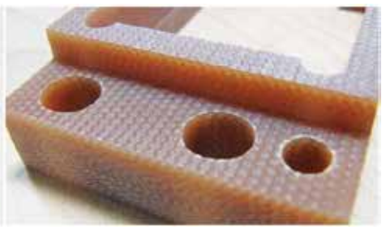
THREADED RODS - **GFRP GRE GRV**

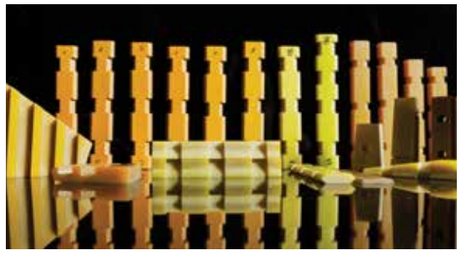
Fastening elements machined from different special grades of epoxy glass laminates make up the threaded rods product range. Electrical insulation materials with high dielectric strength, excellent tracking resistance, and strong mechanical properties account our fastening elements. They are resistant to humidity, seawater corrosion, and chemical agents, reducing the need for frequent and expensive maintenance (rust, painting). They can operate in oil and other dielectric liquids, as well as at extremely low and high temperatures up to 180°C. These come in sizes ranging from m8 to m75, with custom thread sizes, pitch, and nuts.

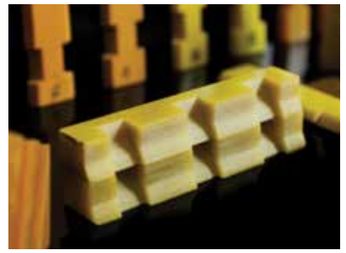


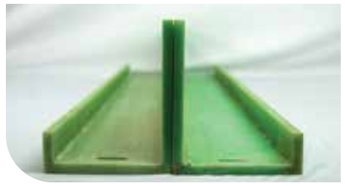
MACHINED **COMPONENTS**

Thanks to our extensive mechanical processing capabilities and manufacturing processes, we will provide you with finished components which meet the highest quality standards in small and large series. Due to the wide range of substrate and resin combinations available, we will provide the material that will provide the best results in your application. We manufacture not only semi-finished products but also finished components as a full service after finishing and testing, thanks to our superior materials science and cutting-edge equipment.









TUFFLAM SSGRE
COMPOSITE LAMINATE

Steel & Insulation Composites (SIC) is made with combination of Glass Reinforced Epoxy (GRE) and steel core offering the strength and integrity of a mental which also maintains the Isolation characteristics of traditional GRE designs. This in turn ensures the highest levels of electrical isolation. This material provides excellent solution for resistance and withstand extremely corrosive condition such as CO2, H2S and generally used for high-pressure services. It is mainly used in the manufacturing of insulating gasket of sealing flange in piping connections from oil, gas, water, chemical and offshore industries.

COMPOSITION of Laminates for Insulation Gasket

Metal Core

Attached Stainless Metal Core between Glass Reinforced Epoxy performs superior sealing ability and reinforced insulation characteristic in high pressure. (Max ASME Class 2500) Standard core material is Stainless Steel 316L and other special material options are available depend on client requests.

DIN/EN	Tradename	AISI/UNS	Temperature
X5CrNi18-10	Stainless Steel	304(S30400)	-200 To +550
X2CrNiMo17-12-2	Stainless Steel	316L(S31603)	-200 To +550
X6CrNiMoTi17-12-2	Stainless Steel	316Ti(S31635)	-270 To +550
X6CrNiTi18-10	Stainless Steel	321(S32100)	-270 To +550

Insulation Material

The laminate material is composed with Glass Reinforced Epoxy (NEMA G10,G11,Fr4,Fr5) for excellent insulation. It used as sealing materials in flanges to protects from leakage and penetration of fluids induced erosion with deformation.

Name	Water Absorption	Tensile Strength	Compression Strength	Dielectric Values	Max Operating Continous
FR4	3.5%	12,000 PSI	34,000 PSI	400 VPM	130°C
G7	0.09 %	22,000 PSI	40,000 PSI	400 VPM	200
G10	0.01 %	40,000 PSI	66,000 PSI	800 VPM	130
G11	0.20 %	43,000 PSI	63,000 PSI	900 VPM	180°C

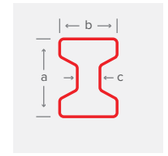
ADVANTAGES of Laminates for Insulation Gasket

- Superior sealing and insulating ability.
- High pressure (max asme class 2500)
- Excellent insulation for cathodic protection, galvanic corrosion and other piping isolation products.
- Protection for electrical corrosion in dissimilar metals.
- Withstand harsh operating conditions, especially high reliability in corrosive environments.

PULTRUSION STRUCTURAL **MATERIAL**

Tufflam also manufactures various components and profiles using pultrusion to create continuous lengths of thermosetting material like FRP, etc. Our pultruded profiles are highly machineable, highly durable, non-corrosive, smooth and consistent.

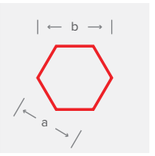
Tufflam® Pultruded Parts are available in an extensive range of sizes.
They include, but are not restricted to:



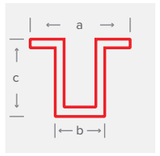
Square I-shaped bar

I-shaped bar

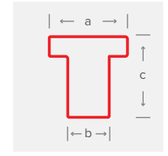
Flat bar



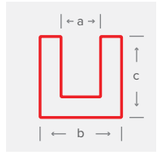
Hexagonal bar



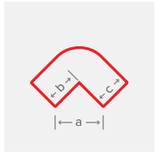
Hollow T-shaped bar



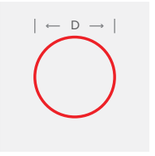
Solid T-shaped bar



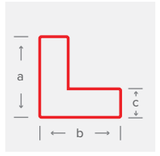
U-shaped bar



R-shaped bar



Round bar



Vertical shaped bar

Glass : Unidirectional E-glass And ECR Boron Free Roving | Continuous Strand Mats | Woven Tapes

Resin : Epoxy Resin

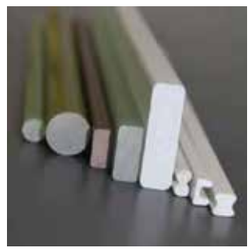
Temperature Class : Profiles of higher temperature - Class H (200° c) can be manufactured using special resin system on requirement.

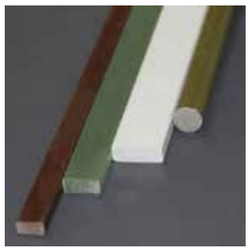
Pultrusion Process : Unidirectional E-glass and Epoxy Resin System are used for section where high Longitudinal strength is required.

- Lasting Performance
- Electro Magnetic Transparency
- Electrical Insulation
- Light Weight & High Strength
- Thermal Insulation
- Machinability
- Corrosion Resistant
- Low Temperature Capabilities
- Dimensional Stability

Applications :

- Transformers
- Lightening Arrestors
- Switch Gears
- Cable Trays
- Motor Wedges





We cater to custom sizes based on special dies as well.
For the complete list of Pultruded Parts offered by Tufflam, contact us.

MANUFACTURING & **ASSEMBLY**

One of our absolute core competencies is the perfect machining of ready-to-install components.

In addition to manufacturing prototype and test components, ACS-A has been contracted to develop and supply advanced composite structures and assemblies for highly demanding, safety-critical applications.

We are also able to provide independent advice on the best combination of materials and process for your composites application, including assistance with the development of new materials.

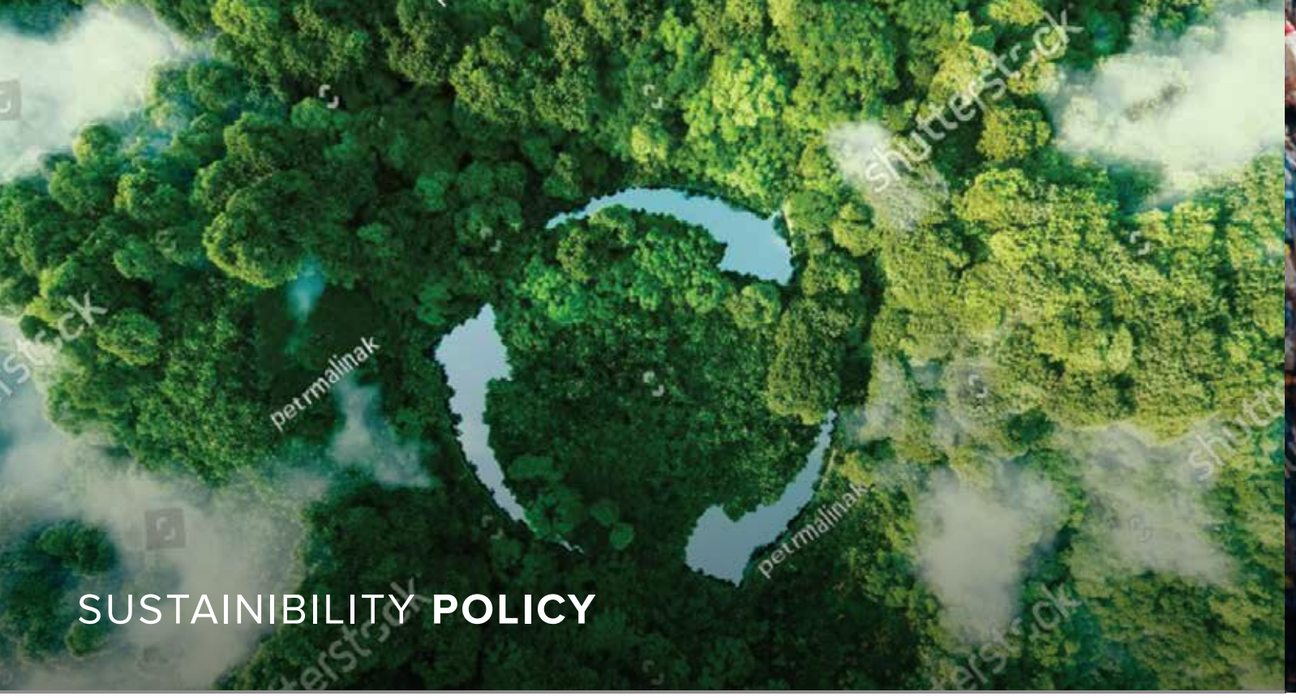
SAM has in-house capability to design and manufacture rapid low-cost tooling, for prototyping and manufacture of high-accuracy, prototype and low-volume production components.

SAM has in-house capability to design and manufacture rapid low-cost tooling, both for prototyping as well as rapid manufacture of high-accuracy, low-production-run components. Our engineers are able to print a wide range of thermoplastic materials for project production and tooling.

This enables the incorporation of low-cost manufacturing concepts into the product design process and fast turnaround of tooling to support the product development process.

OUR **SERVICES**

- **APPLICATION ENGINEERING**
- **MANUFACTURING**
- **FABRICATION & CONVERTING**
- **PAINTING & PRINTING**
- **ASSEMBLY**
- **KITTING**
- **INVENTORY MANAGEMENT**



SUSTAINIBILITY **POLICY**

At SAM Group, we have devoted ourselves to sustainability and it's pursuance by learning about the various effects that construction and related site activities can potentially have on communities. As a market leader, we are aware of our impact.
Taking cognizance of the same, we have incorporated in our policy documents and contracts with all Sub-Contractors / Suppliers (who are chosen to carry out works and supply products/materials) to protect the environment through practices that can reduce waste generation while also minimizing the risk of the harms done environment and can help preserve energy for further use.

Our goal has now become to follow and promote good sustainability practices in our entire production and value chain systems. We are committed to decrease the environmental impacts of all our activities, and help our clients/ partners do the same. We have engrained it in our plan documents to undertake all our construction and refurbishment activities in line with the following targets:

- Reduce our environmental impact. This includes things like cutting down on waste, emissions and pollution. We also recycle and reuse materials whenever we can.
- Make sure that dangerous materials are as far away from processes and products as possible, and that any hazardous waste or by-products of the operations are identified and, as much as possible, eliminated or disposed of in the prescribed way,
- Ensure that we are using as few materials and consuming as little energy as possible while still being able to run our operation smoothly.

SLAVERY & HUMAN TRAFFICKING **STATEMENT**

WHISTLEBLOWING

We as an organisation are committed to running an ethical business. We voluntarily take into consideration and encourage all our employees to voice any concerns they have or notice relating to unlawful conduct, or malpractice in our functioning at all levels, and especially for the activities that might be hazardous to the public or the environment. We consider our employees more as our partners who are also committed to our dream for running a sustainable business together with us.

LEADERSHIP AND MANAGEMENT CHARTER

We have created a charter detailing all our management policies. Our charter sets out the way how we run our business and how we treat our employees - fairly at all times. We expect the same values from any partner/ company within our supply chain.
We are proud to say thatin 30 years of our existence, our leadership has made true of its commitment which has helped us in being one of the market leaders.

TRAINING

Our Existing employees are encouraged to make a contribution to running an ethical business by helping to identify practices like slavery and human trafficking within the supply chain and a reporting mechanism has been created to help address these issues with help of a proper authority.

BOARD APPROVAL

All statements have to be approved by the board of directors at the SAM Group and are regularly reviewed along with other policies at board meetings held regularly.

QUALITY STANDARDS

We ensure and are committed that our suppliers also adhere to the highest standards of ethics that we have made for ourselves. We have a thorough quality assurance mechanism in place. Suppliers when being onboarded with us declare that they provide safe working conditions to all their workers and, treat workers with dignity and respect. They also declare that they act ethically as per the prescribed law in their use of labor.

CORPORATE SOCIAL **RESPONSIBILITY**

We are conscious and aware about a corporation's responsibility to the people and environment. To build a better world, we have to take cognizance of our role in the society.

Thus, we, at SAM Group, take initiative to contribute to the harmonious and sustainable development of society and the earth through all business activities that we carry out in each country and region, based on our Guiding Principles. We readily comply with all local, national, and international laws and regulations as well as their spirit, and conduct all our business operations with honesty and integrity at all times.

For being able to contribute and do our bit toward sustainable development, we regularly facilitate management interactions with our stakeholders We are also committed to building and maintaining sound and transparent relationships with our stakeholders by keeping an open and fair communication channel. Our expectation for our business partners is also to support this initiative and act per our values.

INDIA | MIDDLE EAST

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400 009.

BUILDING EXCELLENCE TO
SUPPORT **GROWTH & BETTERMENT**

NOTES