



TECHNICAL

CATALOGUE
ver 2.0



Company (a-joint-stockcompany) has been established in 2014 with the aid of developing and operation of ABS/Rubber plant by Jam Petrochemical Complex are the first and only manufacturer in Iran. 100% of the shares of this company are owned by Jam Petrochemical Company.

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ABS

NOTES

ABS, among the thermoplastic styrenic polymers, is the most complex and performing one, by matching the characteristics of acrylonitrile-styrene copolymers with the ones peculiar of rubber modified materials. ABS is a heterophase copolymer in which there is a rubber phase, based upon polybutadiene elastomer, dispersed in a continuous matrix of styrene-acrylonitrile copolymer. PADJAM ABS process is an advanced continuous flow technology, based on mass Polymerization of acrylonitrile and styrene, together with poly-butadiene rubber. The various solutions available, related to the morphological structure as described above, confer upon PADJAM ABS many different characteristics. The flexibility of PADJAM Technology allows to manufacture all main ABS grades, covering the following fields of application:



Excellent toughness even at low temperatures



High mechanical strength, rigidity and excellent dimensional stability



High surface gloss



Good chemical, scratch and stress-cracking resistance



Excellent processability



High heat resistance

These properties can be particularly beneficial in numerous application sectors.

Processing Technologies

The continuous mass process

This process represents the latest production technology for ABS, through which it is possible to achieve a better balance in the overall performance of the material, utilizing different polymerization mechanisms, grafting and reinforcing of the SAN matrix with butadiene rubber. The process ensures products with greater thermal resistance, better thermal stability during the transformation process and a lower, more consistent yellow index, in addition to much reduced levels of residual volatiles. The most recent developments achieved using continuous mass technology, have led to the production of a new generation of grades which substitute the traditional materials obtained by compounding, in particular the thermally resistant grades used in the automotive industry. Continuous mass ABS is commercialized primarily in natural.

Injection moulding

The injection grades are normally processed in the range of 230-270 °C as the melt temperature and 40-70 °C as the mould temperature. PADJAM ABS is a moderately hygroscopic material; it is advisable to pre-dry the granules in a circulated air oven at about 80 °C for 1-2 hours prior to mould.

Extrusion

PADJAM ABS is normally extruded in film, sheet and profile, using standard extruders with vent. It is recommended to pre-dry the product at 80 °C for 1-2 hours.

Coloring of PADJAM ABS

The product is normally supplied in natural. Continuous mass grades, being characterized by a low and consistent yellow index in the natural version and exceptional processing stability, are particularly suited to the process of self-coloring by the processor (natural product + master batch). This technology carries with it a number of production and logistical advantages.

Supply and Storage

PADJAM ABS is supplied in the form of lenticular/spherical. The apparent granular density is 0.65 g/ml, which is an average value subject to variation for the special grades with particular additives/compounding.

PADJAM ABS is usually supplied in 25 kg polyethylene bags, in octabins of 1000 kg, as well as bulk. Other forms of packaging can also be made available.

ABS INJECTION GRADES

Injection Moulding Grades

Properties	Test Condition	Test Methods	Units	F332	E332	L322	F232
General							
Density		ISO 1183	g/cm ³	1.04	1.04	1.04	1.04
Water Absorption		ASTM D 570	%	0.3	0.3	0.3	0.3
Rheological							
Melt Flow Rate (MFR)		ISO 1133	g/10min	14	10	23	14
Mechanical							
Tensile Strength	50 mm/min	ASTM D 638	MPa	42	40	45	45
Strain at break	50 mm/min	ASTM D 638	%	60	75	20	20
Flexural Strength	2 mm/min	ASTM D 790	MPa	60	62	69	69
Flexural Modulus	2 mm/min	ASTM D 790	MPa	2250	2200	2350	2350
Izod Impact Strength Notched	+23°C - thickness 3.2 mm	ISO 180/4A	J/m	190	190	170	170
	0°C - thickness 3.2 mm	ISO 180/4A	J/m	125	115	100	100
	- 20°C - thickness 3.2 mm	ISO 180/4A	J/m	100	90	70	70
	- 40°C - thickness 3.2 mm	ISO 180/4A	J/m	90	85	50	50
	+23°C - thickness 4 mm	ISO 180/1A	kJ/m ²	14	15	13	13
	- 40°C - thickness 4 mm	ISO 180/1A	kJ/m ²	8	8	6	6
Charpy Impact Strength, Notched	+23°C	DIN 53453	kJ/m ²	13	12	10	10
Unnotched	+23°C	DIN 53453	kJ/m ²	NB	NB	NB	NB
Unnotched	- 40°C	DIN 53453	kJ/m ²	NB	NB	NB	NB
Rockwell Hardness	scale R	ISO 2039/2	kJ/m ²	R110	R111	R109	R109
Thermal							
Vicat Softening Tempreture	10 N - 120°C/h	ISO 306/A120	°C	107	109	99	107
	50 N - 120°C/h	ISO 306/B120	°C	102	104	96	101
Deflection temp. under load (annealed)	1.8 MPa - 120°C/h	ASTM D 648	°C	101	103	96	102
Coefficient of linear thermal expansion		ASTM D 696	10 ⁻⁵ /°C	9	9	9	9
Thermal Conductivity		ASTM C 177	W/(Km)	0.17	0.17	0.17	0.17
Moulding Shrinkage		ISO 294.4	%	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6
Flammability							
Flame behaviour	thickness 1.5 mm	UL 94	class	HB	HB	HB	HB
Glow wire test	thickness 3 mm	IEC 60695-2-1	°C	650	650	650	650
Electrical							
Surface resistivity	dry	IEC 60093	ohm	10+14	10+14	10+14	10+14
Volume resistivity	dry	IEC 60093	ohm*cm	10+15	10+15	10+15	10+15
Dielectric strength	dry	IEC 60243	kV/mm	30	30	30	30
Dielectric constant (relative permittivity)	1000 Hz - dry	IEC 60250		3.1	3.1	3.1	3.1
Dissipation factor	1000 Hz - dry	IEC 60250		15*10 ⁻³	15*10 ⁻³	15*10 ⁻³	15*10 ⁻³
Main Features							
				"General purpose, self-coloring"	"Medium heat resistance, goo flow, good impact strength"	"Medium heat injection moulding, high flow, good thermal stability during processing"	"General purpose, high flow injection moulding grade, good impact resistance, excellent gloss"
Main Applications & Properties							
"Keys: Packaged product should be protected from the atmospheric agents and stored out of direct sunlight NB: No Break /M: Matt - Digit following letter/ M indicates increasing values of mattness"				"Households Small Appliances and white goods Vacuum Cleaners Electrical components for civil and industrial applications"	"Automotive Interior (Trim parts), tiles, forms"	"Domestic appliances thermal resistant items (front panels, frames etc.) Electrical sector"	"Small and large household appliances, vacuum cleaners, toys, telephones and consumer electronics"

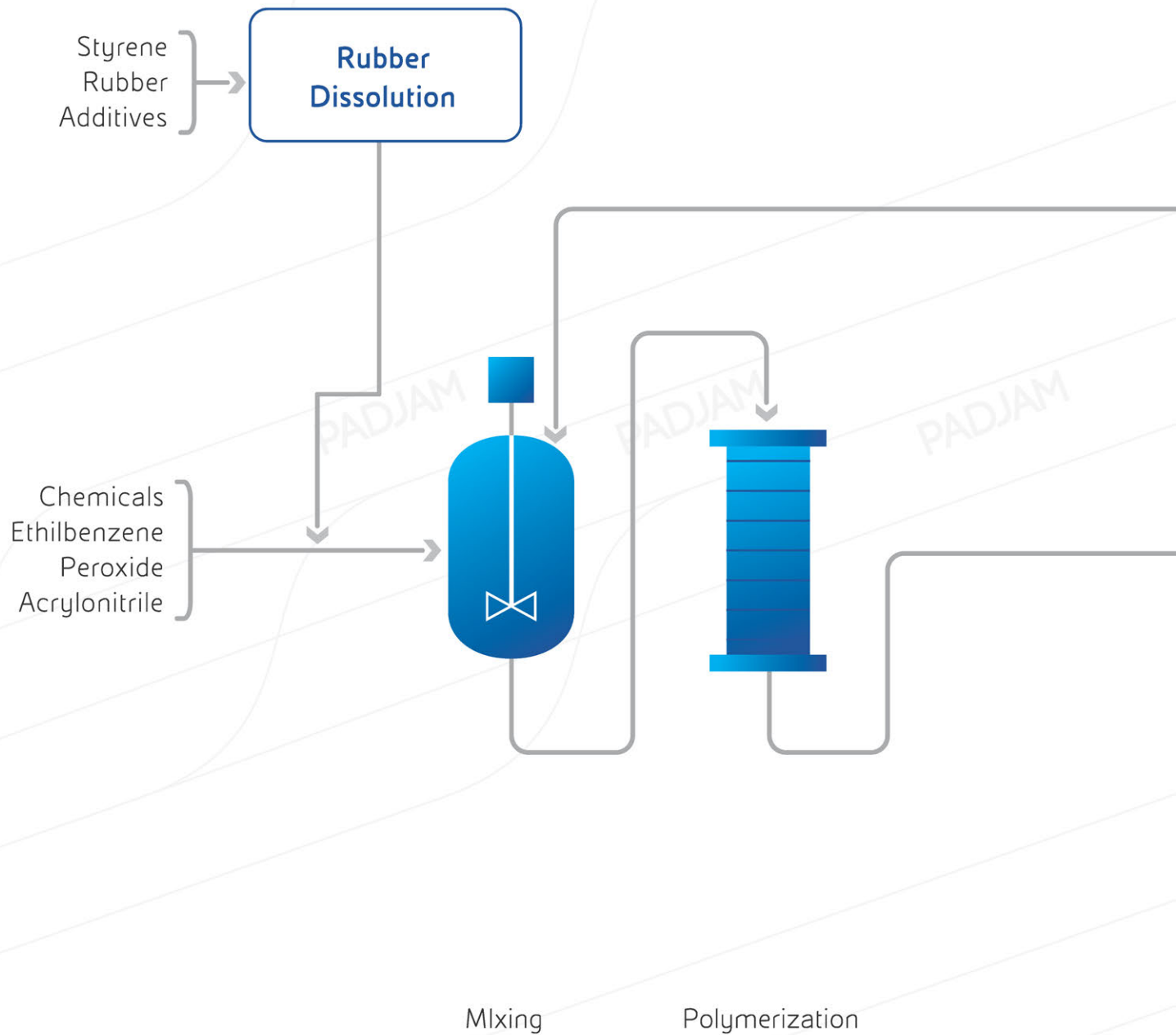
ABS EXTRUSION GRADES

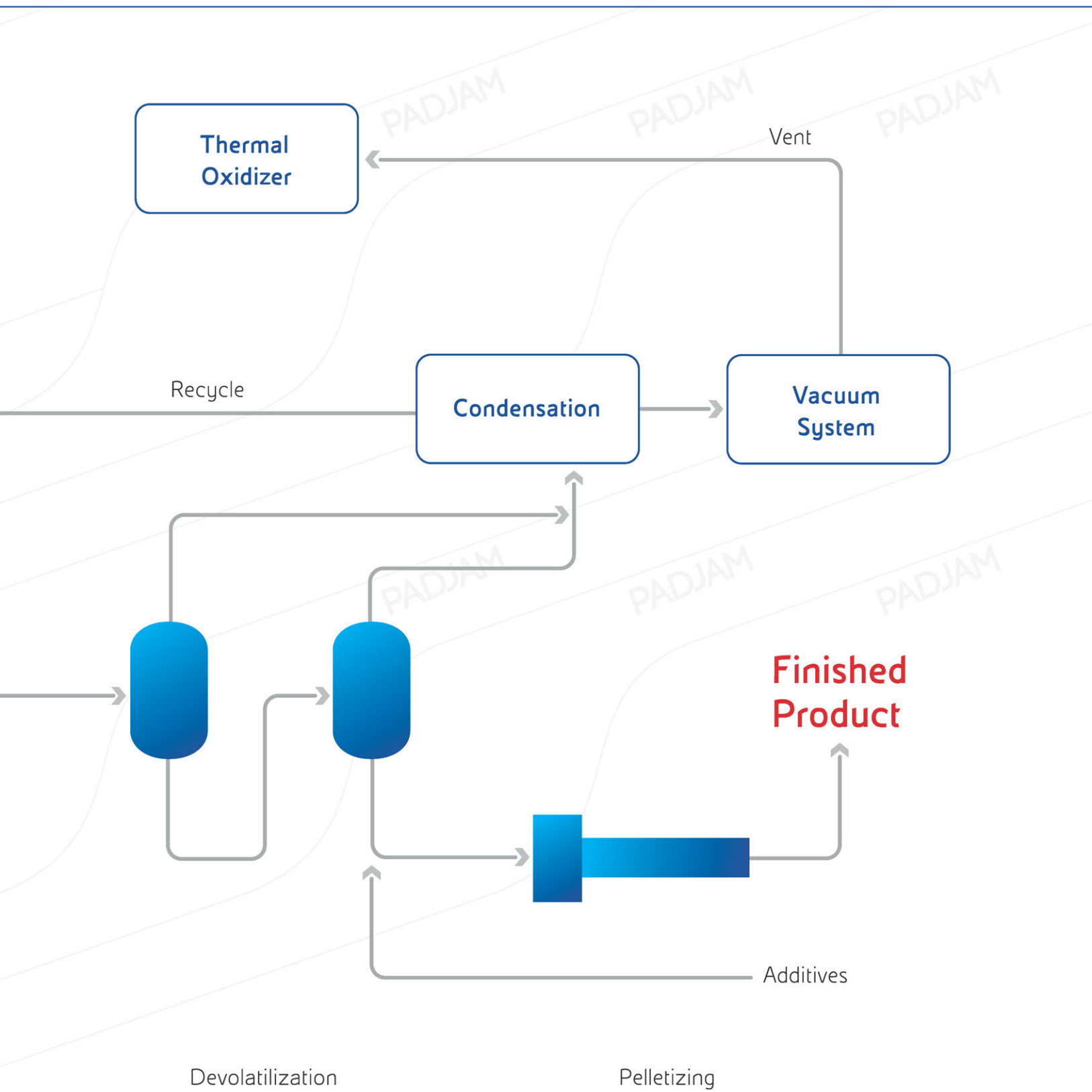
Extrusion Moulding Grades

Properties	Test Condition	Test Methods	Units	B432/E	B532/E	B732/E	D232/M3	C442
General								
Density		ISO 1183	g/cm ³	1.04	1.04	1.04	1.04	1.04
Water Absorption		ASTM D 570	%	0.3	0.3	0.3	0.3	0.3
Rheological								
Melt Flow Rate (MFR)		ISO 1133	g/10min	4	5	4.5	8	6
Mechanical								
Tensile Strength	50 mm/min	ASTM D 638	MPa	45	35	45	27	43
Strain at break	50 mm/min	ASTM D 638	%	45	45	45	100	45
Flexural Strength	2 mm/min	ASTM D 790	MPa	68	68	60	40	65
Flexural Modulus	2 mm/min	ASTM D 790	MPa	2300	2300	2200	1550	2300
Izod Impact Strength Notched	+23°C - thickness 3.2 mm	ISO 180/4A	J/m	220	280	350	110	200
	0°C - thickness 3.2 mm	ISO 180/4A	J/m	165	190	300	90	165
	- 20°C - thickness 3.2 mm	ISO 180/4A	J/m	125	150	200	80	125
	- 40°C - thickness 3.2 mm	ISO 180/4A	J/m	100	125	140	75	100
	+23°C - thickness 4 mm	ISO 180/1A	kJ/m ²	17	20	28	9.5	17
	- 40°C - thickness 4 mm	ISO 180/1A	kJ/m ²	9	10	12	7	9
Charpy Impact Strength, Notched	+23°C	DIN 53453	kJ/m ²	12	16	20	9	12
Unnotched	+23°C	DIN 53453	kJ/m ²	NB	NB	NB	NB	NB
Unnotched	- 40°C	DIN 53453	kJ/m ²	NB	NB	NB	NB	NB
Rockwell Hardness	scale R	ISO 2039/2	kJ/m ²	R110	R110	R103	R97	R110
Thermal								
Vicat Softening Temperature	10 N - 120°C/h	ISO 306/A120	°C	109	108	109	106	114
	50 N - 120°C/h	ISO 306/B120	°C	104	104	104	101	108
Deflection temp. under load (annealed)	1.8 MPa - 120°C/h	ASTM D 648	°C	104	104	100	101	108
Coefficient of linear thermal expansion		ASTM D 696	10 ⁻⁵ /°C	9	9	9	9	9
Thermal Conductivity		ASTM C 177	W/(Km)	0.17	0.17	0.17	0.17	0.17
Moulding Shrinkage		ISO 294.4	%	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6	0.4-0.6
Flammability								
Flame behaviour	thickness 1.5 mm	UL 94	class	HB	HB	HB	HB	HB
Glow wire test	thickness 3 mm	IEC 60695-2-1	°C	650	650	650	650	650
Electrical								
Surface resistivity	dry	IEC 60093	ohm	10+14	10+14	10+14	10+14	10+14
Volume resistivity	dry	IEC 60093	ohm*cm	10+15	10+15	10+15	10+15	10+15
Dielectric strength	dry	IEC 60243	kV/mm	30	30	30	30	30
Dielectric constant (relative permittivity)	1000 Hz - dry	IEC 60250		3.1	3.1	3.1	3.1	3.1
Dissipation factor	1000 Hz - dry	IEC 60250		15*10 ⁻³	15*10 ⁻³	15*10 ⁻³	15*10 ⁻³	15*10 ⁻³
Main Features								
				"Sheets and profile Medium impact strength."	"Sheets and profile. Good impact strength, high toughness"	"Very high impact strength"	"Low gloss, extrusion"	"Heat resistance, good flow and good impact strength"
Main Applications & Properties								
"Keys: Packaged product should be protected from the atmospheric agents and stored out of direct sunlight NB: No Break /M: Matt - Digit following letter/ M indicates increasing values of mattness				Plain or coextruded with high draw ratios for refrigeration, sanitary, automotive, packaging, housholding (profiles)	Plain or coextruded with high draw ratios for refrigeration, sanitary, automotive, packaging, housholding (profiles)	Extrusion of thick sheets for sanitary and automotive applications	Extrusion/ coextrusion of sheets with matt surface, household profiles	"Automotive interior (extruded profiles, interior trim), exterior (grilles, mirrors)"

ABS

Continuous mass process scheme





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NOTES

Styrene and 1,3 Butadiene are the monomers used for the production of SBS, SB and LCBR grades: only 1,3 Butadiene in case of LCBR production and both Styrene and 1,3 Butadiene in case of SBS and SB productions.

PADJAM Low Cis Polybutadiene rubber (LCBR) are obtained by anionic polymerization initiated by lithium alkyls in aliphatic/cycloaliphatic media. Polymerization condition adopted in our process induce the formation of a minority fraction of the long chain branched polybutadiene that greatly modifies the rheological behavior of the material; geometrical constancy of the bales is then guaranteed.

Main application of LCBR polymers are tyres, belting, moulded and extruded articles and production of High Impact Polystyrene (HIPS) and Polystyrene ABS grades.

Key features of PADJAM LCBR production technology are:

High flexibility in terms of product mix and good quality constancy and reproducibility

LCBR can be stabilized with an antioxidant system that has food contact approval;



High consistency;



High purity;



Low cold flow;



Low gel content;



Low dissolution time in styrene;



Wide range of solution viscosity;



Low glass transition temperature

SBS

Styrene and 1,3 Butadiene are the monomers used for the production of SBS, SB and LCBR grades:

PADJAM SBS copolymers, made by styrene and butadiene linked homopolymer blocks, belong to the class of thermoplastic elastomers (TPE), whose elastic behavior – the properties to change and recover the shape when a force is first applied and then removed – and thermoplastic behavior – the property to become soft, viscous and free-flowing like a liquid when heated and return solid when cooled at room temperature – are joined together in the same material.

The elastic/rubbery and thermoplastic/viscous behaviours are displayed at room and high temperatures respectively allowing the fabrication of TPE goods having the same rubbery feeling than traditional vulcanized rubbers, but considerably less expensive in manufacturing process due to the full recyclability of scraps, the shorter cycle, time and the easier process automation/robot assistance.

This balance between properties and process ability leads SBS based material focusing on unique applications instead of only replacing general-purpose rubber. PADJAM SBS technology is well-known for its high flexibility in tailoring the different product grades required by the SBS market which is characterized by a continuous product innovation to meet new application requirements.

PADJAM SBS technology allows then competitive production of the most common SBS grades, as well as additional grades for special applications. Key features of PADJAM SBS production technology are:

- high flexibility in terms of product mix and good quality constancy and reproducibility.
- high plant capability as well as easy operability due to both specifically designed feeding system for chemicals and batch automation.
- cyclopentane, cyclohexane or blend highly compatible with all different polymer compositions; can be used as solvent depending on local climate conditions.
- high purity linear and radial triblock polymers, with four arms, are allowed by the proper selection of halosilane structure as coupling agent;
- production in the same unit of Low Cis Butadiene Rubber (LCBR) grades and/or SB (diblock styrene-butadiene polymers) used mainly for plastic modification or tyre market is possible.
- process design advanced features in polymerization and purification sections.
- optimized configuration of the stripping section with three stages arrangement to minimize steam consumption without impact emissions of VOC.
- small quantity of volatile organic compounds (solvent) enter finishing section (low release during extrusion).

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GRADES

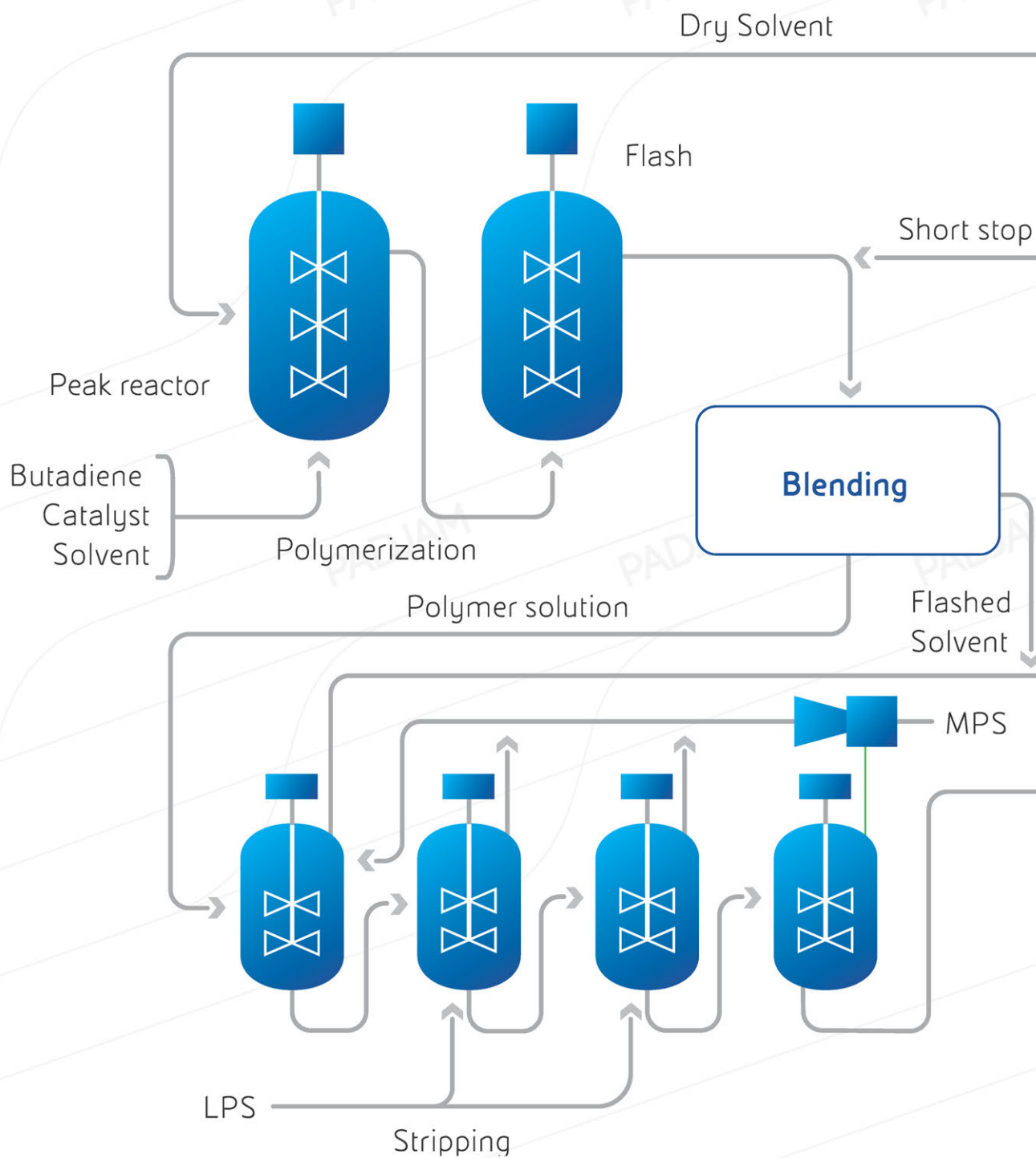
				SBS			SB
Properties	Test Methods	Analytical Manual	Units	SOL T6302 Europrene	SOL T161B Europrene	SOL T6306 Europrene	SOL B183 Europrene
General							
Mooney Viscosity	ASTM D1646	MPP16	ML1+4 @ 100°C	N/A	N/A	N/A	60 – 80
Bound Styrene	ASTM D5775	MPP5-MPP6	wt %	29 – 33	29 - 33	34 - 38	9.0 – 11.0
Block styrene	ASTM D3314	MPP8	wt %	100	100	100	4 – 6
Solution viscosity*	ASTM D5774	MPP9	cPs	N/A	N/A	N/A	N/A
Gel content		MPP12	arbitrary	N/A	N/A	N/A	N/A
Molecular weight		MPP1	KDalton	95 - 125	220 - 260	245 - 275	N/A
Coupling efficiency		MPP1	%	84 min	84 min	85 min	N/A
Volatile matter content	ASTM D5668	MPP10	wt %	1 max	1.0 max	1 max	0.75 max
Residual solvent		MPP18	ppm	< 10	< 10	< 10	N/A
Colour	ASTM E313	MPP13	Yellow index	10 max	10 max	15 max	N/A
Solution color (Pt/Co)	ASTM D1209		arbitrary	N/A	N/A	N/A	N/A
Vinyl content		MPP5-MPP6	wt % on butadiene	10.0 – 14.0	10.0 – 14.0	10.0 – 14.0	9.0 – 11.0
Ash content	ASTM D5667	MPP15	wt %	N/A	N/A	N/A	0.2 max
Solvent extractables	ASTM D5774	MPP11	wt %	N/A	N/A	N/A	N/A
Key Features		SOL T6302		SOL T161B		SOL T6306	SOL B183
		Linear block copolymer, providing excellent mechanical properties, high strength and elasticity, combined with good dispersability and processability.		block copolymer with radial molecular structure excellent mechanical properties, high strength and elasticity in a wide range of formulated products		block copolymer designed for bitumen modification in waterproofing membranes applications. The grade imparts excellent mechanical properties and elasticity to the modified bitumen. The radial structure and the high styrene block content assures outstanding performance under service condition, particularly in the high temperature range	Europrene SOL 183 is a dry solution styrene butadiene tapered block copolymer, polymerized using alkyl lithium catalyst. Its typical styrene content is 11% and vinyl (1,2 butadiene) content is 10%. The block styrene content is typically 5%. The polymer contains a non-staining antioxidant. It is produced in a batch polymerization process
Physical Form							
		Pellet form		Pellet form Powder form		Pellet form Powder form	Bale (25Kg)
Packaging							
		Bags on Pallet, Big bags and wooden crates		Bags on Pallet, Big bags and wooden crates		Bags on Pallet, Big bags and wooden crates	30-36 Bales in wooden crates
Main Applications							
		Bitumen modification, particularly in road paving applications, in compounding for both footwear and technical goods, and in adhesive applications		Bitumen modification for waterproofing membranes used in roofing and bridge insulation, road paving & pipe coating		Bitumen modification in waterproofing systems, formulated compounds for shoe soles and technical goods	SOL 183 is mainly used in plastic material (PS, ABS) modification.

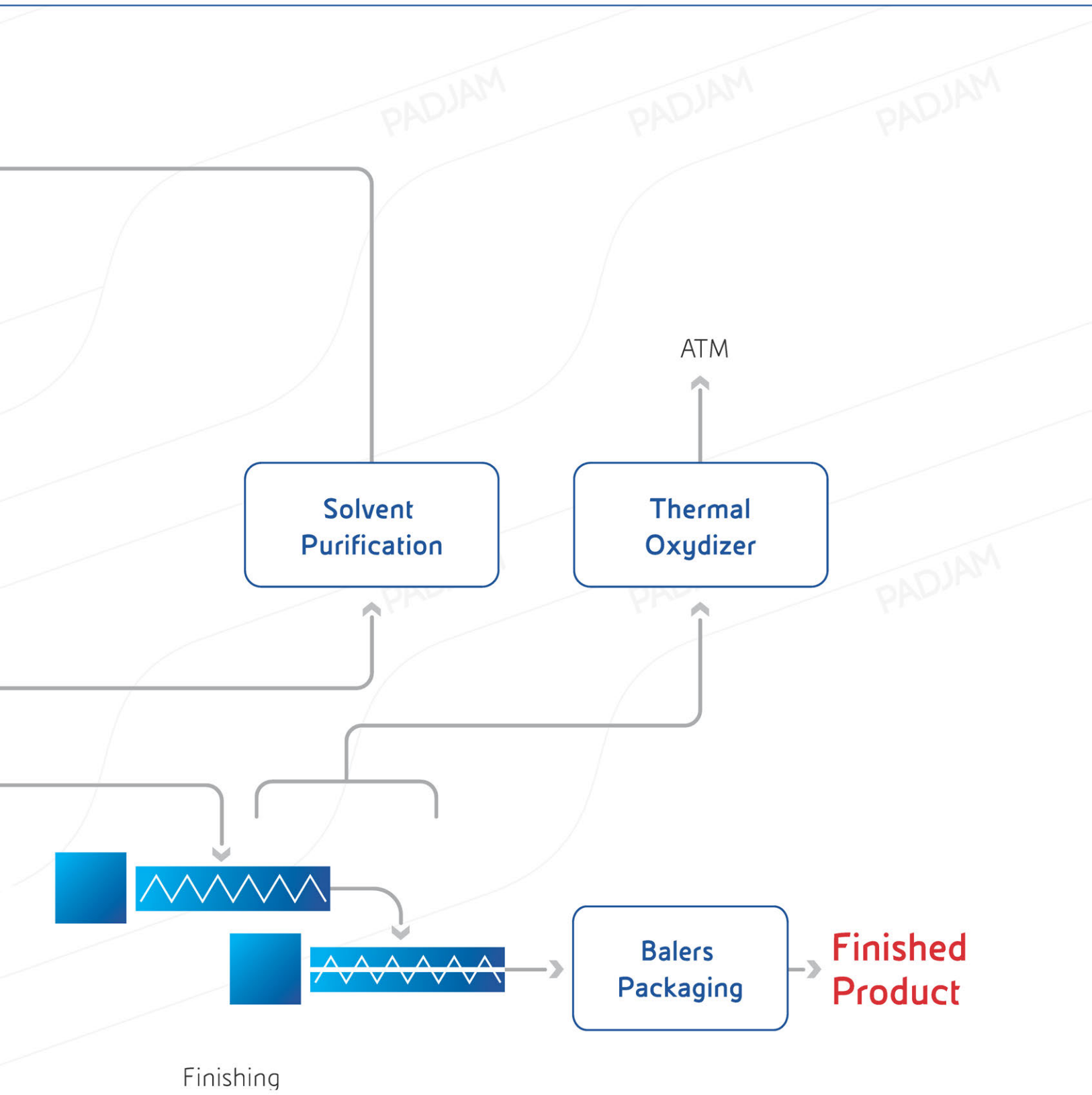
RUBBER GRADES

				LCBR		
Properties	Test Methods	Analytical Manual	Units	Intene P30	BR245	BR 277
General						
Mooney Viscosity	ASTM D1646	MPP16	ML1+4 @ 100°C	45 – 55	50 – 60	37 – 47
Bound Styrene	ASTM D5775	MPP5-MPP6	wt %	N/A	N/A	N/A
Block styrene	ASTM D3314	MPP8	wt %	N/A	N/A	N/A
Solution viscosity*	ASTM D5774	MPP9	cPs	35 - 50	N/A	N/A
Gel content		MPP12	arbitrary	4 max	N/A	N/A
Molecular weight		MPP1	KDalton	N/A	N/A	N/A
Coupling efficiency		MPP1	%	N/A	N/A	N/A
Volatile matter content	ASTM D5668	MPP10	wt %	0.75 max	0.6 max	0.3 max
Residual solvent		MPP18	ppm	N/A	N/A	N/A
Colour	ASTM E313	MPP13	Yellow index	N/A	N/A	N/A
Solution color (Pt/Co)	ASTM D1209		arbitrary	10 max	N/A	N/A
Vinyl content		MPP5-MPP6	wt % on butadiene	11 – 13	11 – 13	11 – 13
Ash content	ASTM D5667	MPP15	wt %	0.2 max	0.08	0.04
Solvent extractables	ASTM D5774	MPP11	wt %	N/A	N/A	26.3–29.3
Key Features						
	Intene P30			BR245	BR 277	
				BR245 rubber is a solution polymerized low cis star branched, low coupled, dry polybutadiene produced using alkyl lithium initiator in batch reactors.	BR277 rubber is a solution polymerized low cis star branched, low efficiency coupled, oil extended polybutadiene produced using alkyl lithium initiator in batch reactors.	
Physical Form						
	Bale (25Kg)			Bale (25Kg)	Bale (25Kg)	
Packaging						
	30-36 Bales in wooden crates			30-36 Bales in wooden crates	30-36 Bales in wooden crates	
Main Applications						
	Mainly used in bulk and suspension ABS process where low-cis polybutadiene (4-15%wt on the final product) with a low viscosity is required. The ability of the rubber domains to promote craze formation and shear yielding accounts for improved impact properties; crazing and shear yielding function as energy-dissipating processes that can inhibit the formation of a crack that would otherwise produce catastrophic failure. The star like structure of P30 guarantees a low value in viscosity and, contemporary, a molecular weight sufficiently high. The high capacity of loading carbon black and good extrudibility made this grade suitable for abrasion strips construction in tire building.			BR 245 polybutadiene is used in tire compounds and in some mechanical good compounds. Good hysteresis properties of BR 245 allow it to be blended with natural rubber to produce enhanced properties in truck tire treads. The addition of polybutadiene low cis to natural rubber upgrades abrasion and cracking resistance, maintains good resilience and also provides better resistance to overcure and degradation during aging. BR 245 and SOL R 1204 were tried in blends with natural rubber in large size passengers tyre reducing groove cracking compared to natural rubber.	BR 277 oil extended polybutadiene is used in tire compounds and in some mechanical good compounds.	

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SB/SBS/LCBR Process Scheme







Design: BashirAlizadeh



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