RGP BALLS®

PRECISION BALLS

www.rgpballs.com

Welcome

COMPANY PROFILE

WELCOME TO OUR WORLD: PRECISION.

For over fifty years, we have been among Europe's leading companies in the manufacturing, trading and distribution of precision balls, rollers and ball transfer units.

WE MOVE MOUNTAINS TO GET THE DETAILS PERFECT

Over 70 people working together since long time in our headquarter in Cinisello Balsamo: at Rgpballs we have about 10,000 m2 of know-how and expertise. We consistently work on innovations to stay at the forefront. With us, everything is about quality.

CHOOSING RGPBALLS® MEANS CHOOSING EXPERTISE, ...

Nothing says more than time. We have over 50 years of efforts, breakthroughs, and expertise under our belts. And we keep improving everyday.

METHOD, ...

Science pushes us far, a consultative spirit keeps us close to your needs.
And this is how we manage to handle the broadest range of inquiries.

SPEED.

Time is valuable, exactly like our warehouse.
Indeed, more stock available means less time needed to satisfy any demand.

AN "EVERYTHING, RIGHT NOW" WAREHOUSE.

You also know that in an ever-changing business, speed is competitiveness.
Our warehouse is a valuable resource with more than 5,000 tons of products regularly in stock.
We can guarantee prompt delivery for most of our customers' needs worldwide.

WE HAVE MORE THAN 3,000 CUSTOMERS ALL AROUND THE WORLD, AND WE SPEAK THEIR LANGUAGES.

Our catalogue is international; wherever you are, you can select our products and consult with our experts, without worrying about physical or language barriers.
Our team can speak all major languages: Italian, German, English, French, Spanish, Ukrainian, Russian, Chinese, and Romanian.

A FAMILY BUSINESS.

We are a company that is also a big family. You won't find any board of directors with us, only the passion we put into each and every challenge. Our business is so stable that after 50 years we are still here, with all the professionalism of an international business.

10.000 m² headquarter

80 employees

4.000 tons of products

+3.000 customers

CERTIFICATION:

CERTIFICATION FOR MANAGEMENT SYSTEMS:
ISO 9001:2015 – ISO 14001:2015 – ISO 45001:2018
PRODUCT CERTIFICATION ACCORDING TO TUV-PROFiCERT PROCEDURES

PLASTIC

ABS BALLS

Thermoplastic resin balls obtained by the polimerization of butadiene rubber with acrylonitrile and styrene (usually 50% styrene and acrylonitrile/butadiene in different percentages). They feature good dimensional stability, hardness, stiffness and resistance to collision and wear, high toughness even at low temperatures. It is a recyclable material.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special pumps and valves, automotive field, electronic devices components, toys.

Technical name	Commercial name	Abbreviation	Molecular formula
Acrylonitrile Butadiene Styrene	ABS	ABS	(C8H8C4H6C3H3N)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,03
Young's modulus	E	MPa	Mechanical	-	2275
Friction coefficient	μ	-	Mechanical	Room temp.	0,30
Water absorption	Aw	%	Physical	24 h	0,28
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	78,0
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,18
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	80 - 90	-	-
Compressive yield strength	Mechanical	MPa	30 - 70	psix10^3	4 - 10
Service temperature	Thermal	ºC	-30 / 80	ºF	-22 / 176

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Good corrosion resistance in contact with water, salt water, diluted acids, alkalis, inorganic salts, saturated hydrocarbons, petrol, mineral oils, animal and vegetal greases. They are not resisting to strong acids, aliphatic aromatic and chlorinated hydrocarbons, aldehydes, ketones, esters.

ACRYLIC (PMMA) BALLS

Amorphous thermoplastics balls, provide good hardness, transparency, abrasion and outdoor resistance. Fair mechanical properties, shock resistance and corrosion resistance.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Acrylic balls are used in check valves, visual flow equipment, laboratory applications, contact juggling. They could be considered as cheaper choice than polycarbonate and lighter than glass.

Technical name	Commercial name	Abbreviation	Molecular formula
Polymethyl-methacrylate	Acrylic, Plexiglass	PMMA	(C5O2H8)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,18
Young's modulus	E	MPa	Mechanical	-	2910
Friction coefficient	μ	-	Mechanical	Room temp.	0,45
Water absorption	Aw	%	Physical	24 h	0,30
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	67
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,18
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	84 - 87	-	-
Compressive yield strength	Mechanical	MPa	80 - 120	psix10^3	11 - 17
Service temperature	Thermal	ºC	-40 / 90	ºF	-40 / 194

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Good resistance against aqueous solutions, diluted inorganic acids, aliphatic hydrocarbons, ammonia, alkalis, greases and oils, balls are not resisting against aromatic hydrocarbons, halogens, ketones, esters, ethyl and methyl alcohols.

DELRIN® - POM BALLS

Very light homopolimeric thermoplastic resin balls, they provide good mechanical characteristics, corrosion resistance, wear and abrasion resistance. They are even good electric insulators and auto lubricant materials.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Spray agitators, light safety valves, low load bearings. Special pumps and valves, sliding rails for furniture, fluids flow check devices, medical instruments. They are used in foodstuff, chemical, electronic, pharmaceutical industry.

Technical name	Commercial name	Abbreviation	Molecular formula
Polyoxymethylene	Delrin®	POM	(~CH2OH)

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,37
Young's modulus	E	MPa	Mechanical	-	2900
Friction coefficient	μ	-	Mechanical	Room temp.	0,28
Water absorption	Aw	%	Physical	24 h	0,50
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	96
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,25
Volume resistivity		*m	Electric	-	> 10^12
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	80 - 90	-	-
Compressive yield strength	Mechanical	MPa	30 - 120	psix10^3	4 - 17

Property	Type	U.o.M.	Values	U.o.M.	Values
Service temperature	Thermal	ºC	-40 / 85	ºF	-40 / 185

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,000 - 160,000	mm	3/64 - 6.5/16	"	0 - I - II - III - IV - V

Corrosion Resistance
Delrin® is resisting in contact with basic, neutral and average acid compounds, sea water, petroleum products, mineral oils and greases, inorganic salt solutions, aliphatic, aromatic and chlorine hydrocarbons, low gradation alcools, ether. It's not resisting in contact with strong acids (hydrochloric, phosphoric, nitric and sulphuric), mineral acids, chlorides, alkalis.

HYTREL® - TPEE BALLS

Thermoplastic polyester elastomer balls, they provide both rubber and plastic properties. Excellent flexibility properites, wear and corrosion resistance. Very large service temperature range. Good radiation resistance.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special pumps and valves, diaphragm pumps.

Technical name	Commercial name	Abbreviation	Molecular formula
Polyester elastomer	Hytrel®	TPEE	(-A-B-)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,14
Young's modulus	E	MPa	Mechanical	-	57
Friction coefficient	μ	-	Mechanical	Room temp.	0,31
Water absorption	Aw	%	Physical	24 h	0,68
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	185
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,19
Volume resistivity		*m	Electric	-	> 10^10
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	35 - 45	-	-
Compressive yield strength	Mechanical	MPa	7 - 17	psix10^3	1 - 3
Service temperature	Thermal	ºC	-40 / 120	ºF	-40 / 248

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Excellent corrosion resistance in contact with petroleum products and mineral oils, good to alcohols and ketones, fair with aromatic hydrocarbons and into not aggressive acid environment. They are not resisting in contact with strong acids, even if diluted.

NYLON® 6/NYLON® 6.6 (PA 6/PA 6.6) BALLS

Semicrystalline thermoplastic Nylon® 6/Nylon® 6.6 polymer balls, they provide low weight, high corrosion, wear and abrasion resistance. They are auto lubricant and with good ductility, toughness and electric insulating properties. Useful even for high temperature applications.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special valves, low load bearings, flow meters, switches, handgrips, medical and industrial applications.

Technical name	Commercial name	Abbreviation	Molecular formula
Polyamide	Nylon® 6 / Nylon® 6.6	PA 6/PA 6.6	-OC-(CH2)4-CO-NH-(CH2)6-NH-

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,12
Young's modulus	E	MPa	Mechanical	-	2670
Friction coefficient	μ	-	Mechanical	Room Temp.	0,31
Water absorption	Aw	%	Physical	24 h	2,18
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	90,0
Thermal conductivity		W/(m·K)	Thermal	Room Temp.	0,23
Volume resistivity		*m	Electric	-	> 10^11
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	75 - 85	-	-
Compressive yield strength	Mechanical	MPa	86 - 103	psix10^3	12,4 - 15
Service temperature	Thermal	ºC	-30 /80	ºF	-22 / 176

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 160,000	mm	1/16 - 6.5/16	"	0 - I - II - III - IV - V

Corrosion Resistance

Nylon® balls are insolvable into diluted mineral acids and in most organic acids. They are resisting to alkalis, petroleum products, greases, inorganic salt solutions, low gradation alcohols, motor oil, transmission fluids, methanol, ketones, esters. They do not resist to strong acids and basis.

PEEK BALLS

High performance semi-crystalline thermoplastic balls, they provide high mechanical properties, dimensional stability and excellent wear and abrasion, corrosion, high temperature and gamma radiation resistance. The high temperature resistance decreases considerably in case the material is charged by heavy loads. Unstable to UV radiations.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special bearings, pumps and valves, components for chemical, electronic and mechanical industry when high mechanical characteristics and corrosion resistance properties are demanded.

Technical name	Commercial name	Abbreviation
Polyetheretherketone	PEEK	PEEK

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,29
Young's modulus	E	MPa	Mechanical	-	3975
Friction coefficient	μ	-	Mechanical	Room temp.	0,29
Water absorption	Aw	%	Physical	24 h	0,44
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	57
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,28
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	82 - 88	-	-
Compressive yield strength	Mechanical	MPa	120 - 250	psix10^3	17 - 36
Service temperature	Thermal	ºC	-50 / 250	ºF	-58 / 482

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

PEEK balls are resisting in contact with most solvents (organic compounds, salts, oils), hot waters and high temparature steams. They are not resisting against strong acids (concentrated nitric acids, sulphuric acids), halogens and some aromatic hydrocarbons.

POLYCARBONATE (PC) BALLS

Polycarbonate amorphous thermoplastic balls, they provide good hardness, impact resistance, dimensional stability. Fair resistance to corrosion, wear and weathering. Suitable into a wide range of temperatures.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special applications when a high impact resistance is demanded, musical instruments, medical and decorative applications.

Technical name	Commercial name	Abbreviation	Molecular formula
Polycarbonate	Lexan®	PC	C15H16O2

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,20
Young's modulus	E	MPa	Mechanical	-	2236
Friction coefficient	μ	-	Mechanical	Room temp.	0,34
Water absorption	Aw	%	Physical	24 h	0,28
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	69
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,25
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	80 - 90	-	-
Compressive yield strength	Mechanical	MPa	60 - 110	psix10^3	8 - 16
Service temperature	Thermal	ºC	-40 / 120	ºF	-40 / 248

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Good corrosion resistance in contact with diluted acids, alcohols and mineral/vegetal oils, they are not resisting against strong acids and bases, esters, organic solvents, aromatic, aliphatic and halogenated hydrocarbons, ketones, oils and greases, oxidizing agents.

POLYKETONE (PK) BALLS

Semi-crystalline engineering thermoplastic material balls, they feature good mechanical properties, excellent wear and abrasion resistance, good corrosion resistance and resistance to high temperatures, high elasticity and good dimensional stability. This material is not stable to UV radiation.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special bearings and pumps, they are used in the automotive and aerospace fields, and in chemical, electronic and petroleum industry.

Technical name	Commercial name	Abbreviation
Polyketone	Polyketone	PK

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,24
Young's modulus	E	MPa	Mechanical	-	1500
Friction coefficient	μ	-	Mechanical	Room temp.	0,27
Water absorption	Aw	%	Physical	24 h	0,50
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	110
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,30
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	75 - 85	-	-
Compressive yield strength	Mechanical	MPa	80 - 110	psix10^3	11 - 16
Service temperature	Thermal	ºC	-40 / 120	ºF	-40 / 248

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Good corrosion resistance in contact with aliphatic hydrocarbons, lubricants, oils, greases, petroleum products, saline solutions. Polyketone balls are attacked by strong acids and basis.

HIGH DENSITY POLYETHYLENE (HDPE) BALLS

Very light thermoplastic material balls, they are available in three versions (high/low density and ultra high molecular weight). High density polyethylene presents best mechanical characteristics. They provide good wear and abrasion resistance. Excellent corrosion resistance and resistance to radiations, they are electric insulators.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Anti evaporation and anti smell devices, they are useful for floating applications. Used in electronic, pharmaceutical and medical industry.

Technical name	Commercial name	Abbreviation	Molecular formula
High Density Polyethylene	High Density Polyethylene	HDPE	(C2H4)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	0,96
Young's modulus	E	MPa	Mechanical	-	962
Friction coefficient	μ	-	Mechanical	Room temp.	0,30
Water absorption	Aw	%	Physical	24 h	0,06
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	138
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,39
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	60 - 73	-	-
Compressive yield strength	Mechanical	MPa	20 - 32	psix10^3	2,9 - 4,6
Service temperature	Thermal	ºC	-30 / 70	ºF	-22 / 158

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Excellent corrosion resistance in contact with acids, alcohols, basis, esters, petrol, greases and oils. Fairish resistance to aliphatic and aromatic hydrocarbons, mineral oils, oxidizing agents. They are not resisting in contact with halogenated hydrocarbons.

LOW DENSITY POLYETHYLENE (LDPE) BALLS

Very light thermoplastic material balls, they are available in three versions (high/low density and ultra high molecular weight). They provide good wear and abrasion resistance. Excellent corrosion resistance and resistance to radiations, they are electric insulators.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Anti evaporation and anti smell devices, they are useful for floating applications. Used in electronic, pharmaceutical and medical industry.

Technical name	Commercial name	Abbreviation	Molecular formula
Low Density Polyethylene	Low Density Polyethylene	LDPE	(C2H4)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	0,92
Young's modulus	E	MPa	Mechanical	-	275
Friction coefficient	μ	-	Mechanical	Room temp.	0,40
Water absorption	Aw	%	Physical	24 h	0,06
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	160
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,33
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	40 - 55	-	-
Compressive yield strength	Mechanical	MPa	9 - 20	psix10^3	1,4 - 2,9
Service temperature	Thermal	ºC	-30 / 70	ºF	-22 / 158

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance
Excellent corrosion resistance in contact with acids, alcohols, basis, esters, petrol, greases and oils. Fairish resistance to aliphatic and aromatic hydrocarbons, mineral oils, oxidizing agents. They are not resisting in contact with halogenated hydrocarbons.

ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE (UHMWPE) BALLS

Very light thermoplastic material balls, they are available in three versions (high/low density and ultra high molecular weight). Ultra high molecular weight polyethylene presents very good wear resistance. They provide good wear and abrasion resistance. Excellent corrosion resistance and resistance to radiations, they are electric insulators.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Anti evaporation and anti smell devices, they are useful for floating applications. Used in valves in electronic, pharmaceutical and medical industry.

Technical name	Commercial name	Abbreviation	Molecular formula
Ultra High Molecular Weight Polyethylene	Ultra High Molecular Weight Polyethylene	UHMWPE	(C2H4)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	0,94
Young's modulus	E	MPa	Mechanical	-	749
Friction coefficient	μ	-	Mechanical	Room temp.	0,16
Water absorption	Aw	%	Physical	24 h	0,01
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	183,0
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,41
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	60 - 68	-	-
Compressive yield strength	Mechanical	MPa	20 - 28	psix10^3	2,9 - 4,1
Service temperature	Thermal	ºC	-100 / 80	ºF	-148 / 176

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
6,350 - 100,000	mm	1/4 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Excellent corrosion resistance in contact with acids, alcohols, basis, esters, petrol, greases and oils. Fairish resistance to aliphatic and aromatic hydrocarbons, mineral oils, oxidizing agents. They are not resisting in contact with halogenated hydrocarbons.

POLYPROPYLENE (PP) BALLS

Polypropylene balls are featured by a low weight, good mechanical characteristics and corrosion, fatigue and collisions resistance. They are resisting to heat and they are excellent electric insulators. They are floating into water. Additives can be added to avoid degradation phenomena causing to a long exposure at sun light (UV radiation absorption). It is a recyclable material.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Low load bearings, special valves, check valves, floating valves, fluid level indicators, carburetors, flow meters, chemical, medical and laboratory devices, blood transfusion kits.

Technical name	Commercial name	Abbreviation	Molecular formula
Poly(propene)	Polypropylene	PP	(C3H6)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	0,87
Young's modulus	E	MPa	Mechanical	-	1425
Friction coefficient	μ	-	Mechanical	Room temp.	0,30
Water absorption	Aw	%	Physical	24 h	0,01
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	135,0
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,19
Volume resistivity		*m	Electric	-	> 10^14
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	70 - 80	-	-
Compressive yield strength	Mechanical	MPa	40 - 50	psix10^3	5,8 - 7,3
Service temperature	Thermal	ºC	-30 / 110	ºF	-22 / 230

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 160,000	mm	1/16 - 6.5/16	"	0 - I - II - III - IV - V

Corrosion Resistance

Polypropylene balls are resisting into not concentrated acids, alkalis, alcohols, oils, greases and most inorganic compounds. Fair resistance in aromatic hydrocarbons, they are not resistant in contact with halogens. They provide corrosive phenomena even in presence of concentrated acids and oxidizing agents at high temperature.

POLYSTYRENE (PS) BALLS

Amorphous light vinyl polymer balls, they provide good hardness and stiffness. Brittle material with fair corrosion resistance and no UV radiation resistant.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
They are used as floating elements on not acqueous liquids, different applications in the electronic, pharmaceutical and medical field, and as decorative elements.

Technical name	Commercial name	Abbreviation	Molecular formula
Polystyrene	Polystyrene	PS	(C8H8)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,05
Young's modulus	E	MPa	Mechanical	-	3169
Friction coefficient	μ	-	Mechanical	Room temp.	0,40
Water absorption	Aw	%	Physical	24 h	0,15
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	80
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,12
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	78 - 82	-	-
Compressive yield strength	Mechanical	MPa	50 - 90	psix10^3	7 - 13
Service temperature	Thermal	ºC	-10 / 90	ºF	14 / 194

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Good corrosion resistance in contact with diluted acids, basis, acqueous solutions, detergents. Fair against oxidizing agents, oils and greases. Poor resistance in contact with aromatic hydrocarbons, aldehydes, halogens, esters, ethers, ketones.

POLYURETHANE (TPU) BALLS

Thermoplastic elastomer balls with characteristics similar to rubber, they provide much better wear and abrasion resistance. Properties are strongly influenced by the starting polymeric formulation.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special bearings, safety valves, they are frequently used in foodstuff industry. Screen cleaning (balls with a metal core and polyurethane coating).

Technical name	Commercial name	Abbreviation	Molecular formula
-	Polyurethane	PUR / PU	-NH-(CO)-O-

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,14
Young's modulus	E	MPa	Mechanical	-	360
Friction coefficient	μ	-	Mechanical	Room temp.	0,24
Water absorption	Aw	%	Physical	24 h	0,3
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	150
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,03
Volume resistivity		*m	Electric	-	> 10^14
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore A	80 - 100	-	-
Compressive yield strength	Mechanical	MPa	70 - 140	psix10^3	10,1 - 20,3
Service temperature	Thermal	ºC	-40 / 80	ºF	-76 / 176

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance
Polyurethane provides good corrosion resistance in diluted acids and alkali, mineral oils and greases, petroleum products. Balls are not resisting into strong acids and basis. Poor resistance in contact with hot water, hot and wet air, steam, aromatic hydrocarbons, organic polar solvents.

Notes

Property	Description
Polyether Urethane	On demand it is possible to supply Polyether Urethane balls, a plastic material similar to Polyurethane with improved mechanical properties.

PVDF BALLS

Semi-crystalline thermoplastic fluoropolymer balls, they provide excellent corrosion, aging and UV radiation resistance. Plastic with a lower density, better mechanical properties and abrasion resistance, lower resistance to high temperatures than Teflon® material.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special pumps and valves, heat exchangers, lithium batteries. They are used into the electronic and petrolchemical industry. They are useful for applications into aggressive environments when balls are even subjected to wear or collisions.

Technical name	Commercial name	Abbreviation	Molecular formula
Polyvinylidenefluoride	PVDF	PVDF	(C2H2F2)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,77
Young's modulus	E	MPa	Mechanical	-	2175
Friction coefficient	μ	-	Mechanical	Room temp.	0,32
Water absorption	Aw	%	Physical	24 h	0,04
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	130,0
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,17
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	70 - 85	-	-
Compressive yield strength	Mechanical	MPa	50 - 70	psix10^3	7 - 10

Property	Type	U.o.M.	Values	U.o.M.	Values
Service temperature	Thermal	ºC	-40 / 130	ºF	-40 / 266

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 60,000	mm	1/16 | 2-1/4	"	0 - I - II - III - IV - V

Corrosion Resistance

Excellent corrosion resistance in contact with inorganic acids and salts, organic acids, alcohols, ethers, aliphatic and aromatic hydrocarbons, halogens except fluorines, oxidizing environments. They are not suitable against nearly pure strong acids and basis, liquid alcaline metals, strong polar solvents.

PHENOLIC RESIN BALLS

Synthetic thermoset resin balls, they provide good dimensional stability, hardness and heat/corrosion resistance.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special pumps and valves, computer industry (mouse), game balls (billiard, bowling and table-based balls).

Technical name	Commercial name	Abbreviation
Phenolic resin	Phenolic resin	-

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,70 *
Young's modulus	E	MPa	Mechanical	-	3000
Friction coefficient	μ	-	Mechanical	Room temp.	0,25
Water absorption	Aw	%	Physical	24 h	0,35
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	95
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,25
Volume resistivity		*m	Electric	-	> 10^9
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	85 - 90	-	-
Compressive yield strength	Mechanical	MPa	35 - 55	psix10^3	5 - 8
Service temperature	Thermal	ºC	-40 / 200	ºF	-40 / 392

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
12,700 - 100,000	mm	1/2 - 4	"	III

Corrosion Resistance
Good corrosion resistance in contact with weak acids and basis, hydrocarbons, petroleum products, alcohols, glycols, mineral oils and greases. They are not resistant to strong acids and bases, oxidizing agents, phenols, hard lyes.

Notes

Property	Description
Density *	For big diameters balls with a lower density (about 1,3 g/cm3) and a precision grade GIV could be available.
Thermoset resin balls (density 1,2-1,7 g/cm3)	Balls typically used for aesthetic applications, they are available in different styles and with highly polished or matt surface finishing.

TEFLON® (PTFE) BALLS

Low weight fluorinated semicrystalline polymer balls, they provide exceptional corrosion resistance and are used into high temperature applications. Mechanical and wear resistance properties are lower than other plastic materials. Good electric insulators, they are auto lubricant. Teflon® properties change if they are exposed to electromagnetic radiations.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Ball bearings, special valves (very aggressive environments), measurement and medical instruments, appliances. They are used into foodstuff, paper, chemical, electronic, pharmaceutical industry.

Technical name	Commercial name	Abbreviation	Molecular formula
Polytetrafluoroethylene	Teflon®	PTFE	(CF2-CF2)n

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	2,16
Young's modulus	E	MPa	Mechanical	-	670
Friction coefficient	μ	-	Mechanical	Room temp.	0,12
Water absorption	Aw	%	Physical	24 h	0,02
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100°C)	145,0
Thermal conductivity		W/(m·K)	Thermal	Room temp.	0,23
Volume resistivity		*m	Electric	-	> 10^16
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	50 - 65	-	-
Compressive yield strength	Mechanical	MPa	7 - 30	psix10^3	1 - 4
Service temperature	Thermal	ºC	-269 / 250	ºF	-436 / 482

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 160,000	mm	1/16 - 6.5/16	"	0 - I - II - III - IV - V

Corrosion Resistance

Teflon® balls provide exceptional corrosion resistance properties, they are resisting even in contact with industrial acids or caustic substances. They suffer corrosive phenomena only against molten alkaline metals and fluorides at elevated temperatures.

TORLON® BALLS

Amorphous thermoplastic material balls, they provide excellent mechanical and stiffness/thoughness features (the best ones among plastics), very good thermal stability and creep resistance, they are suitable for high temperature applications. Torlon® 4301 has better friction and wear resistance properties. They are electric insulators.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Special bearings (when it is demanded lubrication absence, high temperature and wear resistance), automotive components (transmission). They are used in aviation/aerospace and electrionic industry. Applications even in naval industry and angling.

Technical name	Commercial name	Abbreviation
Polyamide-polyimide	Torlon® 4301	PAI + graphite + PTFE
Polyamide-polyimide	Torlon® 4203L	PAI

Physical / mechanical / thermal / electric / magnetic properties

Property	Symbol	U.o.M.	Type	Notes	Values
Density		g/cm3	Physical	Room temp.	1,42
Young's modulus	E	MPa	Mechanical	4203L / 4301	4135 / 6800
Friction coefficient	μ	-	Mechanical	Room temp.	0,21
Water absorption	Aw	%	Physical	24 h	0,34
Coefficient of linear thermal expansion		10^-6/ºC	Thermal	(T=0-100ºC)	28
Thermal conductivity		W/(m·K)	Thermal	Room t. 4203L / 4301	0,26 / 0,54
Volume resistivity		*m	Electric	-	> 10^13
Relative magnetic permeability	μ	-	Magnetic	Diamagnetic	<~1

Technical data

Property	Type	U.o.M.	Values	U.o.M.	Values
Hardness	Mechanical	Shore D	80 - 85	-	-

Property	Type	U.o.M.	Values	U.o.M.	Values
Compressive yield strength	Mechanical	MPa	150 - 220	psix10^3	22 - 32
Service temperature	Thermal	ºC	-196 / 200	ºF	-320,8 / 392

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

Corrosion Resistance

Torlon® is resisting in contact with aliphatic, aromatic, chlorine and fluorine hydrocarbons, most acids compounds at moderate temperatures, automotive and aviation lubricants. Fair resistance to saturated steam, strong basis, high temperature acids.

MACHINED ROD END PLASTIC BALLS

Plastic balls individually machined from rod end only, they do not contain air bubbles (void free). Balls are tumble polished.
Please note: chromatic appearence of the balls may be subject to variation.

Applications

Similar to the corresponding injection molded balls they are used when void free balls are required. The absence of air bubbles slightly increases the density and the mechanical properties of the balls.

Technical name	Commercial name	Abbreviation	Molecular formula
Acrylonitrile Butadiene	ABS	ABS	(C8H8C4H6C3H3N)n
Polymethyl-methacrylate	Acrylic, Plexiglass	PMMA	(C5O2H8)n
Polyoxymethylene	Delrin®	POM	(~CH2OH)
Polyamide	Nylon® 6.6	PA 66	-OC-(CH2)4-CO-NH-(CH2)6-NH-
Polyetheretherketone	PEEK	PEEK	-
Polycarbonate	Lexan®	PC	C15H16O2
Polyethylene	Polyethylene	PE	(C2H4)n
Poly(propene)	Polypropylene	PP	(C3H6)n
Polystyrene	Polystyrene	PS	(C8H8)n
-	Polyurethane	TPU	-NH-(CO)-O-
Polyvinyl chloride	PVC	PVC	CH2=CHCl
Polyvinylidenefluoride	PVDF	PVDF	(C2H2F2)n
Polytetrafluoroethylene	Teflon®	PTFE	(CF2-CF2)n
Polyamide-polyimide	Torlon® 4203	PAI	-

Technical data

Property	Symbol	U.o.M.	ABS	PMMA	POM	PA 66	PEEK	PC	PE
Density		g/cm3	1,07	1,22	1,43	1,15	1,32	1,24	0,95

Property	Symbol	U.o.M.	ABS	PMMA	POM	PA 66	PEEK	PC	PE
Young's modulus	E	MPa	2500	3050	3000	2400	3750	2400	800
Yield strength	y	MPa	35-55	40-65	50-70	45-58	130-220	70-100	17-27
Friction coefficient	μ	-	0,10	0,14	0,09	0,08	0,10	0,10	0,12
Water absorption	Aw	%	0,18	0,20	0,20	2,50	0,08	0,22	0,013
Coefficient of linear thermal expansion		10^-6/ºC	90,0	85,0	120,0	85,0	80,0	65,0	180,0
Thermal conductivity		W/(m·K)	0,21	0,21	0,29	0,23	0,30	0,25	0,38
Volume resistivity		*m	> 10^13	> 10^13	> 10^13	> 10^12	> 10^13	> 10^14	> 10^15
Hardness	-	Shore D	75-85	75-85	75-85	80-83	80-85	75-85	57-67
Service temperatures (min/max)	-	ºC	-30/80	-40/90	-40/85	-30/80	-50/250	-40/120	-50/80

Technical data

Property	Symbol	U.o.M.	PP	PS	TPU	PVC	PVDF	PTFE	PAI
Density		g/cm3	0,91	1,09	1,15	1,42	1,80	2,18	1,45
Young's modulus	E	MPa	1400	3350	400	3400	2100	700	4400
Yield strength	y	MPa	27-37	35-60	50-100	40-60	40-55	10-30	140-200
Friction coefficient	µ	-	0,10	0,09	0,08	0,09	0,10	0,09	0,07
Water absorption	Aw	%	0,10	0,15	0,20	0,15	0,03	0,010	0,24
Coefficient of linear thermal expansion		10^-6/ºC	160,0	110,0	170,0	90,0	155,0	175,0	50,0
Thermal conductivity		W/(m·K)	0,22	0,20	0,20	0,23	0,20	0,23	0,28
Volume resistivity		*m	> 10^14	> 10^14	> 10^14	> 10^14	> 10^13	> 10^17	> 10^13
Hardness	-	Shore D	70-80	75-85	30-60	75-85	65-75	50-65	75-85
Service temperatures (min/max)	-	ºC	-30/110	-10/90	-40/80	-15/70	-40/130	-269/200	-196/250

Range

Diameters (min/max)	Tolerances	Roundness	U.o.M.	Precision grade
1,000 - 3,000	±0,040	≤ 0,06	mm	II
3,001 - 6,000	±0,048	≤ 0,06	mm	II
6,001 - 10,000	±0,058	≤ 0,06	mm	III
10,001 - 18,000	±0,070	≤ 0,06	mm	III
18,001 - 30,000	±0,084	≤ 0,06	mm	III
30,001 - 50,000	±0,100	≤ 0,10	mm	III
50,001 - 80,000	±0,127	≤ 0,15	mm	III
80,001 -120,000	±0,190	≤ 0,20	mm	IV
120,001 -160,000	±0,254	≤ 0,25	mm	IV

GF GLASS FILLED PLASTIC BALLS

"GF" plastic balls filled with fiber glass (from 10% to 35%), they provide best mechanical, dimensional and heat resisting properties than the corresponding standard balls.
Please note: chromatic appearence of the balls may be subject to variation.

Applications
Similar to the applications of the correspinding solid balls, mainly when higher mechanical properties are required.

Technical name	Commercial name	Abbreviation	Molecular formula
Polyoxymethylene	Delrin®	POM	(~CH2OH)
Polyamide	Nylon® 6.6	PA 66	-OC-(CH2)4-CO-NH-(CH2)6-NH-
Polycarbonate	Lexan®	PC	C15H16O2
Poly(propene)	Polypropylene	PP	(C3H6)n
Polyphthalamide	Polyphthalamide	PPA	-
Polyphenylene Sulfide	Polyphenylene Sulfide	PPS	(C6H6)-S n
Epoxy Resin	Epoxy Resin	-	-
Phenolic Resin	Frac balls	-	-
Polytetrafluoroethylene	Teflon®	PTFE	(CF2-CF2)n
Polyamide-polyimide	Torlon®	PAI	-

Technical data

Property	Symbol	U.o.M.	POM	PA 66	PC	PP	PPA 1	PPA 2
% Fiber glass	-	%	25	30	20	30	30	35
Density		g/cm3	1,60	1,38	1,35	1,10	1,70	1,47
Young's modulus	E	MPa	6450	4600	5670	4000	13100	12100
Friction coefficient	μ	-	0,35	0,24	0,16	0,30	0,28	0,25

Property	Symbol	U.o.M.	POM	PA 66	PC	PP	PPA 1	PPA 2
Water absorption	Aw	%	0,24	2,04	0,16	0,08	0,15	0,40
Coefficient of linear thermal expansion		10^-6/ºC	79,0	111,0	28,2	65,0	65,1	48,0
Thermal conductivity		W/(m·K)	0,34	0,30	0,23	0,26	0,33	0,31
Volume resistivity		*m	> 10^12	> 10^13	> 10^13	> 10^12	> 10^13	> 10^13
Hardness	-	Shore D	80-90	77-85	82-92	75-85	80-90	80-90
Compressive yield strength	-	MPa	104-124	130-170	110-125	60-100	235-285	310-360
Service temperature (min/max)	-	ºC	-20/160	-10/110	-20/130	-10/120	-30/150	-20/140

Technical data

Property	Symbol	U.o.M.	PPS	Epox. Res.	Phen. Res.	PTFE	PAI
% Fiber glass	-	%	30	10	30	25	30
Density		g/cm3	1,58	1,85	1,77	2,24	1,60
Young's modulus	E	MPa	13100	18000	6500	800	7460
Friction coefficient	μ	-	0,11	0,15	0,30	0,12	0,20
Water absorption	Aw	%	0,02	0,10	0,05	0,017	0,30
Coefficient of linear thermal expansion		10^-6/ºC	20,8	12,0	85,0	158,0	30,4
Thermal conductivity		W/(m·K)	0,33	0,29	0,32	0,46	0,36
Volume resistivity		*m	> 10^14	> 10^13	> 10^9	> 10^13	> 10^12
Hardness	-	Shore D	80-90	80-90	90-95	65-75	85-95
Compressive yield strength	-	MPa	120-180	180-220	250-350	19-29	160-260
Service temperature (min/max)	-	ºC	-30/220	-30/130	-40/200	-196/230	-100/260

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 4	"	0 - I - II - III - IV - V

COMPOSITES PLASTIC BALLS

Type	Materials	Description / Applications
PTFE filled PA6.6	PA6.6 + PTFE	Nylon® PA6.6 balls with a small addition of PTFE (2%), they feature a lower friction coefficient ad better wear resistance in comparison to the standard Nylon® balls.
MoS2 filled PA6.6	PA6.6 + MoS2	Nylon® PA6.6 balls with a small addition of MoS2, they feature better mechanical properties and dimensional stability in comparison to the standard Nylon® balls.
Metal detector PEEK	PEEK + detectable filler	PEEK balls with a detectable filler inside, they are typically used in the foodstuff field.
BaSO4 filled PP	PP + BaSO4	Polypropylene balls with addition of BaSO4, they feature better mechanical characteristics and a lower friction coefficient in comparison to the standard Polypropylene balls.

Technical data

Property	Symbol	U.o.M.	PA6.6+PTFE	PA6.6+MoS2	PEEK+D.F.	PP+BaSO4
% Filler element	-	%	2	1	2	25
Density		g/cm3	1,16	1,15	1,44	1,12
Young's modulus	E	MPa	2800	3600	4400	1750
Friction coefficient	μ	-	0,20	0,22	0,27	0,20
Water absorption	Aw	%	1,80	2,30	0,02	0,01
Coefficient of linear thermal expansion		10^-6/ºC	99,0	80,0	54,1	168,8
Thermal conductivity		W/(m·K)	0,25	0,29	1,43	0,24
Volume resistivity		*m	> 10^14	> 10^12	> 10^12	> 10^14
Hardness	-	Shore D	70-80	80-90	90-100	75-85
Compressive yield strength	-	MPa	80-100	90-120	145-285	45-55
Service temperature (min/max)	-	ºC	-40/90	-20/80	-60/260	-30/120

Range

Diameters (min/max)	U.o.M.	Diameters (min/max)	U.o.M.	Precision Grade
1,500 - 100,000	mm	1/16 - 14	"	0 - I - II - III - IV

GRADES AND SURFACE FINISHING OF PLASTIC BALLS

PRECISION GRADES

GRADE	TOLERANCE ON DIAMETER (µm)	TOLERANCE ON DIAMETER (In)	TOLERANCE ON SPHERICITY (µm)	TOLERANCE ON SPHERICITY (In)
GR. 0	±10	±0,0005	5 max	0,00025 max
GR. I	±25	±0,0010	12 max	0,0005 max
GR. II	±50	±0,0020	25 max	0,0010 max
GR. III	± 127	±0,0050	60 max	0,0024 max
GR. IV	± 500	±0,0197	600 max	0,0236 max
GR. V	± 1000	±0,0394	-	-

SURFACE FINISH

Precision grade	Type of surface
GRADE 0	SUPER LAPPED FINISHING
GRADE I	LAPPED FINISHING
GRADE II / III	POLISHED FINISHING
GRADE IV	FLASHED FINISHING
GRADE V	BALL BLANKS

GRAMS NET WEIGHTS PER 100 PCS FROM 1,000 MM TO 10,000 MM

DIAMETER		GRAMS NET WEIGHTS PER 100 BALLS			
mm	Inch	Delrin® (POM)	Nylon® 6.6 (PA)	Polypropylene (PP)	Polyurethane (PUR)
1	-	0,07	0,06	0,05	0,06
1,191	3/64	0,12	0,10	0,08	0,10
1,5	-	0,25	0,20	0,15	0,20
1,588	1/16	0,29	0,23	0,18	0,24
2,000	-	0,59	0,46	0,36	0,48
2,381	3/32	0,99	0,78	0,62	0,81
2,500	-	1,15	0,91	0,71	0,93
2,778	7/64	1,57	1,25	0,98	1,28
3,000	-	1,98	1,57	1,23	1,61
3,175	1/8	2,35	1,86	1,46	1,91
3,500	-	3,14	2,49	1,95	2,56
3,969	5/32	4,58	3,63	2,85	3,73
4,000	-	4,69	3,72	2,92	3,82
4,500	-	6,68	5,30	4,15	5,44
4,763	3/16	7,92	6,28	4,92	6,45
5,000	-	9,16	7,26	5,69	7,46
5,500	-	12,2	9,67	7,58	9,93
5,556	7/32	12,6	9,97	7,81	10,2
6,000	-	15,8	12,6	9,84	12,9
6,350	1/4	18,8	14,9	11,7	15,3

DIAMETER		GRAMS NET WEIGHTS PER 100 BALLS			
mm	Inch	Delrin® (POM)	Nylon® 6.6 (PA)	Polypropylene (PP)	Polyurethane (PUR)
6,500	-	20,1	16,0	12,5	16,4
7,000	-	25,1	19,9	15,6	20,5
7,144	9/32	26,7	21,2	16,6	21,8
7,500	-	30,9	24,5	19,2	25,2
7,938	5/16	36,7	29,1	22,8	29,9
8,000	-	37,5	29,8	23,3	30,6
8,500	-	45,0	35,7	28,0	36,7
8,731	11/32	48,8	38,7	30,3	39,7
9,000	-	53,4	42,4	33,2	43,5
9,500	-	62,8	49,8	39,1	51,2
9,525	3/8	63,3	50,2	39,4	51,6
10,000	-	73,3	58,1	45,6	59,7

GRAMS NET WEIGHTS PER 100 PCS FROM 10,319 MM TO 25,400 MM

DIAMETER		GRAMS NET WEIGHTS PER 100 BALLS			
mm	Inch	Delrin® (POM)	Nylon® 6.6 (PA)	Polypropylene (PP)	Polyurethane (PUR)
10,319	13/32	80,5	63,9	50,0	65,6
11,000	-	97,6	77,4	60,6	79,4
11,113	7/16	101	79,8	62,5	81,9
11,906	15/32	124	98,1	76,9	101
12,000	-	127	100	78,7	103
12,700	1/2	150	119	93,3	122
13,000	-	161	128	100	131
13,494	17/32	180	143	112	147
14,000	-	201	159	125	164
14,288	9/16	214	170	133	174
15,000	-	247	196	154	201
15,081	19/32	251	199	156	205
15,875	5/8	293	233	182	239
16,000	-	300	238	187	244
16,669	21/32	339	269	211	276
17,000	-	360	286	224	293
17,463	11/16	390	309	243	318
18,000	-	428	339	266	348
18,256	23/32	446	354	277	363
19,000	-	503	399	312	409

DIAMETER		GRAMS NET WEIGHTS PER 100 BALLS			
mm	Inch	Delrin® (POM)	Nylon® 6.6 (PA)	Polypropylene (PP)	Polyurethane (PUR)
19,050	3/4	507	402	315	413
19,844	25/32	573	454	356	466
20,000	-	586	465	364	478
20,638	13/16	644	511	400	525
21,000	-	679	538	422	553
21,431	27/32	722	572	448	588
22,000	-	781	619	485	636
22,225	7/8	805	638	500	655
23,000	-	892	707	554	726
23,019	29/32	894	709	556	728
23,813	15/16	990	785	615	806
24,000	-	1013	803	630	825
24,606	31/32	1092	866	679	889
25,000	-	1145	908	712	933
25,400	1	1201	952	746	978

KG NET WEIGHTS PER 10 PCS FROM 30,000 MM TO 101,600 MM

DIAMETER		KG NET WEIGHTS PER 10 BALLS			
mm	Inch	Delrin® (POM)	Nylon® 6.6 (PA)	Polypropylene (PP)	Polyurethane (PUR)
30,000	-	0,20	0,16	0,12	0,16
31,750	1.1/4	0,23	0,19	0,15	0,19
35,000	-	0,31	0,25	0,20	0,26
38,100	1.1/2	0,41	0,32	0,25	0,33
40,000	-	0,47	0,37	0,29	0,38
44,450	1.3/4	0,64	0,51	0,40	0,52
45,000	-	0,67	0,53	0,42	0,54
50,000	-	0,92	0,73	0,57	0,75
50,800	2	0,96	0,76	0,60	0,78
55,000	-	1,22	0,97	0,76	0,99
57,150	2.1/4	1,37	1,08	0,85	1,11
60,000	-	1,58	1,26	0,98	1,29
63,500	2.1/2	1,88	1,49	1,17	1,53
65,000	-	2,01	1,60	1,25	1,64
69,850	2.3/4	2,50	1,98	1,55	2,03
70,000	-	2,51	1,99	1,56	2,05
75,000	-	3,09	2,45	1,92	2,52
76,200	3	3,24	2,57	2,02	2,64
80,000	-	3,75	2,98	2,33	3,06
82,550	3.1/4	4,12	3,27	2,56	3,36

DIAMETER		KG NET WEIGHTS PER 10 BALLS			
mm	Inch	Delrin® (POM)	Nylon® 6.6 (PA)	Polypropylene (PP)	Polyurethane (PUR)
85,000	-	4,50	3,57	2,80	3,67
88,900	3.1/2	5,15	4,08	3,20	4,19
90,000	-	5,34	4,24	3,32	4,35
95,000	-	6,28	4,98	3,91	5,12
95,250	3.3/4	6,33	5,02	3,94	5,16
100,000	-	7,33	5,81	4,56	5,97
101,600	4	7,69	6,10	4,78	6,26

PLASTIC MATERIALS PROPERTIES

DENSITY

MATERIAL	DENSITY (g/cm3)	MATERIAL	DENSITY (g/cm3)
PMMA	1,18	LDPE / HDPE	0,92 / 0,97
AURUM®	1,42	PP	0,87
POM	1,40	PS	1,05
TPE	1,20	PUR	1,14
PC	1,20	PVC	1,38
PA6.6	1,14	PHENOLIC RESIN	1,40
PBT	1,30	PTFE	2,16
PEEK	1,29	TORLON®	1,42

COMPRESSIVE YIELD STRENGTH

MATERIAL	STRENGTH MPa	MATERIAL	STRENGTH MPa
PMMA	80 - 120	LDPE / HDPE	9 - 32
AURUM®	70 - 230	PP	40 - 50
POM	30 - 90	PS	50 - 90
TPE	10 - 60	PUR	70 - 140
PC	60 - 110	PVC	55 - 90
PA6.6	86 - 103	PHENOLIC RESIN	35 - 55
PBT	75 - 135	PTFE	7 - 30
PEEK	200 - 300	TORLON®	150 - 220

WORKING TEMPERATURES

MATERIAL	MINIMUM TEMPERATURE	MAXIMUM TEMPERATURE	MATERIAL	MINIMUM TEMPERATURE	MAXIMUM TEMPERATURE
PMMA	-40	90	LDPE / HDPE	-30	70
AURUM®	-196	235	PP	-60	120
POM	-40	85	PS	-10	90
TPE	-40	180	PUR	-40	80
PC	-40	120	PVC	-15	70
PA6.6	-30	80	PHENOLIC RESIN	-40	200
PBT	-30	120	PTFE	-269	250
PEEK	-50	250	TORLON®	-196	200

MAKE YOUR WORLD MOVE

® RGPBALLS S.r.l.

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