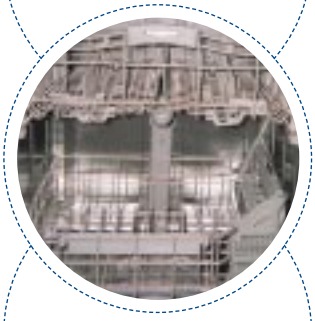
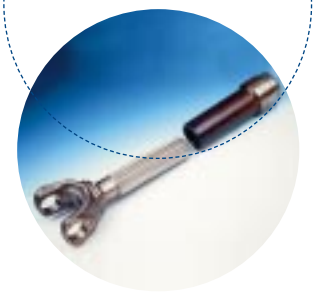
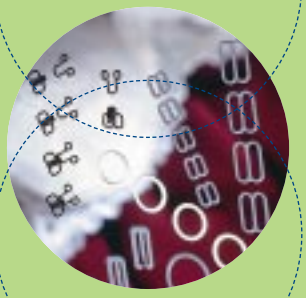
Rilsan®
FINE POWDERS







COATING PHYSICAL AND CHEMICAL PROPERTIES

ATOFINA

Physical properties of the coatings

Typical results for coating applied according to ATOFINA specifications

Melting point	ISO 1218	186°C
VICAT point	ISO 306	181°C
Specific gravity at 20°C natural powders dipping and ES powders, white	ISO 1183	 1.040 g/cm³ 1.065 g/cm³ to 1.25 g/cm³
Water absorption to saturation at 20°C and 65% RH at 20°C and 100% RH at 100°C and 100% RH (boiling water)		 0.9 to 1.1% according to the type of powder 1.6 to 1.9% according to the type of powder 2.4 to 3% according to the type of powder
Shore D hardness at 20°C, measured at a thickness greater than 5 mm to eliminate the influence of the substrate	ISO 868	75-85
Hardness measured with a Persoz pendulum at 20°C	ISO 1522	180-200
Surface hardness at 20°C 10 sec. under load	DIN 53-456	80 N/mm²
Scratch resistance measured with the Clemen apparatus; load necessary to induce a scratch which reaches the underlying metal for a coating of 0.4 mm thickness	ISO 1518	59 N
Pencil hardness	ECCA T4	Note: B
Shear strength	ASTM D 732	35-42 N/mm²
Impact resistance Dip coating powders (thickness 350 µm) ES powders (thickness 100 µm)	 ASTM G14 NFT 30-039 ISO 6272	 > 2 J > 2.5 J > 19 J
Abrasion resistance Taber abrasimeter (wheel type CS 17, load 9.81 N) loss of weight after 1,000 cycles	ISO 9352	 15 mg
Coefficient of friction Black powders	NFT 54-112 (8)	 Static K: 0.15-0.3 Dynamic K: 0.05-0.2
Flexibility Conical mandrel folding	ISO 6860	 > 35%
Specific heat		2.09 kJ/kg K
Thermal conductivity		0.29 W/mK between 323 and 443 K (50° and 170°C)

Typical results for coating applied according to ATOFINA specifications

Latent heat of fusion		83.7 kJ/kg
Surface resistivity at 20°C and 65% RH at 500 V	ASTM D 257	2.4×10^{14} Ω
Inflammability measured at a thickness greater than 3 mm to eliminate the influence of the substrate	ASTM D 635	self-extinguishing
Dielectric constant	102 Hz 106 Hz	3.9 3.1
Transverse or volume resistivity at 20°C and 65% RH at 500 V	ASTM D 257	10^{14} to 10^{16} Ω.cm
Tangent of the angle of loww (power factor) at 1,000 V R.M.S., with a current of 1,000 Hz (at 20°C and 65% RH)		0.05
Resistance to surface tracking KA method	DIN 53-480	Grade KA3c
Dielectric rigidity ES powders thickness ± 100 µm Dipping powders, thickness 350 to 450 µm	ASTM D 149	55 to 90 kV/mm 30 to 36 kV/mm
Dielectric strength Influence of the thickness studied on a natural coating (measured at 20°C and 65% RH) 0.20 mm 0.43 mm 0.70 mm 0.90 mm		 52.8 kV/mm 38.4 kV/mm 34.7 kV/mm 33.1 kV/mm
Resistance to boiling water	ISO 1521	Excellent adhesion after 2,000 hours; neither bubbing nor modification
Resistance to outdoor exposure	ASTM D 1235	3 years Florida exposure: Adhesion 4, NFT 58-112 without any corrosion
Resistance to salt spray	NFX 41-002	No corrosion after 2,000 hours exposure.
Resistance to salt water		No corrosion after 10 years exposure.

Chemical properties of the coatings

Resistance of RILSAN® to various chemicals, as a function of temperature

In general, RILSAN® coatings have good resistance to inorganic salts, alkalis, most solvents, and to organic acids. Greater caution must be observed in uses involving inorganic acids, phenols and certain chlorinated solvents. In such cases, it is advisable to consult the ATOFINA Technical Service Department, specifying the practical problem involved: e.g. nature of metal to be protected and the temperature and chemical composition of the liquid.

Resistance (°C)	20	40	60	90
Inorganic bases				
ammonium hydroxide (concentrated)	G	G	G	G
ammonia (liquid or gas)	G	G		
lime-wash		G	G	G
potassium hydroxide (50%)	G	L	P	P
sodium hydroxide (5%)	G	G	L	
sodium hydroxide (10%)	G	L	L	
sodium hydroxide (50%)	G	L	P	P
Inorganic acids				
chromic acid (10%)	P	P	P	P
hydrochloric acid (1%)	G	L	P	P
hydrochloric acid (10%)	G	L	P	P
nitric acid (all concentrations)	P	P	P	P
phosphoric acid (50%)	G	L	P	P
sulphuric acid (1%)	G	L	L	P
sulphuric acid (10%)	G	L	P	P
sulphuric trioxide	L	P	P	P
Inorganic salts				
alum	G	G	G	
aluminium suplhate	G	G	G	G
ammonium nitrate	G	G	G	
ammonium sulphate	G	G	L	
barium chloride	G	G	G	G
calcium arsenate (concentrated solutions of slurries)	G	G	G	
calcium chloride	G	G	G	G
calcium sulphate	G	G	L	
copper sulphate	G	G	G	G
diammonium phosphate	G	G	L	
magnesium chloride (50%)	G	G	G	G
potassium ferrocyanide	G	G	G	
potassium nitrate	G[1]	L[1]	P	P
potassium sulphate	G	G	G	G
sodium carbonate	G	G	L	P
sodium chloride (saturated)	G	G	G	G
sodium silicate	G	G	G	
sodium sulphide	G	L	L	
trisodium phosphate	G	G	G	G

Resistance (°C)	20	40	60	90
Other inorganic products				
agricultural sprays	G	G		
bleach solution	L	P	P	P
bromine	P	P		
chlorine	P	P	P	P
fluorine	P	P	P	P
hydrogen	G	G	G	G
hydrogen peroxide (20 volumes)	G	L		
mercury	G	G	G	G
oxygen	G	G	L	P
ozone	L	P	P	P
potassium permanganate (5%)	P	P		
sea water	G	G	G	
soda water	G	G	G	G
sulphur	G	G		
water	G	G	G	G
Aldehydes and ketones				
acetaldehyde	G	L	P	
acetone (pure)	G	G[3]	L	P
benzaldehyde	G	L	P	
cyclohexanone	G	L	P	
formaldehyde (technical)	G	L	P	
methylethylketone	G	G	L	P
methylisobutylketone	G	G	L	P
Hydrocarbons				
acetylene	G	G	G	G
benzene	G	G[2]	L	
butane	G	G	G	
cyclohexane	G	G	L	
decalin	G	G	G	L
HFA (Forane®)	G			
hexane	G	G	G	
methane	G	G	G	
naphthalene	G	G	G	L
propane	G	G	G	
styrene	G	G[3]		
toluene	G	G[3]	L	L
xylene	G	G[3]	L	L

Condition after 18 months contact: G: Good – L: Limited – P: Poor

1: Slight yellowing - 2: Yellowing - 3: Swelling action

Resistance of RILSAN® to various chemicals, as a function of temperature

Resistance (°C)	20	40	60	90
Organic bases				
aniline (pure)	L	P	P	P
diethanolamine (20%)	G	G[3]	G[3]	L
pyridine (pure)	L	P	P	P
urea	G	G	L	L
Organic acids and anhydrides				
acetic acid	L	P	P	P
acetic anhydride	L	P	P	P
citric acid	G	G	L	P
formic acid	P	P	P	P
lactic acid	G	G	G	L
oleic acid	G	G	G	L
oxalic acid	G	G	L	P
picric acid	L	P	P	P
stearic acid	G	G	G	L
tartaric acid (saturated solution)	G	G	G	L
uric acid	G	G	G	L
Various organic compounds				
anethole	G			
carbon disulphide	G[3]	L[2]	P	
diacetone alcohol	G	G[3]	L	P
dimethyl formamide	G	G	L	
ethylene chlorhydrin	P	P		
ethylene oxide	G	G	L	P
furfurol	G	G[3]	L	P
glucose	G	G	G	G
tetraethyl lead	G			
tetrahydrofurane	G	G	L	
Salts, esters, ethers,				
amyl acetate	G	G	G	L
butyl acetate	G	G	G	L
diethyl ether	G			
dioctylphosphate	G	G	G	L
diotylphthalate	G	G	G	L
ethyl acetate	G	G	G	
fatty acid esters	G	G	G	G
methyl acetate	G	G	G	
methyl sulfate	G	L		
tributylphosphate	G	G	G	L
tricesylphosphate	G	G	G	L

Resistance (°C)	20	40	60	90
Alcohols				
benzyl alcohol	L	P	P	P
butanol	G[3]	L	P	
ethanol (pure)	G[3]	G	L	
glycerine (pure)	G	G	L	P
glycol	G	G	G	P
methanol (pure)	G[3]	L	P	
Chlorinated solvents				
carbon tetrachloride	P			
methyl bromide	G	P		
methyl chloride	G	P		
perchloroethylene	G	G	L	
trichloroethane	L	P		
trichloroethylene	G	L		
Phenols	P	P	P	P
Various products				
beet	G			
cider	G			
crude petroleum	G	G	G[3]	
diesel fuel	G	G	G[3]	
fruit juices	G	G		
fuel-oil	G	G	G	
greases	G	G	G	G
ground-nut oil	G	G		
high octane petrol	G	G	G[3]	
kerosene (paraffin)	G	G	G[3]	
linseed cake	G	G	G	G
milk	G	G	G	G
mustard	G			
normal petrol	G	G	G[3]	
oils	G	G	G	G
solutions or emulsions D.D.T. or lindane hydroxy-quinoline (agricultural sprays)	G			
soap solution	G			
stearin	G	G	G	
solvent naphtha	G	G	G[3]	
town gas	G	G		
turpentine	G	G	G[3]	
vinegar	G			
wine	G			

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