

Garlock TUFF-RAIL™ Manway Gasket Chemical Resistance Guide

A general guide for selection of gasketing material, Rev. August 2019

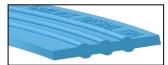
Key: A = Suitable - little or no adverse effect

B = Possible minor to moderate adverse effect

C = Not suitable - moderate to severe adverse effect

- = No data or insufficient evidence

Footnotes explained on last page.

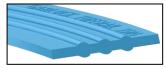


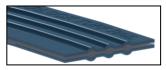


Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Abietic Acid	А	А
Acetaldehyde	A	А
Acetamide	А	А
Acetic Acid (Crude, Glacial, Pure)	A ¹	A ¹
Acetic Anhydride	A^1	A ¹
Acetone	A	А
Acetonitrile	A	Α
Acetophenone	A	А
2-Acetylaminofluorene	А	А
Acrolein	A ¹	A^1
Acrylamide	A^1	A^1
Acrylic Acid	A ¹	A ¹
Acrylic Anhydride	A ¹	A ¹
Acrylonitrile	A ¹	A ¹
Allyl Acetate	А	Α
Allyl Chloride	А	Α
Allyl Methacrylate	A^1	A ¹
Aluminum Chloride	А	А
Aluminum Fluoride	_	А
Aluminum Hydroxide (Solid)	А	А
Aluminum Nitrate	А	Α
Aluminum Sulfate	А	А
Alums	А	А
4-Aminodiphenyl	А	А
Ammonia Liquid, Anhydrous	А	А
Ammonium Chloride	Α	А
Ammonium Hydroxide	А	А
Ammonium Nitrate	А	А
Ammonium Phosphate, Monobasic	A	A
Ammonium Phosphate, Dibasic	А	А
Ammonium Phosphate, Tribasic	A	A
Ammonium Sulfate	А	А
Amyl Acetate	А	А
Amyl Alcohol	А	А
Aniline, Aniline Oil	A	А
Aniline Dyes	A	A
o-Anisidine	A	А
Aqua Regia	A	А
Aroclors	A	А
Asphalt	A	А
Aviation Gasoline	А	А

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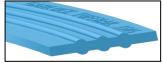






Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Barium Chloride	А	А
Barium Hydroxide	A	A
Barium Sulfide	A	A
Baygon	A	A
Beer	A	A
Benzaldehyde	A	A
Benzene, Benzol	A	A
Benzidine	A	A
Benzoic Acid	A	A
Benzonitrile	A	A
		A
Benzotrichloride	A A	A
Benzoyl Chloride		
Benzyl Alcohol	A	A
Benzyl Chloride	A	A
Bio-diesel (B100)	A	A
Biphenyl Bir (2) Harris (1) H	A	A
Bis(2-chloroethyl)ether	A	A
Bis(chloromethyl)ether	A	A
Bis(2-ethylhexyl)phthalate	A	A
Bitumen	A	A
Black Sulfate Liquor	В	A
Bleach (Sodium Hyprochlorite)	A	A
Borax	A	A
Brake Fluid (Mineral Oil)	А	А
Brake Fluid (Glycol Ether)	А	А
Boric Acid	Α	Α
Brine (Sodium Chloride)	Α	Α
Bromine	A	Α
Bromine Trifluoride	С	С
Bromoform	Α	A
Bromomethane	Α	A
Butadiene	A ¹	A ¹
2-Butanone	А	A
Butyl Acetate	А	A
Butyl Alcohol, Butanol	А	А
n-Butyl Amine	А	А
tert-Butyl Amine	А	А
Butyl Methacrylate	A ¹	A ¹
Butyric Acid	А	А
Calcium Bisulfite	А	А
Calcium Chloride	А	А
Calcium Cyanamide	А	А
Calcium Hydroxide	А	А
Calcium Hypochlorite	А	А
Calcium Nitrate	A	A
Calflo AF	A	A
Calflo FG	A	A
Calflo HTF	A	A
Calflo LT	A	A
Cane Sugar Liquors	A	A
Caprolactam	A	A
Captan	A	A
	A	A
Carbaryl Carbolic Acid, Phenol	A	A
Carbon Dioxide, Wet	A	A
Carbon Disulfide	A	A



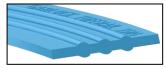


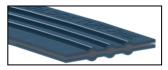


Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Carbon Tetrachloride	А	А
Carbonic Acid	A	A
Carbonyl Sulfide	A	A
Castor Oil	A	A
Catechol	A	A
Caustic Soda (<150°F)	A	A^2
Cetane (Hexadecane)	A	A
China Wood Oil	A	A
Chloramben	A	A
Chlorazotic Acid (Aqua Regia)	A	A
Chlordane	A	A
Chlorinated Solvents, Dry	A	A
Chlorinated Solvents, Wet	A	A
Chlorine Dioxide	A	A
Chloroacetic Acid	A	A
	A	A
2-Chloroacetophenone Chloroazotic Acid (Aqua Regia)	A	A
Chlorobenzene		
Chlorobenzilate	A A	A
		A
Chloroethane	A	A
Chloroethylene	A	A
Chloroform	A	A
Chloromethyl Methyl Ether	A	A
Chloronitrous Acid (Aqua Regia)	A	A
Chloroprene	A	A
Chlorosulfonic Acid	A	A
Chrome Plating Solutions		A
Chromic Acid	A	A
Chromic Anhydride	A	A
Chromium Trioxide	A	A
Citric Acid	A	A
Copper Chloride	A	A
Copper Sulfate	A	A
Corn Oil	A	A
Cotton Seed Oil	A	A
Creosote	A	A
Cresols, Cresylic Acid	A	A
Crotonic Acid	A	A
Crude Oil	A	А
Crude oil, sour	A	A
Cumene	A	Α
Cyclohexane	A	Α
Cyclohexanone	Α	Α
2,4-D, Salts and Esters	A	A
Detergent Solutions	B ³	Α
Diazomethane	А	A
Dibenzofuran	A	A
Dibenzylether	A	A
1,2-Dibromo-3-chloropropane	A	A
Dibromoethane	A	A
Dibutyl Phthalate	A	А
Dibutyl Sebacate	A	А
o-Dichlorobenzene	A	A
1,4-Dichlorobenzene	A	A
3,3-Dichlorobenzidene	A	A
Dichloroethane (1,1 or 1,2)	A	A
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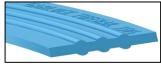


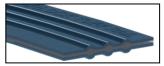




Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
1,1-Dichloroethylene	A^1	A ¹
Dichloroethyl Ether	А	A
Dichloromethane	A	A
1,3-Dichloropropene	A	A
Dichlorvos	A	A
Diesel Oil/Fuel	A	A
Diethanolamine	A	A
N,N-Diethylaniline	A	A
•	A	
Diethyl Carbonate	A	<u>А</u> А
Diethyl Sulfate		
3,3-Dimethoxybenzidene	A	A
Dimethylamine	A	A
Dimethylaminoazobenzene	A	A
N,N-Dimethyl Aniline	A	A
3,3-Dimethylbenzidine	A	A
Dimethyl Carbamoyl Chloride	A	A
Dimethyl Ether	A	A
Dimethylformamide	A	A
Dimethyl Hydrazine, Unsymmetrical	A	Α
Dimethyl Phthalate	A	A
Dimethyl Sulfate	A	A
4,6-Dinitro-o-Cresol and Salts	А	А
2,4-Dinitrophenol	А	А
2,4-Dinitrotoluene	Α	Α
Dioxane	Α	Α
1,2-Diphenylhydrazine	A	A
Diphyl DT	А	А
Dowfrost	А	А
Dowfrost HD	А	А
Dowtherm 4000	Α	А
Dowtherm A	А	А
Dowtherm E	Α	А
Dowtherm G	Α	А
Dowtherm HT	А	А
Dowtherm J	А	A
Dowtherm Q	А	А
Dowtherm SR-1	Α	Α
Dynalene EG	А	A
Dynalene PG	A	A
Dynalene HC Series	A	A
Dynalene MV	A	A
Dynalene HF-LO	A	A
Dynalene Calcium Chloride	A	A
Epichlorohydrin	A	A
E85 (85% Ethanol, 15% Gas)	A	A
1,2-Epoxybutane	A	A
Ethane	A	A
Ethanol, Ethyl Alcohol	A	A
Ethers		
	A	A
Ethyl Acetate	A A ¹	A A ¹
Ethyl Acrylate		
Ethyl Alcohol	A	A
Ethylbenzene	A	A
Ethyl Carbamate	A	A
Ethyl Cellulose	А	A
Ethyl Chloride	А	А

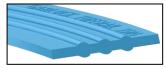


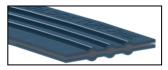




Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Ethyl Ether	А	А
Ethyl Hexoate	А	A
Ethylene Bromide	А	А
Ethylene Dibromide	А	A
Ethylene Dichloride	А	А
Ethylene Glycol	А	А
Ethyleneimine	-	А
Ethylene Oxide	A ¹	A ¹
Ethylene Thiourea	А	А
Ethylidine Chloride	А	А
Ferric Chloride	А	А
Ferric Phosphate	А	А
Ferric Sulfate	А	А
Formaldehyde	A^1	A^1
Formic Acid	А	А
Fuel Oil	А	А
Fuel Oil, Acid	А	А
Furfural	А	А
Gasoline, Refined	А	А
Gasoline, Sour	А	А
Gelatin	А	А
Glucose	А	А
Glue, Protein Base	А	А
Glycerine, Glycerol	А	А
Glycol	А	А
Grain Alcohol	А	А
Grease, Petroleum Base	А	А
Green Sulfate Liquor	В	А
Heptachlor	А	А
Heptane	А	А
Hexachlorobenzene	А	А
Hexachlorobutadiene	А	А
Hexachlorocyclopentadiene	А	А
Hexachloroethane	А	А
Hexadecane	А	А
Hexamethylene Diisocyanate	А	А
Hexamethylphosphoramide	А	А
Hexane	А	А
Hexone	А	A
Hydraulic Oil, Mineral	А	A
Hydraulic Oil, Synthetic (Phosphate Esters)	А	Α
Hydrazine	А	А
Hydrobromic Acid	А	Α
Hydrochloric Acid	А	A
Hydrocyanic Acid	А	Α
Hydrofluoric Acid, Anhydrous	С	A
HF Acid, Less than 65%, Above 150°F	С	Α
HF Acid, 65% to Anhydrous, Above 150°F	С	A
HF Acid, Up to Anhydrous,150°F & below	С	A
Hydrofluorosilicic Acid	С	Α
Hydrofluosilicic Acid	С	A
Hydrogen Bromide	А	A
Hydrogen Fluoride	С	A
Hydrogen Peroxide, 10%	А	A
Hydrogen Peroxide, 10-90%	А	А
Hydrogen Sulfide, Dry or Wet	А	А



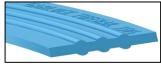


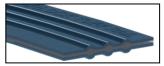


Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Hydroquinone	А	А
Iodine Pentafluoride		_
Isobutane	A	A
Isooctane	A	A
Isophorone	A	A
Isopropyl Alcohol	A	A
Jet Fuels (JP A, B and JP4 thru JP8)	A	A
Jet Fuels, JP9 and JP10	A	A
Kerosene Legguer Salvente	A A	A
Lacquer Solvents		A
Lacquers	A	A
Lactic Acid, 150°F and below	A	A
Lactic Acid, Above 150°F	A	A
Lime Saltpeter (Calcium Nitrates)	A	A
Lindane	A	A
Linseed Oil	A	A
Liquified Petroleum Gas (LPG)	A	A
Lithium Bromide	A	A
Lithium, Elemental	С	С
Lubricating Oils, Refined	A	A
Lubricating Oils, Mineral or Petroleum Types	A	A
Lubricating Oils, Sour	А	А
Lye	В	A^2
Magnesium Chloride	А	А
Magnesium Hydroxide	Α	Α
Magnesium Sulfate	Α	А
Maleic Acid	Α	A
Maleic Anhydride	Α	A
Mercuric Chloride	А	A
Mercury	А	A
Methanol, Methyl Alcohol	А	A
Methoxychlor	А	А
Methylacrylic Acid	А	А
Methyl Alcohol	А	А
2-Methylaziridine	_	А
Methyl Bromide	А	А
Methyl Chloride	А	А
Methyl Chloroform	А	А
4,4 Methylene Bis(2-chloroaniline)	A	A
Methylene Chloride	A	A
4,4-Methylene Dianiline	A	A
Methylene Diphenyldiisocyanate	A	A
Methyl Ethyl Ketone	A	A
Methyl Hydrazine	A	A
Methyl lodide	A	A
Methyl Isopyrapate	A	A
Methyl Isocyanate	A A ¹	A A ¹
Methyl Methacrylate		
N-Methyl-2-Pyrrolidone	A	A
Methyl Tert. Butyl Ether (MTBE)	A	A
Milk	A	A
Mineral Oils	A	A
Mobiltherm 600	A	A
Mobiltherm 603	А	A
Mobiltherm 605	A	Α
Mobiltherm Light	А	А

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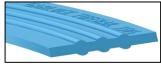






Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Monomethylamine	А	А
MultiTherm 100	A	A
MultiTherm 503	A	A
MultiTherm IG-2	A	A
MultiTherm PG-1	A	А
Muriatic Acid	А	А
Naphtha	A	А
Naphthalene	A	А
Naphthols	A	А
Nickel Chloride	А	А
Nickel Sulfate	А	А
Nitric Acid, Less than 30%	А	А
Nitric Acid, Above 30%	A	А
Nitric Acid, Crude	А	А
Nitric Acid, Red Fuming	A	А
Nitrobenzene	A	А
4-Nitrobiphenyl	A	А
2-Nitro-Butanol	A	А
Nitrocalcite (Calcium Nitrate)	A	А
Nitrogen Tetroxide	A	А
Nitrohydrochloric Acid (Aqua Regia)	A	А
Nitromethane	A	A
2-Nitro-2-Methyl Propanol	A	А
Nitromuriatic Acid (Aqua Regia)	А	A
4-Nitrophenol	А	A
2-Nitropropane	А	А
N-Nitrosodimethylamine	А	A
N-Nitroso-N-Methylurea	A	А
N-Nitrosomorpholine	A	А
Norge Niter (Calcium Nitrate)	A	A
Norwegian Saltpeter (Calcium Nitrate)	A	А
N-Octadecyl Alcohol	A	A
Octane	A	А
Oil, Petroleum	A	A
Oils, Animal and Vegetable	A	А
Oleic Acid	А	A
Oleum	-	А
Orthodichlorobenzene	А	А
Oxalic Acid	А	А
Palmitic Acid	А	А
Paraffin	А	А
Paratherm HE	А	А
Paratherm NF	А	А
Parathion	Α	А
Paraxylene	А	А
Pentachloronitrobenzene	А	А
Pentachlorophenol	А	А
Pentane	А	А
Perchloric Acid	А	А
Perchloroethylene	А	А
Petroleum Oils, Crude	А	А
Petroleum Oils, Refined	А	А
Phenol	А	А
p-Phenylenediamine	А	А
Phosphate Esters	А	А
Phosphoric Acid, Crude	С	А

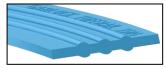






Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Phosphoric Acid, Less than 45%	А	A
Phosphoric Acid, Above 45%, to 150°F	В	A
Phosphoric Acid, Above 45%, Above 150°F	В	А
Phosphorus Pentachloride	A	A
Phthalic Acid	А	A
Phthalic Anhydride	А	A
Picric Acid, Water Solution	A	А
Pinene	А	A
Piperidine	А	А
Polyacrylonitrile	А	А
Polychlorinated Biphenyls	А	A
Potash, Potassium Carbonate	A	А
Potassium Acetate	А	А
Potassium Bichromate	A	А
Potassium Chromate, Red	A	A
Potassium Cyanide	A	A
Potassium Dichromate	А	А
Potassium Hydroxide (<150°F)	A	A^2
Potassium Nitrate	A	A
Potassium Permanganate	A	A
Potassium Sulfate	A	A
1,3-Propane Sultone	A	A
Beta-Propiolactone	A	A
Propionaldehyde	A	A
Propoxur (Baygon)	A	A
Propyl Alcohol	A	A
Propyl Nitrate	A	A
Propylene Dichloride	A	A
Propylene Glycol	A	A
Propylene Oxide	A	A
1,2-Propylenimine	-	A
Prussic Acid, Hydrocyanic Acid	A	A
Pyridine	A	A
Quinoline	A	A
Quinone	A	A
Salt Water	A	A
Saltpeter, Potassium Nitrate	A	A
2,4-D Salts and Esters	A	A
Sewage	A	A
Silver Nitrate	А	A
Skydrols	A	A
Soap Solutions	A	A
Soda Ash, Sodium Carbonate	A	A
Sodium Bicarbonate, Baking Soda	A	A
Sodium Bisulfate (Dry)	A	A
Sodium Bisulfite	A	A
Sodium Chlorate	A	A
Sodium Chloride	A	A
Sodium Cyanide	C	A
Sodium Hydroxide (<150°F)	A	A^2
Sodium Hypochlorite	A	A
Sodium Metaborate Peroxyhydrate	A	A
Sodium Metaphosphate Sodium Metaphosphate	A	A
Sodium Nitrate	A	A
Sodium Perborate	A	A
Sodium Perovide	A	A
Obdiditi i Grovido	Λ	Λ



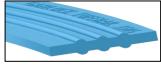


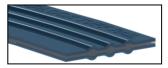


Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
Sodium Phosphate, Monobasic	А	A
Sodium Phosphate, Dibasic	В	A
Sodium Phosphate, Tribasic	В	A
Sodium Silicate	В	A
Sodium Sulfate	A	A
Sodium Sulfide	A	A
Sodium Superoxide	A	A
Sodium Thiosulfate, "Hypo"	A	A
Soybean Oil	A	A
Stannic Chloride	A	A
	A	A
Stearic Acid	A	A
Stoddard Solvent	A ¹	A ¹
Styrene Styrene		
Styrene Oxide	A	A
Sulfur Chloride	A	A
Sulfur Dioxide	A	A
Sulfur Trioxide, Dry	A	A
Sulfur Trioxide, Wet	A	A
Sulfuric Acid, 10-98%, 150°F and below	A	A
Sulfurous Acid	A	A
Syltherm 800	A	A
Syltherm XLT	A	A
Tannic Acid	A	A
Tar	A	A
Tartaric Acid	A	A
2,3,7,8-TCDB-p-Dioxin	А	A
Tertiary Butyl Amine	А	A
Tetrabromoethane	A	A
Tetrachlorethane	A	A
Tetrachloroethylene	A	A
Tetrahydrofuran, THF	A	A
Therminol 44	А	А
Therminol 55	Α	А
Therminol 59	А	А
Therminol 60	А	А
Therminol 66	А	А
Therminol 75	Α	Α
Therminol D12	Α	А
Therminol LT	Α	Α
Therminol VP-1	A	A
Therminol XP	Α	Α
Thionyl Chloride	Α	A
Titanium Sulfate	Α	А
Titanium Tetrachloride	Α	А
Toluene	Α	А
2,4-Toluenediamine	Α	А
2,4-Toluenediisocyanate	A	A
Toluene Sulfonic Acid	А	A
o-Toluidine	А	А
Toxaphine	A	A
Transformer Oil (Mineral Type)	А	А
Transmission Fluid A	A	А
Trichloroacetic Acid	А	A
1,2,4- Trichlorobenzene	А	А
1,1,2-Trichloroethane	А	A
Trichloroethylene	A	A
I richloroethylene	Α	A

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Media	3504 TUFF-RAIL™ Gasket	3545 TUFF-RAIL™ Gasket
2,4,5-Trichlorophenol	Α	А
2,4,6-Trichlorophenol	A	A
Tricresylphosphate	А	А
Triethanolamine	A	А
Triethyl Aluminum	A	А
Triethylamine	A	А
Trifluralin	А	А
2,2,4-Trimethylpentane	A	А
Tung Oil	A	А
Turpentine	А	А
UCON Heat Transfer Fluid 500	A	А
UCON Process Fluid WS	А	А
Urea (<150°F)	A	А
Varnish	А	А
Vegetable Oil	A	А
Vinegar	А	Α
Vinyl Acetate	A ¹	A^1
Vinyl Bromide	A ¹	A^1
Vinyl Chloride	A^1	A ¹
Vinylidene Chloride	A^1	A ¹
Vinyl Methacrylate	A	А
Water, Distilled	А	А
Water, Potable ⁴	A	А
Whiskey and Wines	А	А
Wood Alcohol	А	А
Xceltherm 550	А	А
Xceltherm 600	A	A
Xceltherm MK1	A	A
Xceltyherm XT	A	A
Xylene	А	A
Zinc Chloride	A	A
Zinc Sulfate	A	Α

NOTES

- 1. This chemical is a monomer. Contact Applications Engineering if the chemical is not inhibited.
- 2. TUFF-RAIL™ 3545 gaskets can be expected to be suitable to 75% concentration at temperatures up to 400°F (204°C).
- 3. Some detergent solutions are strongly alkaline and/or may contain bleach. Please contact Applications Engineering.
- 4. If NSF 61 Approved gaskets are required contact Applications Engineering.