



## Chemical Compatibility Guide for Safety Strip 61 Special



This chemical compatibility chart was derived from reviewing data supplied by raw material manufacturers and other engineering databases to help customers determine what materials can be used in the construction of a cleaning tank and what substrates can be cleaned with Safety Strip 61 Special. The chart is not based on direct experimental results due to the time and expense of running such a study. The data search included information supplied by two major suppliers of N-methyl pyrrolidone (NMP), BASF and Lyondell, as well as a comprehensive review of a series of corrosion guides from Compass Publications. The Compass Publications guides list chemical compatibilities between individual raw materials and specific elastomers, metals, and hard plastics. NMP was not listed in these guides so the nearest equivalents used were acetamide, dimethylformamide, and formamide. Based on all the data, the following recommendations can be made:

1. The cleaning tank should be constructed preferably out of 304 or 316 stainless steel. Carbon Steels 1010 and 1020 can be used but since they will rust, BHC advises that they be avoided. Although the corrosion guides indicate aluminum to be suitable, BASF and ARCO state that it is only suitable for short-term storage. Do not use zinc-plated steel/galvanized steel as well as copper and copper-based alloys; the amine in Safety Strip 61 Special will leach-out the copper and zinc.
2. The hard plastics that should be able to withstand Safety Strip 61 Special are polyethylene, polypropylene, polyethylene/propylene alloys like EPDM, HMW and UHMW, Ryton, Teflon, and Tefzel. Nylon 11 and 12 appear to be sufficiently chemically resistant but it would be best to put them in last place on the list of choices provided here. BASF had a generic statement saying that "all polymers that have greater than 70% fluorinated carbon backbone content" are not affected by long term exposure to NMP.
3. The elastomers (gasket materials) that should be able to withstand Safety Strip 61 Special are Chemraz, Kalrez, Teflon, ethylene propylene blends such as EP, EPDM, LDPE and Butyl Rubber. Be careful on the Butyl Rubber recommendation. The Compass Publication books had several different "butyl rubber" elastomers listed and the only one that withstood the same/similar chemicals as found in Safety Strip 61 Special was Polyisobutylene-Polyisoprene Rubber (sometimes designated as IIR).

Even with all the data presented here, it has been BHC's experience that most manufacturers' data and recommendations are based on room temperature conditions. Thus, it is best to limit plastic and elastomer use to EP, EPDM, HMW, UHMW, Kalrez, Teflon, and Tefzel only.

A complete list of conclusions made by using data only from the Compass Publications books has also been added. This should be helpful in determining if there could be a problem in cleaning specific parts in Safety Strip 61 Special. Remember, none of this is based on actual testing.

### Elastomers

The Elastomer compatibility data was compiled from the following reference:

Chemical Resistance Guide for Elastomers II: A Guide to Chemical Resistance of Rubber and Elastomeric Compounds, written and researched by Kenneth M. Pruett, published by Compass Publications, P.O. Box 1275, La Jolla, CA 92038-1275, copyright 1988 and 1994.

1. Acceptable/Compatible Elastomers with Speculated Ratings



C-Flex, Styrenic TPE (good at RT but elevated temp unknown)	AB
Chemraz, FFKM	A
Kalrez, perfluorinated elastomer	A
Teflon, FEP	A
Ethylene-Propylene, EP & EPDM	AB
Polyethylene, LDPE	AB
Nylon 11 polyamide (limited data)	AB
Isobutylene Isoprene Rubber, IIR	B
Nylon 12 polyamide (limited data)	C

Rating	Volumetric Swelling	Loss of Tensile Strength	Description of Attack
A	≤ 15% in 30 days to 1 year	≤ 15% in 30 days to 1 year	Excellent, little, or no swelling or softening or surface deterioration.
B	≤ 30% in 30 days to 1 year	≤ 30% in 30 days to 1 year	Good chemical resistance. Minor chemical attack, swelling, softening, or surface deterioration.
C	≤ 50% in 30 days to 1 year	≤ 60% in 30 days to 1 year	Limited chemical resistance. Moderate chemical attack. Conditional service.
NR	> 50% immediately to 1 year	> 60% immediately to 1 year	Severe attack, swelling, softening, or dissolved within minutes to years. Not recommended.

## 2. Acceptable/Compatible Elastomers with Speculated Ratings

Aflas, Fluorinated Copolymer  
 Chloroprene, CR  
 Chlorosulfonated Polyethylene, CSM  
 Fluoraz, Fluorinated Copolymer  
 Fluorosilicone, FVMQ  
 Fluorocarbon, FKM  
 Hydrogenated Nitrile Rubber, HNBR  
 Natural Isoprene, NR  
 Nitrile Rubber, NBR  
 Polyacrylate, ACM  
 Polybutadiene Rubber, BR  
 Polysulfide, T  
 Polyurethane, AU & EU  
 Polyvinylchloride, Flexible PVC  
 Silicone, VMQ  
 Styrene Butadiene Rubber, SBR  
 Synthetic Isoprene Rubber, IR

## 3. Insufficient Data

©Aeroquip  
 C-Flex, Styrenic TPE  
 Chlorinated Polyethylene, CM  
 Epichlorohydrin, CO & ECO  
 Ethylene Acrylic, EA  
 Ethylene Vinyl Acetate, EVA



©Hytrell Copolyester, TPE  
 Norprene, Copolymer TPO  
 Polyallomer Linear Copolymer  
 ©Santoprene Copolymer, TPO

### **Hard Plastics**

The Hard Plastics compatibility data was compiled from the following reference:

Compass Corrosion Guide II: A Guide to Chemical Resistance of Metals and Engineering Plastics, written and researched by Kenneth M. Pruett, published by Compass Publications, P.O. Box 1275, La Jolla, CA 92038-1275, copyright 1978 and 1983.

#### 1. Acceptable/Compatible Elastomers with Speculated Ratings

Nylon, Polyamide	A
Polyethylene, HMW	AB
Polyethylene, UHMW	AB
Polypropylene, PP	AB
Ryton, Polyphenylene Sulfide	A
Teflon, FEP	A
Teflon, PFA	A
Teflon, TFE	A
Tefzel, ETFE	A

Rating	Swelling or Dimensional Change in any Direction	Loss of Tensile Strength	Description of Chemical Attack
A	< 10%	< 15%	Little or no chemical attack
B	< 15%	< 30%	Good resistance (minor chemical attack)
C	< 20%	< 50%	Limited resistance; moderate chemical attack, swelling, or absorption
NR	> 20%	> 50%	Attacked or dissolved within minutes or years (Not recommended)

#### 2. Unacceptable

Acetals  
 Acrylics  
 Furan (asbestos-filled)  
 Halcar, E-CTFE  
 Kel-F, CTFE  
 Kynar, Polyvinylidene fluoride  
 Noryl, Polyphenylene Oxide  
 Penton, Chlorinated Polyether  
 Polycarbonates  
 Polyester, PBT/PTMT  
 Polysulphones  
 Polyvinylchloride, PVC  
 Torton, Polyamide-imide  
 Vinyl Ester (Thermoset)

#### 3. Insufficient Data

Epoxies (they are expected to be unacceptable)

### **Metals and Metal Alloys**

The Metals and Metal Alloys compatibility data was compiled from the following references:



Compass Corrosion Guide II: A Guide to Chemical Resistance of Metals and Engineering Plastics, written and researched by Kenneth M. Pruett, published by Compass Publications, P.O. Box 1275, La Jolla, CA 92038-1275, copyright 1978 and 1983

Chemical Resistance Guide for Metals and Alloys: A Guide to Chemical Resistance of Metals and Alloys, written and researched by Kenneth M. Pruett, published by Compass Publications, P.O. Box 1275, La Jolla, CA 92038-1275, copyright 1978, 1983, and 1995.

1. Acceptable/Compatible Metals and Alloys with Speculated Ratings

Carbon-Graphite Impregnated Resin	A
Carbon, Nickel-impregnated	A
Carbon Steels 1010, 1020, 1075, and 1095	AB
Cast Iron Hi-Nickel (Ni-Resist Grade)	AB
Hastelloy B, C and C-276 (limited data on B)	A
Incoloy 825	A
Inconel 600	B
Magnesium	A
Monel	A
Stainless Steels 303, 304, 316, 317, 416, 420, 430, 440, Cast CF-8M and Carpenter 20Cb-3	A
Stainless Steels 17-4PH, 18-8, 301, 302, 305, 403, 410,	AB
Stellite 1, 6, and 12	A
Tantalum	A

Rating	Depth of Corrosion Per Surface
A	≤ 0.002 inches per year (< 0.05 mm/yr.)
B	≤ 0.020 inches per year (< 0.50 mm/yr.)
C	≤ 0.050 inches per year (< 1.27 mm/yr.)
NR	> 0.050 inches per year or explosive. Not recommended.

2. Unacceptable (NR)

Admiralty Brass  
 Aluminum 3003  
 Aluminum 5052  
 Aluminum Bronze  
 Aluminum-Nickel Bronze  
 Aluminum Cast B-356  
 Beryllium-Copper  
 Beryllium-Copper-Nickel  
 Brass 345, 350, 360, 377  
 Brass ("unspecified")  
 Bronze ("unspecified grade")  
 Cartridge Brass  
 Cast Iron ("unspecified grade")  
 Copper  
 Copper-Nickel 90-10 and 70-30  
 Leaded Red Brass 85-5-5-5  
 Muntz Metal, Naval Brass, and Yellow Brass  
 Nickel-Silver 20% (Waukesha 118)  
 Zinc  
 Zinc-plating and Galvanized Steels



3. Insufficient Data

Carbon Steels 12L14, 1018

Cast Iron, Ductile, Ductile Nickel-plated, Gray, High Silicon (Duriron), and 3% Nickel

Hastelloy C-22, D

Ilium G

Incoloy 800

Lead

Molybdenum

Nickel

Niobium (also called Columbium)

Phosphor Bronze

Silicon Bronze

Silver

Stainless Steels 309, 310, 312, 321, 347, 348, 431, 436 and 446

Waukesha 1 and 88

Zirconium

Last Revised on 12/07/2017

