



## RECOMMENDED USE DEFINITIONS

### IMMERSION SERVICE (Most Severe) – IS

Suitable for continuous contact with chemical exposure up to specified temperature.

### CARGO/TEMPORARY IMMERSION – CI

Suitable for 60 day continuous contact with chemical exposure up to specified temperature. Coating will show no effect except slight softening or color change, possibly permanent, after 60 days or less continuous immersion. When used in transport or hauling conditions, the vessel must be completely drained to prevent puddling that would constitute continuous immersion.

### SECONDARY CONTAINMENT – SC

Suitable for continuous contact with chemical for up to 72 hours. Softening or discoloration may occur during the exposure.

### FREQUENT CONTACT – FC

Suitable for frequent splash or up to 72 hours exposure to concentrated vapors. The coating will show no effects except slight softening or color change, possibly permanent, after eight hours continuous immersion in the liquid chemical or 72 hours exposure to the vapor.

### OCCASIONAL CONTACT (Least Severe) – OC

Suitable for occasional splash and spillage or occasional exposure to concentrated vapors. The coating shows no effects, except slight softening or color changes, following short exposure to splash or spillage which evaporates, is hosed off, or dried overnight or, 24 hours exposure to vapor.

**NOT TESTED** – This chemical has not been tested or evaluated for the listed chemical.

**NOT RECOMMENDED** – This product is not recommended for the listed exposure. The product's resistance to the listed chemical is often queried, therefore this information is provided as a reference even though the product is not recommended.

## IMPORTANT NOTES

The term "chemicals" is used broadly in this guide and can refer to various constituents including, but not limited to, acids, fatty acids, food and beverage materials, finished and unrefined hydrocarbons, as well as individual chemicals and chemical blends.

Temperature can have a significant effect on a coating's chemical resistance. Prior to coating selection, due care should be taken to determine the service temperature of stored chemicals, elevated temperature caused by natural environmental conditions (i.e. radiant heat from sun, weather), and temperature fluctuations during service (i.e. loading of cargo, service cycling).

Chemical mixtures and alternating chemical storage can aggressively degrade a coating or lining system. Prior to coating selection and application, the expected chemical exposures and sequence of chemical storage should be discussed with Tnemec Technical Service to ensure the proper coating is selected.

Proper surface preparation is always important to ensure optimum coating performance but it is even more so for coatings that will undergo chemical exposure. Carefully read product data sheets along with related application guides to determine the required level of surface preparation and surface profile.

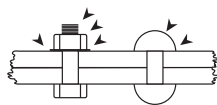
Structural designs of tanks, structures, and containment areas can greatly affect coating performance. Sharp angles, channels, edges, corners, pits, voids, defects, rough welds, and other similar conditions present areas that are either difficult to coat or achieve the required film thickness. Avoid skip welds in favor of continuous welds. A stripe coat on these areas, prior to full coating application, can help achieve needed film thickness and prevent premature coating failure. (Reference NACE SP0178-2007 for more information.)

The length of a coating system's service life depends on surface cleanliness and preparation prior to application, proper application procedures, exposure conditions, physical abuse, cleaning techniques, and frequency of inspection, maintenance, and repair. No coating system has an unlimited service life. Regular inspection of the coating system can prolong service life by identifying areas in need of repair. Additionally, regular inspections can determine when the coating system is nearing its end of service and should be completely replaced.

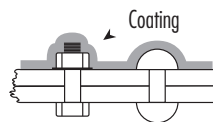
Chemical resistance information is provided for the purpose of establishing a general profile of the coating and was obtained through laboratory testing, field experience, and industry knowledge. Test results were produced in a controlled environment and Tnemec makes no claim that any tests, or published chemical resistance information, accurately represent all environments or correlate to actual field performance. Application, environmental and design factors, chemical temperatures, chemical mixtures, sequence of storage, conditions of service, and cleaning procedures can significantly impact coating performance, so due care must be exercised in the selection and use of the coating. Tnemec disclaims responsibility for product use outside its published information. Contact Tnemec Technical Service to review full project details before the coating or coating system is selected and applied.

## COMMON PROBLEM AREAS FOR COATINGS AND SOLUTIONS

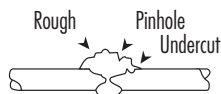
**Problem:**  
Points of failure due to thin spots in coating



**Solution:**  
Carefully and fully coat



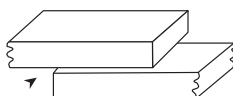
**Problem:**  
Uneven welds



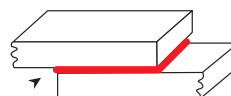
**Solution:**  
Grind smooth



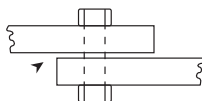
**Problem:**  
Gaps between plates, coating can not cover



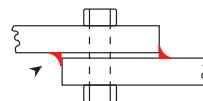
**Solution:**  
Continuous welds



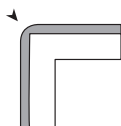
**Problem:**  
Gaps between plates, coating can not cover



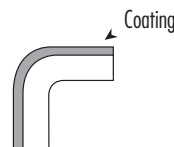
**Solution:**  
Continuous welds



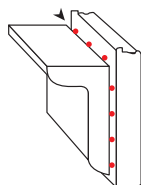
**Problem:**  
Sharp surface contours create thin spots in coating



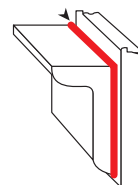
**Solution:**  
Round the contours



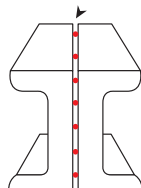
**Problem:**  
Skip welding creates gaps that coating can not cover



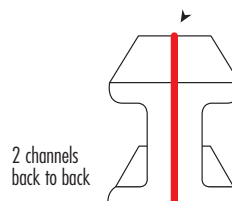
**Solution:**  
Continuous welds



**Problem:**  
Skip welding creates gaps that coating can not cover



**Solution:**  
Continuous welds



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| Chemical                                  | Intended Use<br>(Maximum Temperature Listed) |                  |                       |                 |                   |
|---|--|------------------|-----------------------|-----------------|-------------------|
|   | Occasional Contact                           | Frequent Contact | Secondary Containment | Cargo Immersion | Immersion Service |
| 1, 1, 1-Trichloroethane (Trichloroethane) | NR   | NR               | NR                    | NR              | NR                |
| Acetic Acid, Glacial                      | 100°F (38°C)                                 | 100°F (38°C)     |                       |                 |                   |
| Acetic Anhydride                          | 100°F (38°C)                                 | 100°F (38°C)     |                       |                 |                   |
| Acetone                                   | NR   | NR               | NR                    | NR              | NR                |
| Activated Carbon                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Aluminum Chloride                         | NR   | NR               | NR                    | NR              | NR                |
| Aluminum Nitrate                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Aluminum Sulfate (Alum)                   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Ammonium Nitrite                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Ammonium Perchlorate (Dry)                | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Ammonium Phosphate                        | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Ammonium Sulfate                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Amyl Acetate                              | NR   | NR               | NR                    | NR              | NR                |
| Aniline                                   | NR   | NR               | NR                    | NR              | NR                |
| Aviation Gas                              | NR   | NR               | NR                    | NR              | NR                |
| Barium Chloride                           | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Barium Hydroxide                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Barium Nitrate                            | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Barium Sulfate                            | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Benzene                                   | NR   | NR               | NR                    | NR              | NR                |
| Borax                                     | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Butyric Acid                              | NR   | NR               | NR                    | NR              | NR                |
| Calcium Carbonate                         | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Calcium Nitrite                           | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Calcium Oxide                             | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Calcium Sulfate                           | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Chromic Acid                              | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |

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| Chemical   | Intended Use<br>(Maximum Temperature Listed) |                  |                       |                 |                   |
|--|--|------------------|-----------------------|-----------------|-------------------|
|  | Occasional Contact                           | Frequent Contact | Secondary Containment | Cargo Immersion | Immersion Service |
| Coal (high and low sulfur)                         | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Copper Chloride                                    | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Corn Mash Solution (non-food contact) <sup>1</sup> | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Cyclohexane  | NR   | NR               | NR                    | NR              | NR                |
| Cyclohexanol                                       | NR   | NR               | NR                    | NR              | NR                |
| Dibutyl Phthalate                                  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Diocetyl Phthalate                                 | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Ethyl Benzene                                      | NR   | NR               | NR                    | NR              | NR                |
| Fatty Acids (Greater than C6)                      | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Ferric Chloride                                    | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Ferric Sulfate                                     | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Furan  | NR   | NR               | NR                    | NR              | NR                |
| Gasoline (Unleaded)                                | NR   | NR               | NR                    | NR              | NR                |
| Glycerin   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Heptane  | NR   | NR               | NR                    | NR              | NR                |
| Hexane   | NR   | NR               | NR                    | NR              | NR                |
| Hexanol  | NR   | NR               | NR                    | NR              | NR                |
| Hydrochloric Acid                                  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Hydrofluoric Acid                                  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Hydrogen Sulfide                                   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Iodine   | 100°F (38°C)                                 | 100°F (38°C)     |                       |                 |                   |
| Isobutyl Alcohol                                   | NR   | NR               | NR                    | NR              | NR                |
| Isopropyl Acetate                                  | NR   | NR               | NR                    | NR              | NR                |
| Isopropyl Alcohol                                  | NR   | NR               | NR                    | NR              | NR                |
| Jet A Fuel   | NR   | NR               | NR                    | NR              | NR                |
| JP-4 Aviation Fuel                                 | NR   | NR               | NR                    | NR              | NR                |
| JP-5 Aviation Fuel                                 | NR   | NR               | NR                    | NR              | NR                |
| Kerosene   | NR   | NR               | NR                    | NR              | NR                |

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|---|--|------------------|-----------------------|-----------------|-------------------|
|   | Occasional Contact                           | Frequent Contact | Secondary Containment | Cargo Immersion | Immersion Service |
| Lactic Acid                                       | NR   | NR               | NR                    | NR              | NR                |
| Lead Acetate                                      | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Lithium Chloride                                  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Lubricating Oil (SAE 5W-40, et al)<br>(Motor Oil) | NR   | NR               | NR                    | NR              | NR                |
| Methyl Chloride                                   | NR   | NR               | NR                    | NR              | NR                |
| Methyl Ethyl Ketone                               | NR   | NR               | NR                    | NR              | NR                |
| Methyl Propyl Ketone                              | NR   | NR               | NR                    | NR              | NR                |
| Mineral Oil                                       | NR   | NR               | NR                    | NR              | NR                |
| Mineral Spirits                                   | NR   | NR               | NR                    | NR              | NR                |
| Naphtha   | NR   | NR               | NR                    | NR              | NR                |
| n-Butyl Acetate<br>(Butyl Acetate)                | NR   | NR               | NR                    | NR              | NR                |
| n-Butyl Alcohol (1-Butanol)<br>(Butanol (Normal)) | NR   | NR               | NR                    | NR              | NR                |
| n-Decyl Alcohol<br>(Decyl Alcohol (1-Decanol))    | NR   | NR               | NR                    | NR              | NR                |
| Nitric Acid                                       | NR   | NR               | NR                    | NR              | NR                |
| n-Methyl-2-Pyrolidone                             | NR   | NR               | NR                    | NR              | NR                |
| n-Octyl Alcohol<br>(Octanol)                      | NR   | NR               | NR                    | NR              | NR                |
| n-Propyl Alcohol<br>(Propyl Alcohol)              | NR   | NR               | NR                    | NR              | NR                |
| Oleic Acid  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Perchloroethylene                                 | NR   | NR               | NR                    | NR              | NR                |
| Petroleum Ether                                   | NR   | NR               | NR                    | NR              | NR                |
| Phosphoric Acid                                   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Pine Oil  | NR   | NR               | NR                    | NR              | NR                |
| Potassium Fluoride                                | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Potassium Hydroxide                               | NR   | NR               | NR                    | NR              | NR                |
| Potassium Nitrate                                 | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |

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|---|--|------------------|-----------------------|-----------------|-------------------|
|   | Occasional Contact                           | Frequent Contact | Secondary Containment | Cargo Immersion | Immersion Service |
| Pulpmill (Black Liquor)                                     | NR   | NR               | NR                    | NR              | NR                |
| Pulpmill (Green Liquor)                                     | NR   | NR               | NR                    | NR              | NR                |
| Pulpmill (White Liquor)                                     | NR   | NR               | NR                    | NR              | NR                |
| Silicone Fluids   | NR   | NR               | NR                    | NR              | NR                |
| Skydrol   | NR   | NR               | NR                    | NR              | NR                |
| Sodium Bicarbonate  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Bisulfate  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Sodium Bisulfite  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Sodium Borate   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Carbonate  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Carbonate (slurry)                                   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Chloride (sat'd)<br>(Brine, Water (Sea), Salt Brine) | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Fluoride   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Sodium Hydrosulfide   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Hydroxide<br>(Caustic Soda)                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Sodium Hypochlorite<br>(Bleach)                             | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Sodium Lauryl Sulfate                                       | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Nitrate (dry)  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Sodium Silicate   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Soybean Oil (non-food contact) <sup>1</sup>                 | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Styrene   | NR   | NR               | NR                    | NR              | NR                |
| Sulfuric Acid<br>(Sulphuric Acid)                           | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Tall Oil  | NR   | NR               | NR                    | NR              | NR                |
| Tannic Acid   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Tartaric Acid   | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Tetrahydrofuran   | NR   | NR               | NR                    | NR              | NR                |

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|---|--|------------------|-----------------------|-----------------|-------------------|
|   | Occasional Contact                           | Frequent Contact | Secondary Containment | Cargo Immersion | Immersion Service |
| Toluene                                       | NR   | NR               | NR                    | NR              | NR                |
| Transmission Fluid                            | NR   | NR               | NR                    | NR              | NR                |
| Turpentine                                    | NR   | NR               | NR                    | NR              | NR                |
| Urea Ammonium Nitrate                         | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Vegetable Oil (non-food contact) <sup>1</sup> | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Water (fresh, non-potable)                    | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Xylene  | NR   | NR               | NR                    | NR              | NR                |
| Zinc Bromide                                  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |
| Zinc Chloride                                 | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Zinc Phosphate (dry)                          | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          | 100°F (38°C)    | 100°F (38°C)      |
| Zinc Sulfate                                  | 100°F (38°C)                                 | 100°F (38°C)     | 100°F (38°C)          |                 |                   |

IMPORTANT: Definitions for the terms and acronyms used in this guide to describe the recommended exposures, along with other important information, can be found on the cover page of this guide or by contacting Tnemec Technical Service. Coatings should not be applied in a chemical exposure environment until the user has thoroughly read and understood the product information and full project details have been discussed with Tnemec Technical Service.