

# PPG NOVAGUARD™ 650

## Chemical Resistance Guide

### Validity of this list

This resistance list supersedes all earlier issues. The information provided in this resistance list is to the best of our knowledge correct and given in good faith. It is not intended to be exhaustive and the list of cargoes is subject to change without notice. The data is liable to modification, based upon experience and our policy of continued product development. The advice provided, as guidance only, is based upon user reports and laboratory testing that are believed to be reliable.

As many cargoes can be variable in composition and we have no control over the use of our products in service conditions, we accept no responsibility for the performance of the product or any loss or damage whatsoever, arising out of such use.

### Substrate and curing

The first coat of the system must be applied directly to the steel substrate which has been blasted in-situ to a minimum of ISO-SA 2½ freed from rust, scale, water soluble salts and other foreign matter. Application of the systems must be carried out in accordance with the respective product data and system sheets. After application of the full system has been completed, the system has to be cured under specified conditions for at least the minimum period indicated in system and product data sheets.

Exposure of the coating to an aggressive cargo before the coating has obtained full cure, may permanently affect the resistance properties of the system.

This list is not valid when shop primers are present under the coating system. Shop primers must be completely removed.

### Notation

Ref. note : refers to note in table 1

Max. temp.: refers to maximum temperature allowed for the specific cargo



# PPG NOVAGUARD™ 650

## Chemical Resistance Guide

**Table 1: Reference notes**

| Note  | Description   |  |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
|---|---|--|--|--|-------------------|---------|---------|-------------|--|--|--------|-----------|-------|---|--|-------------|--|---|--|-----------|--|---|--|----------------|-------|---|-----|-------------|--|--|--|--|-------|---|---|--|-------|---|---|----------------------|-------|---|----|----------------------|-------|---|---|---------------------|-------|---|----|---|-------|---|----|----------------------|-------|---|----|-----------------|-------|---|-----|--------------|-----|---|-------|
| 2   | These products may cause some discoloration of the coating. These products are variable in composition, depending on source, and consequently the effects on the coating can also differ. Subsequent cleaning of the tanks may be difficult so that contamination of the subsequent products may occur.   |  |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| 3   | <p>Vegetable and animal oil, fats, greases and waxes are esters of polyols with fatty acids and nearly always contain free fatty acid. If in contact with water at higher temperatures these esters can saponify, resulting in increased free fatty acid content. Free fatty acids, especially the short chain types, can be very aggressive to tank coatings. Thus, during loading, storage and discharge the acid values should not exceed the maximum values indicated in the table.</p> <table border="1"> <thead> <tr> <th>Coating System</th> <th>Maximum Acid Value (acc.to ISO 660 (1996))</th> <th>Approximate Percentage Free Fatty Acid</th> </tr> </thead> <tbody> <tr> <td>PPG NOVAGUARD 650</td> <td>10</td> <td>6-10 %</td> </tr> </tbody> </table> <p>This acid value according to ISO 660 (1996) is the only accepted method to determine a cargo's suitability for storage. The free fatty acid percentages given are a guide as the acid value is dependent on the molecular weight of the Fatty Acid(s). The fatty acids (including fatty acid distillates and acid oils) accepted in this list can be stored provided they comply with the following criteria:</p> <ul style="list-style-type: none"> <li>- The water content must be limited to 1.0 percent maximum;</li> <li>- No free mineral acid content is permitted.</li> </ul>   | Coating System                         | Maximum Acid Value (acc.to ISO 660 (1996)) | Approximate Percentage Free Fatty Acid | PPG NOVAGUARD 650 | 10      | 6-10 %  |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Coating System  | Maximum Acid Value (acc.to ISO 660 (1996))  | Approximate Percentage Free Fatty Acid |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| PPG NOVAGUARD 650                                       | 10  | 6-10 %                                 |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| 16  | This is a generic name. Most of these products can be stored but it should be established that no notes are included under the specific type name of such a product elsewhere in the list.  |  |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| 21  | <p>Automotive gasolines can vary widely in composition. Addition of considerable amounts of aromatic and/or oxygenated solvents are common. When these cargoes have to be transported the tank coating should be fully cured.</p> <p>Limits for oxygenated solvents (in volume) as set out in European Directive 2003/17/EC.</p> <table border="1"> <thead> <tr> <th rowspan="2">Parameter</th> <th rowspan="2">Unit</th> <th colspan="2">Limits</th> </tr> <tr> <th>Minimum</th> <th>Maximum</th> </tr> </thead> <tbody> <tr> <td>Hydrocarbon</td> <td></td> <td></td> <td>6-10 %</td> </tr> <tr> <td>- Olefins</td> <td>% v/v</td> <td>-</td> <td></td> </tr> <tr> <td>- Aromatics</td> <td></td> <td>-</td> <td></td> </tr> <tr> <td>- Benzene</td> <td></td> <td>-</td> <td></td> </tr> <tr> <td>Oxygen content</td> <td>% m/m</td> <td>-</td> <td>2,7</td> </tr> <tr> <td>Oxygenates:</td> <td></td> <td></td> <td></td> </tr> <tr> <td>- Methanol, stabilising agents must be added</td> <td>% v/v</td> <td>-</td> <td>3</td> </tr> <tr> <td>- Ethanol, stabilising agents may be necessary</td> <td>% v/v</td> <td>-</td> <td>5</td> </tr> <tr> <td>- Iso-propyl alcohol</td> <td>% v/v</td> <td>-</td> <td>10</td> </tr> <tr> <td>- Tert-butyl alcohol</td> <td>% v/v</td> <td>-</td> <td>7</td> </tr> <tr> <td>- Iso-butyl alcohol</td> <td>% v/v</td> <td>-</td> <td>10</td> </tr> <tr> <td>- Ethers containing 5 or more carbon atoms per molecule</td> <td>% v/v</td> <td>-</td> <td>15</td> </tr> <tr> <td>Other oxygenates (2)</td> <td>% v/v</td> <td>-</td> <td>10</td> </tr> <tr> <td>Sulphur content</td> <td>mg/kg</td> <td>-</td> <td>150</td> </tr> <tr> <td>Lead content</td> <td>g/l</td> <td>-</td> <td>0,005</td> </tr> </tbody> </table> <p>Notes:</p> <p>(1) Except for unleaded petrol regular (minimum motor octane number (MON) of 81 and a minimum research octane number (RON) of 91) for which the maximum olefin content shall be 21% v/v. These limits shall not preclude the introduction on to the market of a Member State of another unleaded petrol with lower octane numbers than set out in this Annex.</p> <p>(2) Other mono-alcohols with a final distillation point no higher than the final distillation point laid down in national specifications or, where these do not exist, in industrial specifications for motor fuels.</p> <p>Blending of automotive gasolines with above mentioned additives in the tank are not acceptable.</p> <p>For products added but not mentioned in this note, PPG PMC must be contacted before storage of these cargoes.</p> | Parameter                              | Unit                                       | Limits                                 |                   | Minimum | Maximum | Hydrocarbon |  |  | 6-10 % | - Olefins | % v/v | - |  | - Aromatics |  | - |  | - Benzene |  | - |  | Oxygen content | % m/m | - | 2,7 | Oxygenates: |  |  |  | - Methanol, stabilising agents must be added | % v/v | - | 3 | - Ethanol, stabilising agents may be necessary | % v/v | - | 5 | - Iso-propyl alcohol | % v/v | - | 10 | - Tert-butyl alcohol | % v/v | - | 7 | - Iso-butyl alcohol | % v/v | - | 10 | - Ethers containing 5 or more carbon atoms per molecule | % v/v | - | 15 | Other oxygenates (2) | % v/v | - | 10 | Sulphur content | mg/kg | - | 150 | Lead content | g/l | - | 0,005 |
| Parameter   | Unit  |  |  | Limits                                 |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
|   |   | Minimum                                | Maximum                                    |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Hydrocarbon   |   |  | 6-10 %                                     |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Olefins   | % v/v   | -                                      |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Aromatics   |   | -                                      |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Benzene   |   | -                                      |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Oxygen content  | % m/m   | -                                      | 2,7  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Oxygenates:   |   |  |  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Methanol, stabilising agents must be added            | % v/v   | -                                      | 3  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Ethanol, stabilising agents may be necessary          | % v/v   | -                                      | 5  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Iso-propyl alcohol                                    | % v/v   | -                                      | 10   |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Tert-butyl alcohol                                    | % v/v   | -                                      | 7  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Iso-butyl alcohol                                     | % v/v   | -                                      | 10   |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| - Ethers containing 5 or more carbon atoms per molecule | % v/v   | -                                      | 15   |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Other oxygenates (2)                                    | % v/v   | -                                      | 10   |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Sulphur content   | mg/kg   | -                                      | 150  |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |
| Lead content  | g/l   | -                                      | 0,005                                      |  |                   |         |         |             |  |  |        |           |       |   |  |             |  |   |  |           |  |   |  |                |       |   |     |             |  |  |  |  |       |   |   |  |       |   |   |                      |       |   |    |                      |       |   |   |                     |       |   |    |   |       |   |    |                      |       |   |    |                 |       |   |     |              |     |   |       |

**If in doubt, refer to PPG Technical Service**



# PPG NOVAGUARD™ 650

## Chemical Resistance Guide

### PPG NOVAGUARD 650 - positive list

| Chemical Environment                          | Ref. Note | Max. Temp. |
|---|-----------|------------|
| 1-PENTENE                                     |           |            |
| AIRCRAFT GASOLINE                             |           |            |
| ALKYLATES FUEL                                |           |            |
| ALPHA-OLEFIN (C 16-C 18)                      |           |            |
| ASPHALT EMULSIONS                             | 16, 2     |            |
| ASPHALT SOLUTION (LLOYDS CH.9)                | 16, 2     |            |
| AVIATION FUEL OILS 1 AND 2                    |           |            |
| AVIATION FUEL OILS 1-D AND 2-D                |           |            |
| AVIATION GASOLINE                             |           |            |
| AVIATION KEROSENE                             |           |            |
| AVIATION STRAIGHT RUN (LLOYDS CH.9)           |           |            |
| BENZINE, PETROLEUM                            | 21        |            |
| BLACK OIL (GASOLINES/NAPHTAS)                 |           |            |
| BLENDING STOCKS (LLOYDS CH.0)                 | 16, 2     |            |
| BRINE   |           |            |
| BUNKER OIL                                    |           |            |
| CRUDE OIL (HIGH & LOW SULPHUR)                | 2         | 60         |
| CYLINDER BRIGHT STOCK OIL                     |           |            |
| CYLINDER STREAM REFINED STOCK OIL             |           |            |
| DIESEL OIL                                    |           |            |
| DISTILLATES (INCL. STRAIGHT RUN, LLOYDS CH.9) |           |            |
| ENGINE OIL                                    |           |            |
| ETHYLBENZENE                                  |           |            |
| FLASHED FEED STOCK DISTILLATE                 |           |            |
| FRESH WATER                                   |           |            |
| FUEL OIL NR.4                                 |           | 60         |
| FUEL OIL NR.5                                 |           | 60         |
| FUEL OIL NR.6                                 |           | 60         |
| FUEL OILS                                     |           |            |
| GAS OIL CRACKED                               |           |            |
| GASINGHEAD (NATURAL)                          |           |            |
| GASOLINE                                      | 21        |            |
| GASOLINE AUTOMOTIVE                           | 21        | 60         |
| GASOLINE BLENDING STOCKS                      |           |            |
| GREASE  | 3         | 60         |
| JET FUELS JP-1 (KEROSENE)                     |           |            |
| JP-3  |           |            |

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## Chemical Resistance Guide

### PPG NOVAGUARD 650 - positive list

| Chemical Environment                 | Ref. Note | Max. Temp. |
|--------------------------------------|-----------|------------|
| JP-4                                 |           |            |
| JP-5 (KEROSENE HEAVY)                |           |            |
| KEROSENE (JP-1)                      |           |            |
| LUBE OIL                             | 16        |            |
| LUBE OIL BLENDING STOCKS             | 16        |            |
| LUBRICATING OILS                     | 16        |            |
| MINERAL OILS                         |           | 60         |
| MINERAL SPIRIT                       |           |            |
| MOGAS OILS                           | 21        |            |
| MOTOR OILS                           |           |            |
| N-HEPTANE                            |           |            |
| N-HEXANE                             |           |            |
| NAPHTA                               | 16        |            |
| NORMAL PARAFFIN                      |           |            |
| OILS CLARIFIED (LLOYDS CH.9)         |           |            |
| OILS MINERAL                         |           | 60         |
| OLEFIN (C 13 AND ABOVE, ALL ISOMERS) |           |            |
| PARAFFIN                             |           | 60         |
| PENETRATING OIL                      |           |            |
| PETROL                               | 21        |            |
| PETROLATUM                           |           |            |
| PETROLEUM SPIRIT                     |           |            |
| PETROLEUM, CRUDE                     |           |            |
| PETROLEUM, NAPHTA                    |           |            |
| PETROLEUM, REFINED                   |           |            |
| POLYMER FUEL (LLOYDS CH.9)           |           |            |
| REFORMATES                           |           |            |
| RESIDUAL FUEL OIL                    | 2         |            |
| ROAD OIL (LLOYDS CH.9)               |           |            |
| ROOFERS FLUX                         | 16, 2     |            |
| SEA WATER/SALT WATER                 |           |            |
| SOLVESSO 100, 150                    |           |            |
| SOUR CRUDE OIL                       | 2         | 60         |
| SPINDLE OIL                          |           |            |
| STRAIGHT RUN RESIDUE                 |           |            |
| TRANSFORMER OIL                      |           |            |
| TRIMETHYL BENZENE                    |           |            |

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| Chemical Environment | Ref. Note | Max. Temp. |
|----------------------|-----------|------------|
| TURBINE OIL          |           |            |
| TURBO OIL            |           |            |
| V M & P NAPHTA       |           |            |
| WATER (BALLAST)      |           |            |
| WATER SEA            |           |            |
| WATER, DEIONIZED     |           |            |
| WATER, DISTILLED     |           |            |
| WHITE OIL            |           |            |
| WHITE SPIRITS        |           |            |
| XYLENE               |           |            |

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