



# Certificate of Analysis

1.00988.1000 1-Butanol EMPROVE® ESSENTIAL ChP,NF  
Batch K56065688

|                                                                             | Spec. Values                         |         | Batch Values                      |         |
|-----------------------------------------------------------------------------|--------------------------------------|---------|-----------------------------------|---------|
| Assay (GC)                                                                  | ≥ 99.5                               | %       | 99.9                              | %       |
| Identity (IR)                                                               | conforms                             |         | conforms                          |         |
| Identity (B)                                                                | conforms                             |         | conforms                          |         |
| Relative density (d 25 °C/25 °C)                                            | 0.807 - 0.809                        |         | 0.808                             |         |
| Acidity                                                                     | conforms                             |         | conforms                          |         |
| Distilling range<br>(distills within a range of 1.5 °C)                     | 116 - 119                            | °C      | Conforms                          |         |
| Aldehydes                                                                   | conforms                             |         | conforms                          |         |
| Ni (Nickel)*                                                                | ≤ 0.05                               | ppm     | ≤ 0.05                            | ppm     |
| Rh (Rhodium)*                                                               | ≤ 0.05                               | ppm     | ≤ 0.05                            | ppm     |
| Limit of Butyraldehyde, 2-Butanol,<br>Isobutyl alcohol and Butyl ether (GC) | conforms                             |         | conforms                          |         |
| Butyraldehyde (GC)                                                          | ≤ 0.1                                | % (v/v) | ≤ 0.1                             | % (v/v) |
| 2-Butanol (GC)                                                              | ≤ 0.1                                | % (v/v) | ≤ 0.1                             | % (v/v) |
| 2-Methylpropan-1-ol (GC)                                                    | ≤ 0.1                                | % (v/v) | ≤ 0.1                             | % (v/v) |
| Butyl ether (GC)                                                            | ≤ 0.2                                | % (v/v) | ≤ 0.2                             | % (v/v) |
| Related substances (GC)<br>(total impurities) (ChP)                         | conforms                             |         | conforms                          |         |
| Residual solvents class 3 (ICH Q3C)                                         | < 0,5 %                              |         | < 0,5 %                           |         |
| Other residual solvents (ICH Q3C)                                           | excluded by<br>production<br>process |         | excluded by<br>production process |         |
| Non-volatile matter                                                         | ≤ 0.004                              | %       | 0.0002                            | %       |
| Evaporation residue                                                         | ≤ 0.004                              | %       | 0.0002                            | %       |
| Water                                                                       | ≤ 0.1                                | %       | 0.03                              | %       |

Elemental impurity specifications have been set considering ICH Q3D (Guideline for Elemental Impurities).  
Class 1-3 elements are not likely to be present above the ICH Q3D option 1 limit, unless specified and indicated (\*).

Conforms to ChP, NF.

Date of manufacture (DD.MM.YYYY) 10.06.2024  
Date of examination (DD.MM.YYYY) 16.07.2024  
Minimum shelf life (DD.MM.YYYY) 30.06.2029

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Responsible Laboratory manager quality control

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