



NACE Standard TM0173-2005  
Item No. 21205

## Standard Test Method

# Methods for Determining Quality of Subsurface Injection Water Using Membrane Filters

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### Foreword

Corrosion engineers in the oil- and gas-producing industry are often charged with the responsibility of evaluating and controlling the quality of injection waters. Unfortunately, much of the data available are inadequate, misleading, or difficult to interpret. This standard was prepared to provide standard test methods for use by these engineers in evaluating water quality for injection waters.

This standard was originally prepared in 1973 by NACE Task Group T-1C-12, revised in 1976, reaffirmed in 1983, and revised in 1984 and 1992 by T-1C-20, components of Unit Committee T-1C on Detection of Corrosion in Oilfield Equipment. T-1C was combined with T-1D on Corrosion Monitoring and Control of Corrosion Environments in Petroleum Production Operations. This standard was revised by T-1D-47 in 1999 and reaffirmed in 2005 by Specific Technology Group (STG) 31 on Oil and Gas Production—Corrosion and Scale Inhibition. This standard is issued by NACE International under the auspices of STG 31.

In NACE standards, the terms *shall*, *must*, *should*, and *may* are used in accordance with the definitions of these terms in the NACE Publications Style Manual, 4th ed., Paragraph 7.4.1.9. *Shall* and *must* are used to state mandatory requirements. The term *should* is used to state something good and is recommended but is not mandatory. The term *may* is used to state something considered optional.

TM0173-2005

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Standard  
Test Method**

**Methods for Determining Quality of Subsurface Injection  
Water Using Membrane Filters**

**Contents**

1. General.....	1
2. Definitions.....	1
3. Description of Test Methods .....	2
4. Test Apparatus.....	3
5. Preparation for Testing.....	6
6. Test Conditions .....	7
7. Test Procedures.....	7
8. Reporting Test Data .....	11
References.....	12
Bibliography .....	12
Appendix A.....	12
Appendix B.....	13
Appendix C .....	15
Figure 1: Example of a membrane filter holder for 47-mm (1.8-in.) membrane filter. ....	3
Figure 2: Membrane filter test apparatus showing membrane filter holder from Figure 1 connected to water-handling system.....	4
Figure 3: Two-stage test apparatus with pressure gauge and regulator for repressurizing and testing sample from reservoir rather than water-handling system (Figure 2), used mainly when sample point cannot be easily adapted to on-stream application.....	6
Figure 4: Example of a graphic representation of water quality.....	9
Figure 5: Apparatus for various washings or extractions by vacuum filtration.....	10
Table 1: Example of Membrane Filter Test Data .....	11

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## Section 1: General

1.1 This standard describes two test methods for evaluating water quality for subsurface injection: Procedure A—rate versus cumulative volume test (for water-quality monitoring) and Procedure B—suspended solids test (for diagnosis or monitoring). These two test methods are intended to provide standardized water quality in the petroleum production industry. The test methods describe the apparatus required, test conditions, test procedures, reporting procedures, and supplementary tests. Interpretation of the results is beyond the scope of this standard. The bibliography supplies sources of interpretation methods.

1.1.1 Before establishing a test program, the aim of the test should be determined and appropriate criteria for evaluation of the test results should be established. For example, if the intent is to use membrane filtration as a simple water control test, the control criterion might be a given slope of the filtration curve. If diagnostic information is required, more emphasis may be placed on qualitative information, such as the shape of the filtration curve, or spot tests on the filtered solids as well as visual examination of the filter immediately after the test.

1.1.2 Membrane filtration may also be used to monitor pickup of suspended solids from the formation, in which case quantitative determination of solids on the filter may be the selected criterion. Each situation should receive an appropriate review of the parameters involved.

1.2 The injection behavior of subsurface formations varies widely, and results of water-quality tests apply only to the system being tested. Application of the results obtained by these tests, therefore, is strongly influenced by the requirements of each subsurface injection project. This standard should be used for routine monitoring of water quality, diagnosing of problems, evaluating effects of system changes and upsets, and monitoring effects of chemical treatment. The manner in which the test results are used depends on the requirements of the specific injection system.

1.3 This standard is applicable only when precautions are observed to ensure that the sample is representative of the water in the system of interest. It is not the purpose of this standard to imply that the results or their interpretation may be arbitrarily applied to other water injection projects.

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## Section 2: Definitions

2.1 Suspended solids, as used in this standard, are defined as the nonwater, nondissolved substances that exist in the water. These may typically include, but are not limited to, materials such as iron sulfides and oxides, precipitated carbonates and sulfates, sands and silts, oils, paraffins and asphaltenes, and materials of biological origin. The suspended solids may also be considered as the materials in the water that can cause plugging and loss of injectivity in injection wells.

2.1.1 Oil carryover or hydrocarbon-soluble suspended solids are the portions that are soluble in a suitable hydrocarbon solvent. This standard is not intended to be an accurate quantitative test for oil or hydrocarbons. Oil carryover in the water cannot always be measured by this technique because oil can pass through the membrane filter. This method can give only a qualitative indication of the oil carryover. Other measurement methods should be used when quantitative data are desired. These methods are listed in the bibliography.

2.1.2 Primary suspended solids or in-line suspended solids are those substances that exist in the water at the time of sampling.

2.2 Membrane filters, as used in this standard, refer to porous disks composed of pure and biologically inert cellulose esters. Unless specified to the contrary, the membrane filters have a mean pore size of 0.45  $\mu\text{m}$  ( $\pm 0.02$   $\mu\text{m}$ ), a diameter of 47 mm (1.8 in.), a thickness of 15  $\mu\text{m}$  ( $\pm 10$   $\mu\text{m}$ ), and an average total pore volume of approximately 80% of the total filter volume.

2.2.1 Preweighed membrane filters are those that have been weighed prior to the test.

2.2.2 Matched-weight membrane filters are those obtained from the supplier in pairs with identical weights ( $\pm 0.02$  mg).