

											הקלה. מדובר בתנאי בדיקה שלא משפיעים על התוצאות נפחים להחזיל את הבדיקה משום שהדבר ימנע את השך בצד בדיקה מתקדם וקר יותר					בטבלה ניתן יותר מילרנס לממפרטורה, לערך ההבדל, ניתן טווח רחב יותר לריכוז כלל המשקעים המשמשים	Inorganic chemical reduction test water	7.1.2.4.2
											הקלה. מדובר בתנאי בדיקה שלא משפיעים על התוצאות נפחים להחזיל את הבדיקה משום שהדבר ימנע את השך בצד בדיקה מתקדם וקר יותר					בטבלה ניתן יותר מילרנס לממפרטורה, לערך ההבדל, ניתן טווח רחב יותר לריכוז כלל המשקעים המשמשים	Test water	7.1.3.3
											הקלה. הדרשה לרמות זיק נמוכה יותר מאפשרת שימוש בצד מתח-קר, דבר שיחזיל את עלות הבדיקה.					קבעה דרישה לרמות זיק נמוכה יותר לסמן כמות החלקיקים במקום ב-99.9% ב-99.95%	Cyst reduction claims	7.2.2
											הקלה. מדובר בתנאי בדיקה שלא משפיעים על התוצאות נפחים להחזיל את הבדיקה משום שהדבר ימנע את השך בצד בדיקה מתקדם וקר יותר					בטבלה ניתן יותר מילרנס לממפרטורה, לערך ההבדל, ניתן טווח רחב יותר לריכוז כלל המשקעים המשמשים	General test water	7.2.2.3
											הקלה. מדובר בתנאי בדיקה שלא משפיעים על התוצאות נפחים להחזיל את הבדיקה משום שהדבר ימנע את השך בצד בדיקה מתקדם וקר יותר					בטבלה ניתן יותר מילרנס לממפרטורה, לערך ההבדל, ניתן טווח רחב יותר לריכוז כלל המשקעים המשמשים	General test water	7.2.3.3
													התאמה לדרישות מ' הגנת העור			נדרש שההוראות ופירוש המדע כספיק ירו בשפה העברית לפחות	Instructions and information	8

מערכות לטיפול במי שתייה: מערכות אוסמוזה הפוכה

Drinking water treatment systems: Reverse osmosis systems

תקן זה ייכנס לתוקף ב-

מסמך זה הוא הצעה בלבד

מכון התקנים הישראלי
The Standards Institution of Israel



תקן זה הוכן על ידי ועדת המומחים 537508 – מערכות לטיפול מיקרוביולוגי במים, בהרכב זה:
עיריית הן (יו"ר), זוהר הרחול, עיריית וייזר, אתי מנשרוב-אלוף, דני עיני, הלה פרנקל

יניב בוימל ריכז את עבודת הכנת התקן.

רפ"מ

<p>הודעה על רויזיה הודעה על מידת התאמת התקן הישראלי לתקנים או למסמכים זרים תקן ישראלי זה בא במקום התקן הישראלי ת"י 1505 חלק 2 מינואר 2018</p>	<p>תקן ישראלי זה, למעט השינויים והתוספות הלאומיים המצוינים בו, זהה לתקן האמריקני NSF/ANSI 58 – 2017</p>
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מילות מפתח:

מים, איכות מים, מי שתייה, טיפול במי שתייה, טיהור מים, סינון, מכשירי חשמל ביתיים, מסננים, אוסמוזה הפוכה, בדיקות, אנליזה כימית, בדיקות מיקרוביולוגיות.

Descriptors:

water, water quality, potable water, drinking water treatment, water purification, filtration, household electrical appliances, filters, reverse osmosis, testing, chemical analysis, microbiological analysis.

עדכניות התקן

התקנים הישראליים עומדים לבדיקה מזמן לזמן, ולפחות אחת לחמש שנים, כדי להתאימם להתפתחות המדע והטכנולוגיה. המשתמשים בתקנים יודאו שבידיהם המהדורה המעודכנת של התקן על גיליונות התיקון שלו. מסמך המתפרסם ברשומות כגיליון תיקון, יכול להיות גיליון תיקון נפרד או תיקון המשולב בתקן.

תוקף התקן

תקן ישראלי על עדכוני נכנס לתוקף החל ממועד פרסומו ברשומות. יש לבדוק אם התקן רשמי או אם חלקים ממנו רשמיים. תקן רשמי או גיליון תיקון רשמי (במלואם או בחלקם) נכנסים לתוקף 60 יום מפרסום ההודעה ברשומות, אלא אם בהודעה נקבע מועד מאוחר יותר לכניסה לתוקף.

סימון בתו תקן



כל המייצר מוצר, המתאים לדרישות התקנים הישראליים החלים עליו, רשאי, לפי היתר ממכון התקנים הישראלי, לסמנו בתו תקן:

זכויות יוצרים

© אין לצלם, להעתיק או לפרסם, בכל אמצעי שהוא, תקן זה או קטעים ממנו, ללא רשות מראש ובכתב ממכון התקנים הישראלי.

הקדמה לתקן הישראלי

תקן ישראלי זה הוא התקן האמריקני NSF/ANSI 58 משנת 2017, שאושר כתקן ישראלי בשינויים ובתוספות לאומיים.

התקן כולל, בסדר המפורט להלן, רכיבים אלה:

- תרגום סעיף חלות התקן האמריקני בשינויים ובתוספות לאומיים (בעברית)
- פירוט השינויים והתוספות הלאומיים לסעיפי התקן האמריקני (בעברית)
- תרגום חלקו העברי של התקן (באנגלית)
- התקן האמריקני (באנגלית)

הערות לאומיות לתקן הישראלי מובאות כהערות שוליים וממוספרות באותיות האלף-בית.

מהדורה זו של התקן הישראלי באה במקום מהדורת התקן הישראלי ת"י 1505 חלק 2 מינואר 2018, שאימצה את התקן האמריקני NSF/ANSI 58 משנת 2015 בשינויים ובתוספות לאומיים.

ההבדלים העיקריים בין מהדורה זו של התקן הישראלי לבין מהדורתו הקודמת נובעים מעדכון התקן האמריקני והם מפורטים בסעיף FOREWORD של התקן האמריקני.

לשם השוואה מדוקדקת בין המהדורות יש לעיין בנוסח המלא שלהן.

תקן זה הוא חלק מסדרת תקנים החלים על מערכות לטיפול במי שתייה.

חלקי הסדרה הם אלה:

ת"י 1505 חלק 1 - מערכות לטיפול במי שתייה לשימוש ביתי-סינון וטיהור: מערכות^(א) למעט מערכות אוסמוזה הפוכה

ת"י 1505 חלק 2 - מערכות לטיפול במי שתייה: מערכות אוסמוזה הפוכה

חלות התקן (תרגום סעיף 1.2 של התקן האמריקני בשינויים ובתוספות לאומיים)

הערה:

השינויים והתוספות הלאומיים בסעיף זה מובאים בגופן שונה.

תקן זה חל על מערכות לטיפול במי שתייה בנקודות השימוש (POU – point-of-use) בטכנולוגייה של אוסמוזה

הפוכה. מערכות אלה מתוכננות לשמש להפחתת הריכוז של חומרים מסוימים העלולים להימצא באספקת

מי השתייה (אספקה ציבורית או פרטית), הנחשבת בטוחה מבחינה מיקרוביולוגית ומאיכות ידועה

(מותר גם להצהיר על יכולת המערכת להפחית ציסטות^(א) העוברות בסינון).

המערכות שתקן זה חל עליהן מיועדות להפחית את הריכוז של כלל המוצקים המומסים

(TDS – total dissolved solids) במים ושל מזהמים אחרים המפורטים להלן. מערכות בעלות רכיבים או

פונקציות שחל עליהם ת"י 1505 חלק 1^(ב) יעמדו בדרישות הרלוונטיות המפורטות בו.

הבהרה:

אם המערכות כוללות יחידות לקירור מים או לחימום מים או לשניהם, התקן חל על המכלל כולו.

תקן זה אינו חל על מערכות המיועדות לטיפול במי שתייה לשימוש בתהליכים תעשייתיים.

^(א) לפי קביעת האקדמיה ללשון העברית: Cyst - פִּיסְתָּה.

^(ב) התקן הישראלי ת"י 1505 חלק 1 עובר בימים אלה ררוויזה ובמהלכה הוא יתפצל לכמה תתי חלקים.

פירוט השינויים והתוספות הלאומיים לסעיפי התקן האמריקני

2. Normative references

לסעיף יוסף:

תקנים ישראליים

- ת"י 900 חלק 1 בטיחות מכשירי חשמל ביתיים ומכשירים דומים: דרישות כלליות
- ת"י 900 חלק 2.15 בטיחות מכשירי חשמל ביתיים ומכשירים דומים: דרישות מיוחדות למכשירים לחימום נוזלים
- ת"י 5438 (על חלקיו) כימיקלים לטיפול במים המיועדים לשתייה
- ת"י 5452 בדיקת מוצרים הבאים במגע עם מי שתייה

3. Definitions

בסוף הסעיף תוסף הגדרה 3.1, כמפורט להלן:

3.1. מערכת לטיפול במי שתייה

מערכת כמפורט בהגדרה 3.168 (System) בתקן האמריקני NSF/ANSI 330, המיועדת לשימוש בבית, בעסק, במוסד ציבורי וכדומה.

4. Materials

הכתוב בסעיף אינו חל, ובמקומו יחול:
רכיבי המערכת הבאים במגע עם המים ייבדקו כמפורט בתקן הישראלי ת"י 5452 ויתאימו לדרישות הנקובות בו, למעט בסעיף 6.4 שלו.
הכימיקלים המשמשים לטיפול במים יעמדו בדרישות התקנים המתאימים בסדרת התקנים הישראליים ת"י 5438.

6. Minimum performance requirements

6.9. TDS reduction, recovery rating, and efficiency rating claims

6.9.5. TDS reduction test water

הטבלה בסעיף אינה חלה, ובמקומה תחול הטבלה שלהלן:

עכירות	1 NTU ^(ג) מקסי'
ערך הגבה (pH)	7.5±1.0
טמפרטורה	22±4 °C
מוליכות	10 מיקרוסימנס לס"מ, מקסי' ^(ד)

^(ג) NTU – Nephelometric Turbidity Unit.

^(ד) μS/cm.

- לאחר סעיף 6.10 יוסף סעיף 6.11, כמפורט להלן :

6.11. בטיחות חשמל

בודקים בבדיקה זו רק מערכת לטיפול במי שתייה הניזונה מרשת החשמל.
בודקים את התאמת המערכת לדרישות בטיחות החשמל החלות עליה לפי התקנים הישראליים
ת"י 900 חלק 1 ות"י 900 חלק 2.15.
המערכת תתאים לדרישות בטיחות החשמל החלות עליה לפי התקנים הישראליים ת"י 900 חלק 1 ות"י 900 חלק 2.15.

7. Elective performance claims - test methods

7.1. Chemical reduction claims

7.1.2. Inorganic chemical reduction claims

7.1.2.1. Pentavalent arsenic reduction claims

Table 7.2 - Contaminant reduction requirements

לעמודה החמישית, שכותרתה "USEPA method/s", תוסף הערה זו:
אפשר לבדוק גם לפי השיטות של APHA/AWWA. במקרה של חילוקי דעות, השיטה הקובעת היא
השיטה של USEPA כנקוב בטבלה זו.

7.1.2.4. Test water

7.1.2.4.1. TDS reduction test water

הטבלה בסעיף אינה חלה, ובמקומה תחול הטבלה שלהלן :

עכירות	NTU 1 ^(ב) , מקס'
ערך הגבה (pH)	7.5±1.0
טמפרטורה	°(22±4) צ'
מוליכות	10 מיקרוסימנס לס"מ ^(ג) , מקס'

7.1.2.4.2. Inorganic chemical reduction test water

הטבלה בסעיף אינה חלה, ובמקומה תחול הטבלה שלהלן :

כלל המוצקים המומסים (TDS) ^(ה)	200 מ"ג לליטר - 750 מ"ג לליטר
עכירות	NTU 1 ^(ב) , מקס'
ערך הגבה (pH)	7.5±1.0
טמפרטורה	°(22±4) צ'

7.1.3. Nitrate/nitrite reduction claims

7.1.3.3. Test water

הטבלה בסעיף אינה חלה, ובמקומה תחול הטבלה שלהלן :

עכירות	NTU 1 ^(ב) , מקס'
ערך הגבה (pH)	7.5±1.0
טמפרטורה	°(22±4) צ'

^(ה) TDS – Total Dissolved Solids

מוליכות	10 מיקרוסימנס לס"מ ^(א) , מקס'
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7.2 Mechanical filtration claims

7.2.2 Cyst reduction claims

בשורה הראשונה, הערך "99.95%" אינו חל, ובמקומו יחול: 99.9%

7.2.2.3 General test water

הטבלה בסעיף אינה חלה, ובמקומה תחול הטבלה שלהלן:

כלל המוצקים המומסים (TDS) ^(ד)	200 מ"ג לליטר - 750 מ"ג לליטר
עכירות	1 NTU ^(ב) , מקס'
ערך הגבה (pH)	7.5±1.0
טמפרטורה	°(22±4) צ'

7.2.3 Turbidity reduction (organic and inorganic solids) claims

7.2.3.3 General test water

הטבלה בסעיף אינה חלה, ובמקומה תחול הטבלה שלהלן:

כלל המוצקים המומסים (TDS) ^(ד)	200 מ"ג לליטר - 750 מ"ג לליטר
עכירות	1 NTU ^(ב) , מקס'
ערך הגבה (pH)	7.5±1.0
טמפרטורה	°(22±4) צ'

8 Instructions and information

בתחילת הסעיף יוסף:

ההוראות ופרטי המידע הנדרשים בסעיף זה יהיו בשפה העברית, לפחות.

Methanol shall be used as the solvent for chloroform when introduced to the test water.

7.1.1.2.5 VOC influent challenge water

Chloroform (CHCl_3) shall be added to the test water specified in 7.1.1.2.4 to achieve an average challenge concentration of 0.300 ± 0.030 mg/L.

NOTE — Reduction of cysts, turbidity, and asbestos shall not be tested with chemical reduction or TDS tests.

7.1.1.2.6 Method

Two systems shall be conditioned in accordance with the manufacturer's instructions using the test contaminant specified in 7.1.1 and the test water specified in 7.1.1.2.4. The systems shall be tested using the VOC influent challenge water as specified in 7.1.1.2.5 at an initial dynamic pressure of 350 ± 18 kPa (50 ± 3 psig) at the manufacturer's recommended daily production rate. The pressure shall not be readjusted, although the system may experience some change in dynamic pressure.

Before the carbon filter is tested for VOC reduction, it shall be removed from the RO system.

7.1.1.2.7 Sampling

7.1.1.2.7.1 Systems equipped with a performance indication device

Systems equipped with a performance indication device, in accordance with 6.7.2, shall have influent and product water samples collected and analyzed to determine VOC reduction. Prior to the initial sampling, 10 unit volumes of influent challenge water shall be passed through the system. An initial influent and product water sample shall then be taken, followed by sample collections at 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100%, 110%, and 120% of estimated service cycle of replaceable treatment components.

7.1.1.2.7.2 Systems lacking a performance indication device

Systems lacking a performance indication device shall have influent and product water samples collected and analyzed to determine VOC reduction. Prior to the initial sampling, 10 unit volumes of influent challenge water shall be passed through the system. An initial influent and product water sample shall be taken followed by sample collections at 20%, 40%, 60%, 80%, 100%, 120%, 140%, 160%, 180%, and 200% of the estimated service cycle of replaceable treatment components. Testing up to 200% of the estimated capacity will provide a 2:1 safety factor.

7.1.2 Inorganic chemical reduction claims

Claims for inorganic chemical reduction may be made for the specific contaminants shown in table 7.2. To qualify for a specific contaminant reduction claim, the system shall reduce the level of the contaminant from the influent challenge level so that the arithmetic mean of all product water sample results and 90% of the individual product water samples is less than or equal to the maximum allowable product water concentration in table 7.2 when tested in accordance with 7.1.2.

7.1.2.1 Pentavalent arsenic reduction claims

Arsenic reduction by reverse osmosis is species dependent. Pentavalent arsenic [also known as As(V), As(+5), and arsenate] can be removed by reverse osmosis. It has been shown that trivalent arsenic [also known as As(III), As(+3), and arsenite] will be oxidized to pentavalent arsenic in the presence of a detectable free chlorine residual or in the presence of other effective oxidants.⁹ Some water supplies may

⁹ Laboratory Study on the Oxidation of Arsenic III to Arsenic V, EPA/600/R-01/021, March 2001

Table 7.2 – Contaminant reduction requirements

Contaminant	Individual influent sample point limits ¹ mg/L	Average influent challenge level mg/L	Maximum allowable product water level mg/L	USEPA method/s	Compounds
⁶ The first limits apply to analysis conducted according to USEPA method 200.7, and the second limits apply to analysis conducted according to USEPA method 200.8 or 200.9. ⁷ Trivalent chromium is a calculated parameter. The range is based on the propagated error of two analyses. ⁸ For test purposes, barium shall be added to the influent challenge water and shall be analyzed in the influent challenge water and product water. The reduction of radium is not concentration-dependent; therefore, barium shall be added at 10 mg/L with a maximum product water level of 2.0 mg/L. Barium is used as a surrogate based on its relationship with radium on the periodic table and the difficulty in using radium for routine testing.					

7.1.2.2 Apparatus

A test apparatus capable of providing specified flow rates and pressures shall be used. An example of an appropriate test apparatus appears in figure 2.

7.1.2.3 Analytical methods

All analyses shall be conducted in accordance with the applicable methods referred to in 2.

7.1.2.4 Test water**7.1.2.4.1 TDS reduction test water**

Chlorine free deionized water shall be used with the following specific characteristics maintained throughout the test:

turbidity	≤1 NTU
pH	7.5 ± 0.5
temperature	25 ± 1 °C (77 ± 2 °F)
conductivity	1 µS/cm

Sodium chloride (NaCl) shall be added to the test water to achieve a challenge concentration of 750 ± 40 mg/L TDS.

7.1.2.4.2 Inorganic chemical reduction test water

A public water supply shall be used with the following specific characteristics maintained throughout the test for inorganic chemical reduction claims:

total dissolved solids (TDS)	200 – 500 mg/L
turbidity	≤ 1 NTU
pH	7.5 ± 0.5
temperature	25 ± 1 °C (77 ± 2 °F)

NOTE — The test water shall not contain interfering substances that cause false positive or false negative performance results (e. g., flocculating iron may adsorb the contaminants being tested).

7.1.2.5 Inorganic substance challenge water

For pentavalent arsenic, barium, chromium, radium, and perchlorate, the test compound listed in table 7.2 shall be added to the TDS influent challenge water (see 7.1.2.4.1) to achieve the influent concentration specified in table 7.2.

For the remaining inorganic substances, the test compound listed in table 7.2 shall be added to either the TDS influent challenge water (see 7.1.2.4.1) or the inorganic chemical reduction test water (see 7.1.2.4.2) to achieve the influent concentration specified in table 7.2.

7.1.2.6 Method

Two systems shall be conditioned in accordance with the manufacturer's instructions using the test contaminant specified in table 7.2 and the appropriate general test water specified in 7.1.2.4.1 or 7.1.2.4.2. The systems shall be tested using the appropriate influent challenge water at an initial dynamic pressure of 350 ± 18 kPa (50 ± 3 psig). The pressure shall not be readjusted, although the system may experience some change in dynamic pressure. Pre-membrane and post-membrane filters shall be removed prior to testing.

7.1.2.7 Sampling

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 12 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h. A test contaminant sample shall be collected and analyzed from the tank. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.1.2.7.1 Systems with storage tank and automatic shut-off

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 12 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of

Table 7.3 – Contaminant reduction requirements

Contaminant	Individual influent ¹ sample point limits mg/L	Average influent challenge level mg/L	Maximum allowable product water level mg/L	USEPA method/s	Compounds
nitrate plus nitrite (as N) ²	30.0 ± 20%	30.0 ± 10% (added as 27 mg/L as N of Nitrate and 3 mg/L as N of Nitrite) OR 70 +/- 10% (Added as 65mg/L as N of Nitrate and 5 mg/L as N of Nitrite)	10.0 ³	300	NaNO ₃ NaNO ₂
¹ Equals average influent challenge concentration variability plus one of the following, in order of availability: 1. Acceptable Continuing Calibration Verification (CCV) limits stated in the appropriate USEPA method. 2. Acceptable spike recoveries as stated in the appropriate USEPA method. 3. Opinion of laboratory professionals – no guidance available in USEPA method. ² Some public and private water supplies may exceed indicated influent nitrate (NO ₃) and nitrite (NO ₂) levels. Additional treatment or individual design, or both, shall be applied to ensure that the product water level consistently meets the MCLs for such water supplies. ³ Of the 10 mg/L maximum product water level, no more than 1.0 mg/L shall be in the form of NO ₂ as N.					

7.1.3.1 Apparatus

A test apparatus capable of providing specified flow rates and pressures shall be used. An example of an appropriate test apparatus appears in figure 2.

7.1.3.2 Analytical methods

All analyses shall be conducted in accordance with the applicable methods referred to in 2.

7.1.3.3 Test water

Chlorine free deionized water shall be used with the following specific characteristics maintained throughout the test:

turbidity	≤ 1 NTU
pH	7.5 ± 0.5
temperature	25 ± 1 °C (77 ± 2 °F)
total dissolved solids (TDS) ¹	750 ± 40 mg/L
¹ Added as NaCl.	

7.1.3.4 Method

Two systems shall be conditioned in accordance with the manufacturer's instructions using the test contaminant specified in table 7.3 and the appropriate general test water specified in 7.1.3.3.

The method specified in 6.9.6 shall be followed, except that the initial dynamic pressure shall be applicable to the intended end use. The pressure shall not be readjusted, although the system may experience some

collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.1.6.2 Systems without storage tanks

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, samples shall be collected at 4 h and 8 h. On Days 2 to 4 of testing, samples shall be collected at the beginning of the day and after an elapsed time of 6 and 12 h and analyzed for TDS. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed. A final sample shall be collected and analyzed on Day 7 for the first 4-h period.

7.2.1.6.3 Systems with storage tank and automatic shut-off

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 12 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.1.6.4 Systems with no shut-off provisions

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for test contaminants. On Day 1 of testing, samples shall be collected at 4 h intervals including 4, 8, 12, and 16 h. The storage tank shall be emptied after each collection and the product water volume shall be recorded in liters (gallons) at each 4-h sample point. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.2 Cyst reduction claims

The system shall reduce the number of particles from the influent test water by at least 99.95% at every individual unit effluent sample point when tested in accordance with 7.2.2.

7.2.2.1 Apparatus

A test apparatus capable of providing specified flow rates and pressures shall be used. An example of an appropriate test apparatus appears in figure 2.

7.2.2.2 Analytical methods

Standard particle counting techniques available from particle counter manufacturers shall be used for test dust cyst reduction tests. The methods for detecting and enumerating microspheres described in NSF/ANSI 53 Annex B shall be followed for microsphere cyst reduction tests. Post-membrane filters shall be removed prior to testing.

7.2.2.3 General test water

A public water supply shall be used with the following specific characteristics maintained throughout the test:

total dissolved solids (TDS)	200 – 500 mg/L
turbidity	≤ 1 NTU
pH	7.5 ± 0.5
temperature	25 ± 1 °C (77 ± 2 °F)

7.2.2.4 Influent challenge

Test dust or fluorescent microspheres should be used for the influent challenge particle. Fluorescent microspheres shall be added to the influent challenge water specified in 7.2.2.3 to achieve at least 50,000 (5×10^4) microspheres per liter. The polystyrene latex microspheres shall have 95% of particles in the range of $3.00 \pm 0.15 \mu\text{m}$. The size variation of the polystyrene microspheres shall be confirmed by electron microscopy. The spheres shall have a surface charge content of less than 2 uEq/g. The microspheres shall contain a fluorescein isothiocyanate (FITC) dye or equivalent.

The test dust shall be added to the influent challenge water specified in 7.2.2.3 to achieve at least 50,000 (5×10^4) particles per milliliter between 3- to 4- μm in diameter. The test dust shall have a nominal size classification of 0- to 5- μm and shall have 96% (by volume %) of its particles within the 0- to 5- μm range and 20% to 40% (by volume %) of its particles greater than 2.5 μm .¹⁰

7.2.2.5 Method

Two systems shall be conditioned in accordance with the manufacturer's instructions using the general test water specified in 7.2.2.3. The systems shall be tested using the appropriate influent challenge water at an initial static pressure of $350 \pm 18 \text{ kPa}$ ($50 \pm 3 \text{ psig}$). The pressure shall not be readjusted, although the system may experience some drop in dynamic pressure.

7.2.2.6 Sampling

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 8 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h from which a test contaminant sample shall be collected and analyzed. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.2.6.2 Systems without storage tanks

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, samples shall be collected at 4 h and 8 h. On Days 2 to 4 of testing, samples shall be collected at the beginning of the day and after an elapsed time of 6 and 12 h and analyzed for TDS. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no

¹⁰ A test dust that meets these specifications is available from Powder Technologies, Inc., P.O. Box 1464, Burnsville, MN 55337 <www.powdertechusa.com>.

product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed. A final sample shall be collected and analyzed on Day 7 for the first 4-h period.

7.2.2.6.3 Systems with storage tank and automatic shut-off

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 12 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.2.6.4 Systems with no shut-off provisions

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for test contaminants. On Day 1 of testing, samples shall be collected at 4 h intervals including 4, 8, 12, and 16 h. The storage tank shall be emptied after each collection and the product water volume shall be recorded in liters (gallons) at each 4-h sample point. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.3 Turbidity reduction (organic and inorganic solids) claims

The system shall reduce the influent challenge level of 11 ± 1 NTU (nephelometric turbidity unit) to not more than 0.5 NTU when tested in accordance with 7.2.3. This level of turbidity reduction shall be maintained at all sampling points during testing.

NOTE — Turbidity reduction is not a surrogate for cyst reduction or any other health effect contaminant reduction.

7.2.3.1 Apparatus

A test apparatus capable of providing specified flow rates and pressures shall be used. An example of an appropriate test apparatus appears in figure 2.

7.2.3.2 Analytical methods

All analyses shall be conducted in accordance with the applicable methods referred to in 2. Post-membrane filters shall be removed prior to testing.

7.2.3.3 General test water

A public water supply shall be used with the following specific characteristics maintained throughout the test:

total dissolved solids (TDS)	200 – 500 mg/L
turbidity	≤ 1 NTU
pH	7.5 ± 0.5
temperature	25 ± 1 °C (77 ± 2 °F)

7.2.3.4 Influent challenge

The fine test dust specified in 7.2.2.4 shall be added to the general test water specified in 7.2.3.3 to achieve a turbidity level of 11 ± 1 NTU.

The influent turbidity level shall be allowed to exceed 12 NTU if the manufacturer requests the turbidity reduction test to be run concurrently with the cyst reduction test using fine test dust.

7.2.3.5 Method

Two systems shall be conditioned in accordance with the manufacturer's instructions using the general test water specified in 7.2.3.3. The systems shall be tested using the appropriate influent challenge water at an initial static pressure of 350 ± 18 kPa (50 ± 3 psig). The pressure shall not be readjusted, although the system may experience some drop in dynamic pressure.

7.2.3.6 Sampling

7.2.3.6.1 Counter top systems with storage tanks or reservoirs

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, the storage tank shall be emptied after each collection at 4 h and 8 h. On Days 2 to 4 of testing, 5% of the first day's production rate shall be withdrawn from the storage tank after each collection at the beginning of the day and after an elapsed time of 6 and 12 h from which a test contaminant sample shall be collected and analyzed. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed, followed by emptying of the storage tank. A final sample shall be collected and analyzed on Day 7 for the first 4-h period. After the last sample for test contaminants is collected, the storage tank shall be emptied.

7.2.3.6.2 Systems without storage tanks

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for all test contaminants. On Day 1 of testing, samples shall be collected at 4 h and 8 h. On Days 2 to 4 of testing, samples shall be collected at the beginning of the day and after an elapsed time of 6 and 12 h and analyzed for TDS. Days 5 and 6 represent a 54-h stagnation period, under pressure, during which no product water shall be withdrawn. At the start of Day 7, 144 h into the test, a sample shall be collected and analyzed. A final sample shall be collected and analyzed on Day 7 for the first 4-h period.

7.2.3.6.3 Systems with storage tank and automatic shut-off

Product water samples shall be collected from the first water out of the system in the amount of 250mL or total volume needed for analysis, whichever is greater. Influent and product samples shall be analyzed for

$$\text{TDS}_{\text{ratio 2}} = \text{TDS}_{\text{candidate}} / \text{TDS}_{\text{atmosphere}}$$

b) DPR candidate system – The DPR test results of the membrane elements tested in the candidate system shall be compared to the DPR test results of the same membrane elements open to atmosphere. The following calculation shall be used to determine the TDS reduction ratio.

$$\text{DPR}_{\text{ratio 2}} = \text{DPR}_{\text{Candidate}} / \text{DPR}_{\text{atmosphere}}$$

c) Recovery rating of the candidate system – The average fractional decimal of the surrogate system from days 1 and 7 shall be recorded.

7.3.3 Acceptance criteria

a) $\text{TDS}_{\text{ratio 2}}$ shall be equal to or greater than $\text{TDS}_{\text{ratio 1}}$

NOTE — The values used in the TDS calculation are fractional decimals.

b) $\text{DPR}_{\text{ratio 2}}$ shall be equal to or greater than $\text{DPR}_{\text{ratio 1}}$

c) Percent recovery of the candidate system shall be equal to or less than the fractional decimal of the surrogate system.

8 Instructions and information

Data listed in the literature for the candidate system shall be the data obtained from the surrogate system for the influent levels, average and maximum effluent levels, and percent reductions.

Data listed in the literature for TDS reduction, DPR, and % recovery (% efficiency if desired) shall be reported only from the actual data obtained for the candidate system

8.1 Installation, operation, and maintenance instructions

8.1.1 Information setting forth complete, detailed instructions for installation, operation, and maintenance shall be provided with each system. Specific instructions shall include:

- complete name, address, and telephone number of manufacturer;
- model number and trade designation;
- flushing and conditioning procedures;
- production rate in L/d (gpd) as determined by testing to 6.7 and in relation to published efficiency rating, recovery rating, or both, if applicable;
- maximum and minimum working pressure in kPa (psig). Minimum working pressure shall not be less than the pressure specified for testing;
- maximum and minimum operating temperature in degrees C (degrees F);
- detailed installation instructions including an explanation or schematic diagram of proper connections to the plumbing system;
- operation and maintenance requirements (including user responsibility, parts, and service);

- drawing and parts list for easy identification and ordering of replacement parts;
- sources of supply for replaceable treatment components;
- diagram showing proper air gap installation to waste connections; and
- for systems equipped with an automatic shut-off valve and a pressurized or non-pressurized storage tank:
 - a statement describing the system's efficiency rating as verified by testing in accordance with 6.7 along with the following: "Efficiency rating means the percentage of the influent water to the system that is available to the user as reverse osmosis treated water under operating conditions that approximate typical daily usage;" and
 - if the recovery rating is also reported, a statement describing the system's recovery rating as verified by testing in accordance with 6.7. The recovery rating shall be reported together with or in succession with the efficiency rating, shall be presented in the same type and size font as the efficiency rating, and shall be reported in the same units of measurement as the efficiency rating, along with the following: "Recovery rating means the percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed;"
- for all other systems:
 - if the recovery rating is stated, a statement describing the system's recovery rating as verified by testing in accordance with 6.7, along with the following: "Recovery rating means the percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed;"
 - a statement noting the need for the system and installation to comply with state and local laws and regulations;
 - a statement that the reverse osmosis system contains a replaceable treatment component, critical for the effective reduction of total dissolved solids and that product water shall be tested periodically to verify that the system is performing properly; and
 - a statement that the system conforms to NSF/ANSI 58 for the specific performance claims as verified and substantiated by test data.

8.1.2 Where applicable and appropriate, the following information shall also be included:

- explicit instructions explaining the performance indicator functions;
- model numbers of replaceable treatment components;
- a statement for systems claiming VOC reduction: "This system conforms to NSF/ANSI 58 for VOC reduction. See performance data sheet for individual contaminants and reduction performance;"

NOTE — Manufacturers may refer to individual chemicals from Table 8.1 on labels, manuals, or promotional materials if such information conforms to the following requirements:

- percent reductions, if specified, shall be either less than or equal to those specified in Table 6.1, or additional testing is completed to justify the claim for a higher percent reduction; and
- reference to individual chemicals from Table 8.1 shall not imply that specific testing for the chemical was conducted if only the surrogate test was completed.

- a statement for systems claiming nitrate/nitrite reduction shall include the pressure used for testing as the minimum application pressure. For example, systems that were tested at 210 kPa (30 psig) shall state: "This system is acceptable for treatment of influent concentrations of no more than 27 mg/L nitrate and 3 mg/L nitrite in combination measured as N and is certified for nitrate/nitrite reduction only for water supplies with a pressure of 210 kPa (30 psig) or greater;"
- a statement for systems claiming higher levels of nitrate/nitrite at a total influent concentration of 70 mg/L as N that are tested with an internal booster pump that raises the pressures to higher levels, shall include the pressure used for testing as the minimum application pressure. For example, systems that were tested at 350 kPa (50 psig) shall state: "This system is acceptable for treatment of influent concentrations of no more than 65 mg/L nitrate and 5 mg/L nitrite in combination measured as N and is certified for nitrate/nitrite reduction only for water supplies with a pressure of 350 kPa (50 psig) or greater along with an internal built in booster pump;"
- if other built in performance enhancement steps are needed such steps shall also be identified here if the consumer needs to be aware of such steps for the system's continued effective performance after installation;
- a statement for systems with activated carbon: "Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system. Systems certified for cyst reduction may be used on disinfected water that may contain filterable cysts;"
- electrical requirements;
- specific requirements of the influent water characteristics (e.g., chlorine, bacteria, pH, temperature, iron, turbidity, hardness, pressure) that may affect RO membrane polymers or other components, addressed in language easily understood by the user;
- for systems claiming cyst reduction: The percentage of cyst reduction must be included in the claim if the claim is described as cyst removal; and
- a statement for systems equipped with an automatic shut-off device that claim efficiency performance: "This reverse osmosis system contains a replaceable component critical to the efficiency of the system. Replacement of the reverse osmosis component should be with one of identical specifications, as defined by the manufacturer, to ensure the same efficiency and contaminant reduction performance."

8.1.3 Where appropriate and applicable, and where product packaging contains information for the prospective purchaser, the following information shall be included on the product packaging in a location visible to the purchaser:

- for systems claiming cyst reduction: The percentage of cyst reduction must be included in the claim if the claim is described on the packaging as cyst removal; and
- a statement for systems claiming pentavalent arsenic reduction: "This system has been tested for the treatment of water containing pentavalent arsenic (also known as As(V), As(+5), or arsenate) at concentrations of [0.050 mg/L or 0.30 mg/L]¹¹ or less. This system reduces pentavalent arsenic, but may not remove other forms of arsenic. This system is to be used on water supplies containing a detectable free chlorine residual or on water supplies that have been demonstrated to contain only pentavalent arsenic. Treatment with chloramine (combined chlorine) is not sufficient to ensure complete conversion of trivalent arsenic to pentavalent arsenic. Please see the Arsenic Facts section of the Performance Data Sheet for further information."

¹¹ The square brackets, [], indicate that the values enclosed are options and that only one should appear in the final statement.

8.2 Data plate

8.2.1 A permanent plate or label shall be affixed to the system in a readily accessible location and shall contain, at a minimum, the following information:

- model number of system;
- name and address of manufacturer;
- maximum operating temperature in degrees C (degrees F);
- maximum and minimum working pressure in kPa (psig). Minimum working pressure shall not be less than the pressure specified for testing; and
- a statement that the system conforms to NSF/ANSI 58 for specific performance claims as verified and substantiated by test data.

Components that have been evaluated only for design and construction, materials, or both, shall be exempt from this requirement.

8.2.2 Where applicable and appropriate, the following information shall also be included:

- a statement for systems claiming VOC reduction: "This system conforms to NSF/ANSI 58 for VOC reduction. See performance data sheet for individual contaminants and reduction performance;"

NOTE — Manufacturers may refer to individual chemicals from Table 8.1 on labels, manuals, or promotional materials if such information conforms to the following requirements:

- percent reductions, if specified, shall be either less than or equal to those specified in Table 6.1, or additional testing is completed to justify the claim for a higher percent reduction; and
 - reference to individual chemicals from Table 8.1 shall not imply that specific testing for the chemical was conducted if only the surrogate test was completed.
- a statement for systems with activated carbon: "Do not use with water that is microbiologically unsafe or of unknown quality, without adequate disinfection before or after the system. Systems certified for cyst reduction may be used on disinfected water that may contain filterable cysts;"
 - a statement for systems claiming nitrate/nitrite reduction shall include the pressure used for testing as the minimum application pressure. For example, systems that were tested at 210 kPa (30 psig) shall state: "This system is acceptable for treatment of influent concentrations of no more than 27 mg/L nitrate and 3 mg/L nitrite in combination measured as N and is certified for nitrate/nitrite reduction only for water supplies with a pressure of 210 kPa (30 psig) or greater;"
 - a statement for systems claiming higher levels of nitrate/nitrite at a total influent concentration of 70 mg/L as N that are tested at with 50 psig and an internal booster pump that raises the pressures to higher levels, shall include the pressure used for testing as the minimum application pressure. For example, systems that were tested at 350 kPa (50 psig) shall state: "This system is acceptable for treatment of influent concentrations of no more than 65 mg/L nitrate and 5 mg/L nitrite in combination measured as N and is certified for nitrate/nitrite reduction only for water supplies with a pressure of 350 kPa (50 psig) or greater along with an internal built in booster pump;"
 - for systems claiming cyst reduction: The percentage of cyst reduction must be included in the claim if the claim is described as cyst removal; and

- a statement for systems claiming pentavalent arsenic reduction: “Conforms to NSF/ANSI 58 for pentavalent arsenic reduction. See performance data sheet and Arsenic Facts section for an explanation of reduction performance.”

8.3 Performance data sheet

8.3.1 A performance data sheet shall be made available to potential buyers for each system and shall include the following information:

- complete name, address, and telephone number of manufacturer;
- model number and trade designation;
- a statement that while testing was performed under standard laboratory conditions, actual performance may vary;
- a statement for claims: “This system has been tested according to NSF/ANSI 58 for reduction of the substances listed below. The concentration of the indicated substances in water entering the system was reduced to a concentration less than or equal to the permissible limit for water leaving the system, as specified in NSF/ANSI 58;”

NOTE 1 — Minimum substance reductions per NSF/ANSI 58 shall be listed using the values in tables 8.1, 8.2, and 8.3.

NOTE 2 — In addition to this statement, advertising materials may show the average percent reduction determined during verification.

NOTE 3 — Average concentrations shall be the arithmetic mean of all reported influent challenge or product water concentrations (the detection limit value shall be used for any non-detectable concentrations). The specified percent reduction shall not be greater than the reduction calculated using the arithmetic means of the influent challenge and the product water concentrations respectively.

- production rate in L/d (gpd) as determined by testing to 6.7 and in relation to published efficiency rating, recovery rating, or both, if applicable;
- maximum and minimum working pressure in kPa (psig). Minimum working pressure shall not be less than the pressure specified for testing;
- maximum and minimum operating temperature in degrees C (degrees F);
- general installation conditions and needs;
- general operation and maintenance requirements including, but not limited to:
 - user responsibility;
 - replacement elements;
 - parts and service availability; and
 - suggested frequency of element and cartridge/s replacement or service;
- manufacturer's limited warranty;
- specific requirements of the influent water characteristics (e. g., chlorine, bacteria, pH, temperature, iron, turbidity, hardness, pressure) that may affect RO membrane polymers or other components, addressed in language easily understood by the user; and
- for systems equipped with an automatic shut-off valve and a pressurized or non-pressurized storage tank:

- a statement describing the system's efficiency rating as verified by testing in accordance with 6.7 along with the following: "Efficiency rating means the percentage of the influent water to the system that is available to the user as reverse osmosis treated water under operating conditions that approximate typical daily usage."
- if the recovery rating is also stated, a statement describing the system's recovery rating as verified by testing in accordance with 6.7. The recovery rating shall be reported together with or in succession with the efficiency rating, shall be presented in the same type and size font as the efficiency rating, and shall be reported in the same units of measurement as the efficiency rating, along with the following: "Recovery rating means the percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed."; and
- for all other systems:
 - if the recovery rating is stated, a statement describing the system's recovery rating as verified by testing in accordance with 6.7, along with the following: "Recovery rating means the percentage of the influent water to the membrane portion of the system that is available to the user as reverse osmosis treated water when the system is operated without a storage tank or when the storage tank is bypassed."

8.3.2 Where applicable and appropriate, the following information shall be included:

- explanation of performance indicator;
- electrical requirements;
- model number of replaceable treatment components;
- a statement for systems with activated carbon: "Do not use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system. Systems certified for cyst reduction may be used on disinfected water that may contain filterable cysts;"
- a statement for systems claiming nitrate/nitrite reduction shall include the pressure used for testing as the minimum application pressure. For example, systems that were tested at 210 kPa (30 psig) shall state: "This system is acceptable for treatment of influent concentrations of no more than 27 mg/L nitrate and 3 mg/L nitrite in combination measured as N and is certified for nitrate/nitrite reduction only for water supplies with a pressure of 210 kPa (30 psig) or greater;"
- a statement for systems claiming higher levels of nitrate/nitrite at a total influent concentration of 70 mg/L as N that are tested with an internal booster pump that raises the pressures to higher levels, shall include the pressure used for testing as the minimum application pressure. For example, systems that were tested at 350 kPa (50 psig) shall state: "This system is acceptable for treatment of influent concentrations of no more than 65 mg/L nitrate and 5 mg/L nitrite in combination measured as N and is certified for nitrate/nitrite reduction only for water supplies with a pressure of 350 kPa (50 psig) or greater along with an internal built in booster pump;"
- if other built in performance enhancement steps are needed such steps shall also be identified here if the consumer needs to be aware of such steps for the system's continued effective performance after installation;
- a statement for systems claiming pentavalent arsenic reduction: "This system has been tested for the treatment of water containing pentavalent arsenic (also known as As(V), As(+5), or arsenate) at