•
•
•

3 General requirements

3.1 General

3.1.1 Product and material information described in 3.2 shall be used to determine the specific section (4 through 9) under which a product or material shall be evaluated.

3.1.2 Products or materials whose intended uses fall under more than one section of this Standard shall be evaluated under the section with the most rigorous evaluation conditions.

NOTE – Rigorous conditions are typically associated with shorter conditioning periods, longer exposure periods, higher surface-area-to-volume ratios, and higher exposure temperatures.

3.2 Information and formulation requirements

The following information shall be reviewed to determine the appropriate analytical testing and to ensure that the potential health effects of products and materials are accurately and adequately identified:

– the product section(s) under which the product, component, or material is covered and the intended function or end use of the product or the material;

– for assembled products or components, a list of all of components and materials and their corresponding surface areas that come into direct contact with water;

– when appropriate, the total volume of water that the product can hold when filled to capacity;

– the expected service life of the product;

– the anticipated minimum, maximum, and average volumes of water that come into contact with the product, component, or material during a 24-h period;

– complete formulation information for each water contact material as applicable’

NOTE – The complete formulation information may be omitted for a component material if the generic material type is contained in Table 3.1 and its diluted surface area in the application is less than or equal to 0.001 or 0.0001 for static or flowing conditions respectively.

– the composition of the formulation (e. g., percent or parts by weight for each chemical in the formulation or reference to a standardized material specification);

– a chemical abstract number (CAS no.), name, trade designation, and supplier for each chemical present in the formulation and a Material Safety Data Sheet (MSDS), when available; and

– an indication as to whether the chemical is an ingredient, reactant, or processing aid.

– the maximum temperature to which the product, component, or material is exposed during its intended end use;

– a description/classification of the manner in which the product or material is manufactured (including any process parameters that affect product surface areas in direct contact with water),

handled, and packaged. The manufacturing process variability shall be verified by the manufacturer as to its effect on contaminant leachate levels, and the manufacturer shall establish and demonstrate appropriate ongoing process controls to ensure ongoing product conformance with this Standard;

NOTE – The methods used to alter the water contact surfaces of product components during manufacturing, either mechanically (e. g., metal cutting, molding, stamping) or chemically (e. g., washing, coating, plating, brite-dip cleaning), may have a significant effect upon contaminant leachate performance.

– when available, a list of the known or suspected impurities within the product or material and the maximum percent or parts by weight of each impurity;

– when available, the solubility, hydrolysis products, and extraction rates of chemicals within the product or material; and

– when available, a list of published and unpublished toxicological studies relevant to the chemicals and impurities present in the product, component, or material.

3.2.1 Information and formulation requirements for regenerated/reactivated media

In addition to the information formulation requirements of 3.2, the following information is required for the formulation review and preparation of the analytical summary for regenerated and reactivated media.

- A description of the regeneration/reactivation process and process controls, such as time, temperature, chemical regenerants, and any QC tests associated with the regeneration/reactivation process to ensure contaminants are removed from the spent media so that it complies with the requirements of NSF 61.
- A copy of the procedure detailing the evaluation, and conclusion associated with the review of data from spent media sources identifying the primary contaminants removed from water and any contaminant spills or unusual water conditions.
- A copy of the data, and a copy of the documentation associated with the evaluation of the data from the spent media source(s) associated with a specific lot of reactivated or regenerated media for which a retained sample is available for testing.

3.2.1.1 Incoming shipments of media to be regenerated/reactivated

The following information shall be provided by the water system and maintained by the processing plant for each shipment of spent media received for regeneration/reactivation:

– Identification of the type of the spent media, spent media source, and application of use (e.g. production of drinking water);

– Identification of the original media, including manufacturer, trade designation, mesh size and NSF/ANSI 61 compliance for each spent media source;

– Primary contaminants removed from water, including any contaminant spills or unusual water quality conditions;

– Statement as to whether the spent media has been knowingly exposed to:

  o Activated carbon: polychlorinated biphenyls (PCBs), dioxins or 1,2 dibromo-3chloropropane (DBCP);
  o Other media: herbicides, pesticides, polychlorinated biphenyls (PCBs), dioxins or 1,2 dibromo-3chloropropane (DBCP);

– Statement to verify that the spent media source is from a public water system (publicly or privately owned) as defined by US EPA regulations.

3.3 Identification of analytes

For all products and materials, the formulation information required in 3.2 shall be reviewed for completeness (e. g., all formulations total 100%), and to determine whether a minimum test battery has been established for each water contact material (see table 3.1). The availability of an established minimum test battery shall not preclude performance of a formulation review to identify any formulation-dependent analytes (see 3.3.1).

3.3.1 Formulation-dependent analysis selection

For all water contact materials, the formulation information described in 3.2 shall be reviewed, and formulation-dependent analytes shall be identified for each water contact material. The criteria for selection of a formulation-dependent analyte shall include, but not be limited to, the following:

– known or suspected toxicity of the substance or its byproduct(s);

– high water solubility of the substance;

– monomer(s) of polymeric ingredients;

– high probability of extraction of a substance or its byproduct(s) at toxicologically significant concentrations; and

– extraction or migration information for the substance provided by the manufacturer.

3.3.2 Established minimum test batteries

The materials listed in table 3.1 shall be tested for the indicated analyses and any formulation-dependent analyses identified during the formulation-dependent analyte selection. Products, components, or materials shall not require testing if their diluted surface area in the application is less than or equal to 0.001 or 0.0001 for static or flowing conditions respectively.

3.4 Products manufactured from annex C acceptable materials

Products manufactured entirely from annex C materials shall not be required to undergo extraction testing for material-specific analytes of interest. However, extraction testing for contaminants contributed by processes specific to a production site shall be considered formulation-dependent analytes. Annex C contains the evaluation requirements for qualification as an acceptable material.

•
•
•

7 Process media

7.1 Scope

The requirements in this section apply to process media products intended for the reduction of dissolved or suspended materials present in drinking water. The products that are covered include, but are not limited to, process media used in the following processes: ion exchange, adsorption, oxidation, aeration, and filtration.

7.2 Definitions

7.2.1 adsorption: The retention of a gas, liquid, solid, or dissolved material onto the surface of a solid.

7.2.2 adsorption media: A process media material upon which a gas, liquid, solid, or dissolved material will be retained.

7.2.3 aeration: The process of bringing water into contact with air in order to expedite the transfer of gas between the two phases.

7.2.4 aeration packing media: Media used in aerators to increase the surface area of the liquid being processed, resulting in increased liquid-to-air contact and improved gas transfer.

7.2.5 commingled media: A mixture of spent media from different spent media sources. Reactivated/regenerated media from a single source that is mixed with virgin media is not considered to be commingled.

7.2.6~~5~~ filtration: The process of passing a dilute liquid suspension through filter media to reduce the concentration of suspended or colloidal matter.

7.2.7~~6~~ filtration media: Process media through which a liquid is passed for the purpose of filtration.

7.2.8~~7~~ ion exchange: A chemical process in which ions are reversibly interchanged between a liquid and a solid.

7.2.9~~8~~ ion exchange resins: Process media consisting of insoluble polymers having functional groups capable of exchanging ions.

7.2.10~~9~~ low-density process media: Process media such as diatomaceous earth, perlite, or other media, which have a bulk density of less than 500 g/L and are used for filtration purposes.

7.2.11~~10~~ oxidative media: Process media that chemically facilitate oxidation on the media surface and thereby enhance removal of ions from water.

7.2.12 Potable/food grade reactivation/regeneration facility: A reactivation/regeneration facility where all process equipment in contact with spent media is used exclusively to handle media used to treat products designated for human consumption, which does not include pharmaceutical related applications. If the facility is part of a larger media facility that handles non-potable/non-food grade media, the potable/food grade reactivation facility shall have separate entry and shall not allow transport between the facility and the non-potable/non-food grade portion. Any media classified as hazardous under the Resource Conservation and Recovery Act (RCRA) or by U.S. state or Canadian provincial regulations is excluded from reactivation/regeneration in a potable/food grade reactivation facility. [Revised to include media in general]

7.2.13~~1~~ process media: Water insoluble material used to reduce the concentration of dissolved or suspended substances in water through such operations as ion exchange, aeration, adsorption, oxidation, and filtration.

7.2.14~~2~~ reductive media: Process media that chemically facilitate reduction on the media surface and thereby enhance removal of ions from water.

7.2.15 reactivation: A controlled thermal process operating at a temperature and gas environment sufficient to pyrolyze adsorbates from spent activated carbon and restore adsorption capacity.

7.2.16 regeneration: The periodic restoration of an adsorptive media (excluding activated carbon) back to useable form by employing a chemical regenerant to displace contaminants removed during the treatment process.

7.2.17 spent media: Media that has been in service and is no longer able to produce a desired effluent quality.

7.3 General requirements

7.3.1 Manufacturer use instructions

All process media products shall be accompanied by detailed manufacturer use instructions that shall also appear on the product packaging or other technical literature. For process media products that are dosed (e. g., powdered activated carbon), use instructions shall include the maximum dose at which the product can be acceptably used (as determined by evaluation to the requirements of this section).

7.3.2 Product labeling

Process media product containers shall facilitate traceability to the production location and shall, at a minimum, contain the following information:

- manufacturer's name and address;
- production location identifier;
- product identification (product type and, when applicable, trade name);
- net weight or net volume;
- when applicable, mesh or sieve size;
- lot number; and
- when appropriate, special handling, storage, and use instructions.

7.3.2.1 Additional labeling and literature requirements for reactivated/regenerated media

Product packaging, literature shipped with the product, and certification listings for reactivated/regenerated media shall explicitly identify the product as reactivated or regenerated. Labeling of media from commingled sources shall identify the product as commingled.

7.3.3 Additional requirements for reactivated/regenerated media

Only reactivation/regeneration facilities and equipment used to handle spent and reactivated/regenerated media, classified as potable and/or food grade, shall be used. Transportation containers shall be suitably protected from environmental contamination and suitably cleaned, by evidence of wash-out tickets that are presented to the purchaser or certifying agency on demand.

Samples from each reactivated/regenerated batch of media shall be retained at the facility for a period of at least 2 years, and be made available for analysis by the purchaser or a certification organization. Retained samples shall contain at least twice the weight in table 7.2.

Commingled spent media shall be of comparable type and function.

Transportation containers are suitably protected from environmental contamination and suitably cleaned prior to use.

Reactivation/regeneration facilities shall have written verification from each water system that each shipment of spent media to be processed meets the following criteria.

- The spent media shall only have been used only for drinking water applications;
- The spent media shall not be a RCRA hazardous waste as defined by 40CFR Part 261;
- The spent media is not classified as a hazardous waste in the facility's state or province;
- The spent media shall not have knowingly been exposed to:
  - Activated carbon: polychlorinated biphenyls (PCBs), dioxins or 1,2 dibromo-3chloropropane (DBCP);
  - Other media: herbicides, pesticides, polychlorinated biphenyls (PCBs), dioxins or 1,2 dibromo-3chloropropane (DBCP);

7.3.4 Product line evaluation

When a line of products is manufactured to the same material formulation and contains identical ingredients, product evaluation shall be preferentially conducted on the product form that has the highest surface-area-to-volume ratio (smallest particle size). Products of a lower surface-area-to-volume ratio (larger particle size) shall be considered to have met the requirements of this section when a higher surface-area-to-volume ratio product, belonging to the same line of products and having an identical use, has been demonstrated to meet the requirements of this section.

7.4 Sample requirements

A representative sample of the media shall be reduced to three test samples, each of a sufficient quantity for the extraction procedures described in 7.5. The three test samples shall be placed and stored in airtight, moisture-proof, sealed glass containers. If a glass container is inappropriate, containers made from some other inert material recommended by the manufacturer shall be used. Each container shall be clearly labeled with product name, type of sample, manufacturer name, sampling data, production location, lot number, and the name of the individual who collected the sample. One sample shall be used for exposure and analysis; the remaining two samples shall be retained for re-evaluation purposes.

-
-
-

Table 7.1 – Product-specific minimum test batteries for process media products

Product	Primary use	Analytes for virgin media	Analytes for regenerated/ reactivated media
activated alumina	adsorption	metals[1], nickel, and aluminum	see footnote 2.
aluminum silicates (e. g., zeolites)	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
impregnated aluminum silicates	adsorption	metals[1], GC/MS (base neutral acid scans), and radionuclides	metals[4], GC/MS (base neutral acid scans), VOCs and radionuclides
anthracite	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
diatomaceous earth ~~media~~	filtration	metals[1] and radionuclides	see footnote 2.
garnet	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
granular activated carbon (GAC)	adsorption	metals[1], GC/MS[3] (base neutral acid scans),and radionuclides	metals[4], GC/MS[3] (base neutral acid scans), and radionuclides
gravel	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
ilmenite	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
ilmenite	adsorption	metals[1], GC/MS (base neutral acid scans), and radionuclides	metals[4], GC/MS (base neutral acid scans), VOCs and radionuclides
ion exchange resins	ion exchange	residual monomer, other formulation dependent	metals[4], GC/MS (base neutral acid scans), VOCs and radionuclides, ~~residual monomer,~~ other formulation dependent
impregnated ion exchange resins	adsorption	metals[1], GC/MS (base neutral acid scans), and radionuclides, residual monomer, other formulation dependent	metals[4], GC/MS (base neutral acid scans), VOCs and radionuclides, ~~residual monomer,~~ other formulation dependent
oxidative media (e. g., manganese green sand)	oxidation	metals[1], GC/MS (base neutral acid scans), and radionuclides	metals[4], GC/MS (base neutral acid scans), VOCs and radionuclides
perlite	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
powdered activated carbon (PAC)	adsorption	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.

metal-based media (e. g., granular iron, iron oxide, titanium dioxide, etc.)	Adsorption	metals[1], GC/MS (base neutral acid scans), and radionuclides	metals[4], GC/MS (base neutral acid scans), VOCs and radionuclides
sand	filtration	metals[1], GC/MS (base neutral acid scans), and radionuclides	see footnote 2.
synthetic media	aeration, filtration	formulation dependent	see footnote 2.

[1] Metals = antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, selenium, thallium

[2] These products are not typically regenerated or reactivated at remote locations. Therefore a minimum test battery has not been established. A full formulation review would be required for these products if they are evaluated under this standard.

[3] GC/MS (base neutral acid scans) required if documentation identifying process controls intended to ensure complete activation/reactivation is not available.

[4] Metals (for reactivated and regenerated media) = antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, selenium, thallium, aluminum, manganese, nickel, silver, tin, vanadium, zinc.

Table 7.2 – Process media exposure weight-per-volume ratios

Media type	**Weight-per-volume**[1]
adsorption media: activated alumina GAC and PAC	 625 ± 25 g/L 25 ± 5 g/L
anthracite and gravel[2]: ≤ 3/8" diameter particles > 3/8" diameter particles	 625 ± 25 g/L 1250 ± 25 g/L
filter precoat media (e. g, perlite, diatomaceous earth)	10 times the manufacturer's recommended use concentration
filtration media other than anthracite or gravel	625 ± 25 g/L
ion exchange resins	625 ± 25 g/L
synthetic media	625 ± 25 g/L

[1] Weight-per-volume of the product on an "as shipped" basis.

[2] For the size range specified, not more than 8% by weight shall be either finer than or coarser than the designated size limit (AWWA B100-96).

Table 7.3 – Maximum conditioning expansion rates for filtration and adsorption media

Media type	Maximum laboratory expansion rate of wetted media (by height) (%)
activated alumina	25 ± 5%
aluminum silicates (zeolites)	25 ± 5%
Anthracite	25 ± 5%
Garnet	30 ± 5%
granular activated carbon	30 ± 5%
Gravel	10 ± 5%
Ilmenite	30 ± 5%
manganese greensand	30 ± 5%
Sands	20 ± 5%

Table 7.4 – Exposure schedule for process media of ≥ 0.25 mm in diameter

Time	Temperature	Comment
60 ± 5 min	23 ± 1 °C (73 ± 2 °F)	Exposure water is drained/decanted and discarded; the exposure vessel is refilled and exposure is continued.
60 ± 5 min	23 ± 1 °C (73 ± 2 °F)	Exposure water is drained/decanted and discarded; the exposure vessel is refilled and exposure is continued.
60 ± 5 min	23 ± 1 °C (73 ± 2 °F)	Exposure water is collected and filtered for analyses.

-
-
-