

# SPECIFICATIONS FOR HYPOCHLORITE WATER TREATMENT CHEMICALS



The NSF/ANSI 60: *Drinking Water Treatment Chemicals – Health Effects* standard incorporates the limits shown below for oxyhalides as trace contaminants in hypochlorite chemicals.

## PERCHLORATE SPECIFICATION

Pass/fail testing for perchlorate is required for sodium hypochlorite treatment chemicals, based on a U.S. EPA draft health advisory of 15 parts per billion (ppb) for perchlorate in drinking water, and on state regulatory limits in California (6 ppb) and Massachusetts (2 ppb). All hypochlorite chemicals are evaluated to a general single product allowable concentration (SPAC) of 5 ppb (one-third of the EPA health risk advisory level).

In addition, bleach manufacturers may have their products evaluated and certified to the California SPAC of 2 ppb (one-third of the CA state MCL) and/or the Massachusetts SPAC of 0.7 ppb (one-third of the MA state MCL).

## CHLORATE SPECIFICATION

Pass/fail testing criteria for chlorate are also required for sodium hypochlorite treatment chemicals. A Health Canada guideline of 1 part per million (ppm) has been established for chlorate. Accordingly, a SPAC of 300 ppb (one-third of the Health Canada guideline) is in place as evaluation criteria for chlorate in bleach chemicals.

## HYPOCHLORITE CHEMICAL STORAGE

As the concentration of perchlorate and chlorate in sodium hypochlorite has been shown to increase over time (as bleach is stored), NSF/ANSI 60 requires a born-on date (original bleach manufacture date) and any subsequent bleach repackaging dates to be shown on the product label or other documentation provided with the product shipment.



This enables water treatment plant operators to take steps to prevent accumulation of significant levels of chlorate and perchlorate in stocks of hypochlorite.

The Southern Nevada Water Authority completed an American Water Works Association (AWWA)/ Water Research Foundation (WRF) sponsored study that recommends storage, use and handling practices for sodium hypochlorite by water utilities. Whereas NSF/ANSI 60 is a health effects standard for chemical vendors/products, the Southern Nevada recommendations were incorporated into the AWWA B300 Hypochlorites Standard and include the following:

- > **Dilute hypochlorite solutions on delivery.** Diluting a 15 percent solution by a factor of two decreases perchlorate formation by a factor of seven.
- > **Reduce storage temperature.** Each five-degree reduction in temperature reduces the rate of decomposition by a factor of two.





- > **Control pH between 11 and 13.**  
Below pH 11, chlorate formation increases.  
Above pH 13, perchlorate formation increases.  
On-site generators typically are between pH 9 and 10, and the solutions should be used within one to two days.
- > **Control the concentration of metal ions.**  
Purchase filtered sodium hypochlorite solutions and use low-metal ion concentration feed water for on-site generators.
- > **Use fresh hypochlorite solutions when possible.**

## BROMATE SPECIFICATIONS

NSF/ANSI 60 also includes pass/fail testing criteria for bromate in hypochlorite chemicals. The EPA Disinfectants and Disinfection Byproducts Rule establishes an MCL of 10 ppb for bromate ion. Because hypochlorite treatment chemicals, in addition to ozonation systems, are a known potential source of bromate ion to drinking water, the SPAC for bromate was established at 3.3 ppb (one-third of the EPA MCL).

As many drinking water utilities manufacture sodium hypochlorite chemicals through on-site hypochlorite generators (in lieu of, or in addition to, purchased bleach), NSF/ANSI 60 also includes criteria to address the bromate-forming potential of sodium chloride salt, which is used as the feedstock for on-site hypochlorite generators.

Many natural salt formations contain a small level of bromide, which can form and release bromate ion during the electrochlorination process where hypochlorite effluent is generated. Therefore, bromide content is a standard evaluation parameter for sodium chloride salt products under NSF/ANSI 60, in addition to regulated metals and radionuclides (gross alpha/beta) content.

For salt products used in the electrochlorination process, NSF verifies that the bromide concentration is less than or equal to the manufacturer's specification in accordance with the analytical parameters defined in Annex B, Section 4.2.2.2 of NSF/ANSI 60.

**Note:** The bromide specification may not exceed 59 mg/kg in NaCl (sodium chloride) salt for electrolytic hypochlorite generators at a maximum feed rate of 10 mg/L (as chlorine). A higher concentration of bromide is permitted in NaCl salt used in generators that deliver lower maximum feed concentrations of chlorine, so that the total concentration of bromate does not exceed 3.3 ppb.

**Note:** The 59 mg/kg limit is based on a use assumption that 3.3 ug/L (ppb) bromate will be produced from 3.5 pounds of NaCl containing 59 mg/kg bromide with 15 gallons of water to produce (via electrolysis) 1 pound of free available chlorine (FAC) equivalent disinfectant and dosed to affect a 10 mg/L FAC in the finished drinking water.

Product literature for salt products which references NSF/ANSI 60 certification is also required to indicate the maximum bromide concentration specification and the associated maximum feed concentration of chlorine. Use a low bromide salt in on-site generators to reduce the formation of bromate in effluent bleach solutions.

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