COCA-COLA NORTH AMERICA (CCNA) BASE FILTRATION WATER TREATMENT SPECIFICATION FOR FOODSERVICE

Purpose	Provide minimum technical specifications for Base Filtration water treatment units used in Coca-Cola North America (CCNA) Foodservice accounts.
Scope	Base Filtration is water treatment that improves the water quality from municipal water sources due to inconsistent production or contamination from distribution systems. The following quality improvements are required for the stated life cycle of the Water Treatment Unit: • Remove off-taste and off-odor • Reduce total chlorine (free chlorine and/or chloramine) to less than 0.5 ppm demonstrated by NSF 42 Chloramine Reduction Certification • Remove visible particles (> 30 µm) **NOTES:** • Fundamental to CCNA's specification is the potability, or safety, of the incoming water provided by US municipal sources. Water Treatment Unit specifications for health and safety parameters, such as protozoan cysts and pathogenic microorganisms, are not provided in this document. These are found in NSF 53, see Appendix C. Water quality specifications are found below. • CCNA recognizes Base Filtration does not address other parameters found in the specifications, such as dissolved mineral reduction, pH adjustment or small particle reduction. Water treatment unit specifications for these quality parameters
Independent Validation	Validation of a Base Filtration water treatment unit shall be accomplished by Certification through an accredited third party Certifier, preferably NSF. Use of other third party certifiers must first be agreed upon by Coca-Cola North America. Expenses related to certification shall be the supplier's responsibility.
References:	This document references: • NSF/ANSI Standard 42 • CCNA Water Specification
Appendices	• Appendix A: Post-Mix Water Supply System Requirements • Appendix B: NSF/ANSI Standard 53 – Health & Safety Claims • Appendix C: Icemakers • Appendix D: Mineral Reduction • Appendix E: Water Softeners

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<table>
<tr><td>CCNA Water Quality Specification</td><td>The water supplied to the post-mix dispensing system must be potable by EPA drinking water standards or meet the drinking water guidelines of the World Health Organization, whichever is more stringent. If the water supply is not considered potable, the source water cannot be qualified for post-mix use.

In addition, and unless local regulatory specifications are more stringent, the water treatment/supply system, as installed, and as it performs throughout the expected life of any/all replaceable treatment system components (i.e. filter cartridges), must deliver to the post-mix dispensing system an uninterrupted water supply that continuously meets the following Company specifications:

<table>
<tr><th>Attribute</th><th>Specification</th></tr>
<tr><td>Bacteria (coliform)</td><td>Must be zero colony forming units (cfu) in any 100-mL sample, or follow local requirement if it is more stringent.</td></tr>
<tr><td>Bacteria (total count/ nonpathogenic)</td><td>Not more than 500 cfu in any 1-mL sample</td></tr>
<tr><td>Turbidity</td><td>Must not exceed 0.5 NTU</td></tr>
<tr><td>Taste/Odor</td><td>Free from off-tastes and odors</td></tr>
<tr><td>Total Chlorine</td><td>Not more than 0.5 mg/L</td></tr>
<tr><td>Iron</td><td>Not more than 0.3 mg/L</td></tr>
<tr><td>Total Alkalinity</td><td>Not more than 150 mg/L</td></tr>
<tr><td>Total Hardness</td><td>Not more than 100 mg/L</td></tr>
<tr><td>Total Dissolved Solids</td><td>Not more than 500 mg/L</td></tr>
<tr><td>Chlorides</td><td>Not more than 250 mg/L</td></tr>
<tr><td>Sulfates</td><td>Not more than 250 mg/L</td></tr>
<tr><td>pH</td><td>6.5 to 8.5</td></tr>
</table>
</td></tr>
<tr><td>Materials</td><td>The unit must meet the Material Safety requirements of NSF/ANSI Drinking Water Treatment Unit Standard 42.</td></tr>
<tr><td>Design and Construction</td><td>The unit must meet the Structural Integrity and Minimum Performance requirements of NSF/ANSI Drinking Water Treatment Unit Standard 42.

The unit must include, at minimum, an outlet pressure gauge.

The unit must include a flush valve.</td></tr>
</table>

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Treatment Capacity	Base Filtration units should have a rated volume that provides the outlet service up to one year before replacement.
Flow Rate	Flow rate requirements depend on the peak demands of the Foodservice account. In general, the units can be considered in three flow rate categories (also see Appendix A): • Low flow: 1.67 gpm • Medium Flow: 3.4 gpm • High flow: 5 gpm All reduction claims should be certified at the appropriate flow rate. The unit must be rated to perform at the required flow rate with maximum pressure drop of 20 psi at 60 psi incoming pressure.
Base Filtration Chemical Reduction Performance **<u>REQUIRED</u>**	Must be certified to the standards under NSF/ANSI 42 by NSF or an independent, accredited Certifier agreed upon by Coca-Cola North America. • Reduction of 3.0 mg/L challenge of mono-chloramines by ≥85% (≤0.5ppm) • Chloramine reduction based from challenge of mono-chloramines, cannot be a chloramine substitute • Nominal Particulate Reduction, Class V (≥ 30 µm to < 50 µm) • Chlorine Taste and odor reduction Validation of claims must be maintained according to NSF 42 Annex A, re-certifications and material change requirements.

APPENDIX A
Post-Mix Water Supply System Requirements

Purpose	Identify the requirements and guidelines for integrating Water Filtration or Water Treatment Systems with the Beverage Dispensing System in a Foodservice Outlet.
Requirements	The following are requirements for any water filtration system to integrate with post-mix dispensing. These must be met for the beverage dispensing system to function properly: • The water filtration or treatment system must provide as a minimum 1.67 gpm of intermittent flow for a dispensing system that consists of a maximum of 1 carbonator and 1 non- carbonated product dispensing valve. • The water filtration or treatment system must provide as a minimum 3.34 gpm of intermittent flow for a dispensing system that consists of a maximum of 2 carbonators and 2 non-carbonated product dispensing valves. • The water filtration or treatment system must provide as a minimum 5 gpm of intermittent flow for a dispensing system of a maximum of 3 carbonators and 3 non-carbonated product dispensing valves. • For water filtration systems with more than 3 carbonators, 1.67 gpm of intermittent flow must be provided with the addition of each additional carbonator over 3 carbonators. • The maximum flowing pressure that may be supplied to the dispensing system is 65 psi. This maximum flowing pressure is measured with a maximum of 1.67 gpm of flow. • The minimum flowing pressure supplied to dispensing system is 40 psi at the maximum rated flow rate. NOTE: the maximum rated flow rate includes all uses of filtered or treated water supplied by the filtration system. In addition all other parallel uses of water in the food service outlet must be in operation. • Water tubing before and after filtration, but prior to carbonation, should be opaque to reduce the likely growth of colored biologic material. • The water supplied to the dispensing system must be free of any off-taste or odor.

APPENDIX A
(cont.)
Post-Mix Water Supply System Requirements

Guidelines	The following are design considerations for the water filtration or treatment system supplier to take into account in the specification or selection of a system to meet a Foodservice customer's needs: • Supply Pressures in Food Service Outlets are quite variable. This variation is the result of: (1) day part variation in water system supply pressures, and/or (2) significant under sizing of supply piping to and/or within the food service outlet. Frequently, a system to boost supply pressure in order to maintain maximum flow rates is required to meet the above beverage dispensing system requirements. • Other potential uses for filtered or treated water in a food service outlet include: ice makers, coffee and/or tea brewers, steam table water, other beverage dispensers (juice dispenser, post-mix tea dispenser, etc.). If a common filtration system is utilized or common elements of a filtration system are utilized, the pressure and flow requirements for the beverage dispensing system must be maintained in all possible configurations and for all possible operation of the integrated system. • The list provided above of possible uses of filtered water is by no means exhaustive; food service outlets due to their unique water distribution requirements may utilize filtered water in many other ways. • Some water booster systems employed to maintain minimum pressure requirements of maximum flow rate requirements may have difficulty meeting the taste and odor criteria. • The water filtration system configuration must account for potential premature filtration system failure due to particulate matter in the water supply system of some municipalities. This may require pre-filtration to assure that the stated useful life of the filtration system is maintained with a water supply containing particulate matter.

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APPENDIX B
HEALTH & SAFETY

Purpose	Foodservice customers may have a Health and Safety specification for water treatment that exceeds CCNA's quality specifications. The Health and Safety claims for a water treatment unit must be certified by an accredited certification agency under claims of NSF Standard 53.

NSF Standard 53	NSF/ANSI 53 provides testing and validation for Health and Safety related claims by water treatment unit manufacturers. There are actually 31 different claims that fall under Standard 53, in 3 classes – Inorganics, Organics and Mechanical. The relevant claims for Foodservice applications are for mechanical reduction:
	• Cyst reduction (99.95% reduction)
	  ○ Influent: contains ≥50,000 cysts or microspheres per L
	  ○ Microspheres (3µm ± 0.15µm) or live cysts (3 - 7µm)
	  ○ Measured by epifluorescent microscopy
	• Turbidity reduction (≤ 0.5NTU)
	  ○ Influent: contains nominal test dust to make 11±1 NTU
	  ○ Nominal test dust (96% between 0 – 5µm)
	  ○ Measured by nephelometry
	• Asbestos reduction (99% reduction of 10^7 to 10^8 challenge water)
	  ○ Not widely used
	NOTE: a Class I Nominal Particulate Reduction claim can be made for submicron particles under NSF/ANSI Standard 42:
	• Nominal Particulate reduction (≥85% reduction of particles from 0.5-1µm)
	  ○ Influent: ≥10,000 particles/mL
	  ○ ISO A2 Fine Test Dust, 0-80µm)
	  ○ Measured by laser particle count (subtracted from effluent blank)

Mechanical Filtration Claims	Measure the sieving capability of filters to remove small particles that are dangerous or considered to be indicators of health or safety issues. NOTE: no claims of capacity or rated service cycle are applicable for mechanical filtration.
Inorganics	10 absorbent media claims for various metals, fluoride and nitrate
Organics	18 absorbent media claims for various pesticides, aromatics and chlorinated organics.

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APPENDIX C
ICEMAKER APPLICATIONS

Purpose	Foodservice customers may specify water treatment for the water feeding their icemakers. Customers should follow the recommendations outlined by icemaker manufacturers.
Icemaker Feedwater:	• May have excess hardness minerals (>50 ppm/3 gpg) that can cause scaling and frequent service calls. Many water filtration companies offer scale inhibitor products (usually composed of polyphosphate) that reduce scale formation without negative impact to dispensed beverage quality. • May require particulate reduction using standard sediment filters. These filters may be spiral wound polyolefin or cellulosic cartridge systems. • May have trace organics that lead to off-tastes and/or off-odors. Base filtration water treatment units, as described in this document, can be used to effectively reduce these compounds.
Water Use	Some icemakers use large amounts of water to produce high quality cubes. Filtering the icemaker feedwater using Base Filtration can actually use more water than filtering the water going to Post Mix alone. Filter change-outs can be dramatically increased with potential pressure drop issues when fountain and icemaker equipment demands coincide.
Chlorine and Chloramine Residual	May have chlorine or chloramine residuals from municipal sources. These compounds are excluded in the ice formation process in vertical evaporator-type icemakers. Other types of icemakers, flakers and nuggets, use a different process that does not remove chlorine or chloramine from the water during the ice making process.

APPENDIX D

MINERAL REDUCTION

Purpose	Base Filtration provides for reduction of off-tastes, *i.e.* from the disinfectant residuals (chlorine and/or chloramine) in municipal water. Some areas of the country may have elevated levels of minerals resulting from the geology of the source water. In these special cases, water treatment beyond Base Filtration may be needed to lower these mineral levels to within CCNA specifications.
Mineral Reduction:	Membrane water treatment is generally used for mineral reduction. Membranes are thin polymer films designed with variable size pores to allow only small ions, molecules, gases – and water to pass through. • Reverse Osmosis (RO) – a water treatment process that removes contaminants from water by using pressure to force the water molecules through a semi-permeable membrane. RO removes ionized salts, colloids, and organic molecules down to a molecular weight of 100. • Nanofiltration (NF) – a membrane treatment process which falls between reverse osmosis and ultrafiltration on the filtration/separation spectrum. NF operates at lower pressures than RO, uses less water and removes contaminants in water such as humic acid, polyvalent salts and compounds down to a molecular weight of about 300 - 1000. NF may be used for selective removal of hardness ions in a process known as *membrane softening*.
CCNA Position:	Reverse Osmosis water treatment systems are a viable option for treating water for food service applications in situations where dissolved minerals are exceptionally high (TDS >800-1000ppm). Water from the system can be used for beverage (soft drink, coffee, tea; non-carbonated, frozen, and juice products), ice, steamers, and proofers. Nanofiltration systems are currently under development for point of use applications. These membrane systems are preferable to RO because they use less water and remove less of the minerals.
Guidelines:	Sizing. Membrane treatment generally doesn't produce water fast enough, so there needs to be a storage tank to meet the sporadic demands of food service equipment. These pressurized tanks need to be sized properly and be sanitized on a regular basis. Installation & Maintenance. Units should be installed and maintained by a water treatment professional. Proper pretreatment should be in place to ensure operation to desired maintenance intervals. Compatibility. RO permeate can be classified as an aggressive water, potentially causing corrosion of metal parts. The result is potential equipment deterioration and trace amounts of metals in final water. Water Use. Conservation is a critical issue to CCNA and our customers. The amount of reject water will impact customers' water/sewer billings and impact the ROI of the equipment. Monitoring of reject water quantity and quality is important. Operation. Some type of monitoring/alerting device should be in place to ensure technicians are notified when membrane systems are not working properly (*i.e.* membrane breach).

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APPENDIX E
WATER SOFTENERS

Purpose	Some areas of the country may have water with elevated levels of hardness minerals resulting from the geology of the source water. These dissolved minerals can come out of solution (precipitate) when heated or cooled to form limescale deposits. In Foodservice accounts, scaling from high water hardness can occur in coffee makers and icemakers causing operational problems. Quality issues can also occur, such as cloudiness in tea or salty taste in dispensed beverage. In these special cases, water treatment beyond Base Filtration may be needed to lower these mineral levels to within CCNA specifications.
Water Softening:	Hardness minerals are calcium and magnesium compounds that are dissolved into the water and exist as positively charged ions (cations). Conventional water softeners use a process called cation exchange to remove water hardness by "trading" the calcium and magnesium ions for sodium ions. Hard water is generally considered to be above 7 grains per gallon (gpg) or 120 parts per million (ppm). Very hard water is over 10.5 gpg/180 ppm. Soft water is less than about 3 gpg/50 ppm. [*Water Quality Association Glossary of Terms*, 4th edition, 2000]
CCNA Position:	CCNA testing shows that water softeners, when properly applied, will not adversely affect beverage quality in most situations. Customers should consult with a qualified water treatment professional to ensure an appropriate softener is properly sized, installed and maintained. Our tests show that in a few cases water softeners can degrade beverage quality and only a water treatment professional can identify and address those situations.
Guidelines:	1. The softener should be approved by an independent testing laboratory such as NSF International, Underwriters Laboratories Inc., or the Water Quality Association. 2. CCNA testing shows no negative impact on dispensed beverage carbonation for source water up to a hardness level of about 250 ppm (as CaCO3), or 14 gpg. As a guideline, the incoming water hardness should be less than this to maintain Total Dissolved Solids (TDS) and sodium content of the product water. 3. Water softeners are not recommended when incoming Total Dissolved Solids (TDS) exceed 500 ppm. Our studies have found that when TDS exceeds 500 ppm, carbonation of our products may be adversely affected. In these cases, alternative water treatment applications should be considered.