

## What Does Sanitation Management Involve?

Employing electrolyzed water production equipment greatly changes daily sanitation management practices. Washing and disinfecting of cooking utensils and sterilization of foodstuffs are vastly simplified-almost like washing without soap.

Electrolyzed water is highly effective against microbes, the main cause of food poisoning, and acts to prevent both primary and secondary contamination.

Paired with an accurate grasp of the routes of contamination, use of electrolyzed water production systems offers an efficient means of providing effective sanitation management.

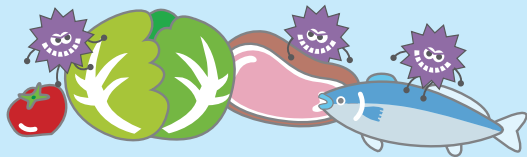


Electrolyzed Water  
Production System  
ROX-10WB

The critical point in ensuring the prevention of food poisoning is "interrupting the route of contamination between foods."

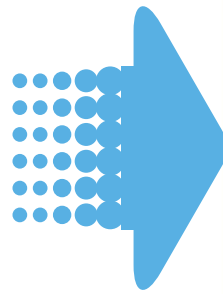
### Primary Contamination

This comprises contamination of foods directly from the natural environment, such as locations where foods are produced. This is broadly considered as contamination present at the time the food is received.



### Secondary Contamination

This type of contamination arises indirectly from utensils and counters used in food processing, food handlers' hands and fingers, and other points of contact.



Electrolyzed water actively prevents contamination.

### Food Poisoning

Food is sterilized with acidic electrolyzed water (sanitizing water).

Prevention of Primary Contamination

### Washing

Contaminants are washed away with alkaline electrolyzed water (cleaning water).

Prevention of Secondary Contamination

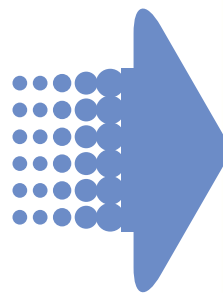
### Disinfecting

Acidic electrolyzed water (sanitizing water) is effective against nearly all types of food poisoning.

Shouldn't YOU be taking another look at your approach to sanitation management thus far?

"We do want to be stringent in following the "Sanitation Management Manual for Large-Scale Food Processing Facilities" guidelines,..."

...but the work is so busy, and proper sanitation management takes a lot of effort..."



Electrolyzed water changes sanitation management.

### Increased Safety

Decreases residues while inhibiting retention of chlorine odors.

### Improved Workflow

No diluting required. Facilitates smooth operations.

### Greater Economy

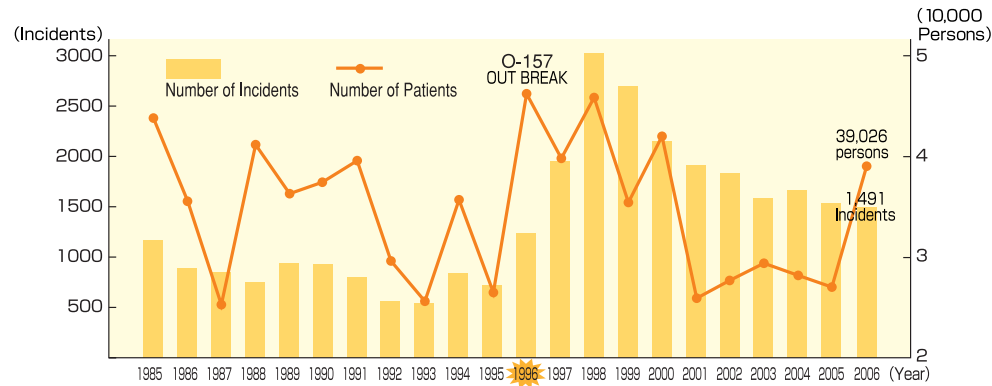
Only 0.4 yen per liter. Enables large-scale use.

# How is Food Poisoning Prevented?

[ Bacterial Food Poisoning ]

Despite the remarkable improvements in Japan's living environment each year, there has been no downturn in the incidence of food poisoning, which instead harms tens of thousands annually.

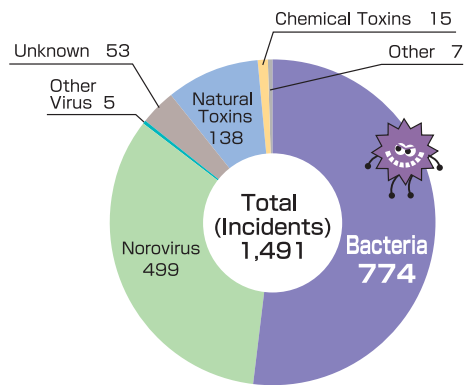
■ Incidence of Food Poisoning by Year (Figures for incidence of food poisoning from Ministry of Health, Labour and Welfare)



## What is Bacterial Food Poisoning?

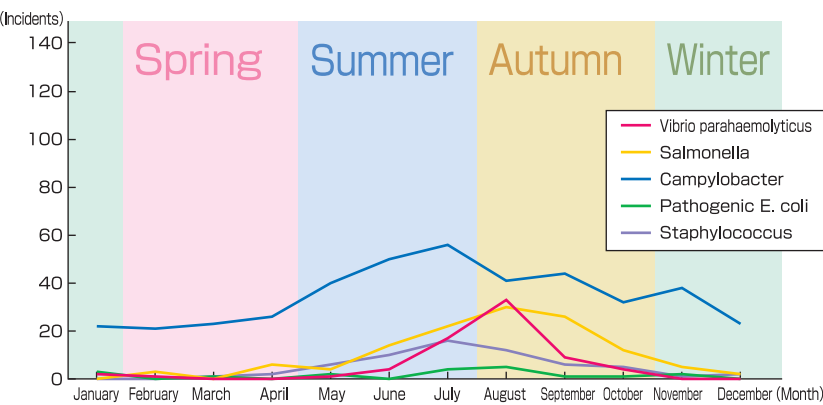
Approximately 50% of all cases of food poisoning is caused by bacteria.

■ Occurrence of Food Poisoning by Etiologic (Disease-Causing) Agent \*



Bacteria, regardless of type, pose a danger throughout the year.

■ Incidence of Food Poisoning by Month \*



\*From 2006 statistics of food poisoning in Japan, categorized by pathogen and by month, produced by the Ministry of Health, Labour and Welfare (MHLW)

There are various types of bacteria that cause illness.

Major Bacteria					
	<b>Vibrio parahaemolyticus</b>	<b>Salmonella</b>	<b>Campylobacter</b>	<b>Pathogenic E. coli</b>	<b>Staphylococcus</b>
Characteristics	Proliferates rapidly in seawater (Perishes in 8-10 minutes at 60°C)	Carried by flies and cockroaches (Perishes in 20 minutes at 60°C)	Present in livestock and pet intestines, proliferate in temperatures at and above 30°C (Perishes in 20 minutes at 60°C)	Well water, practically all environments (Perishes in 30 minutes at 60°C)	Present in human nasal and throat passages and open wounds (Perishes in 10 minutes at 80°C)
Main Foods Contaminated	Seafood Compound foods	Eggs and processed foods containing eggs Compound foods Vegetables and processed foods containing vegetables	Meat and processed foods containing meat	Meat and processed foods containing meat Compound foods Vegetables and processed foods containing vegetables	Cereal grains and processed foods containing cereal grains



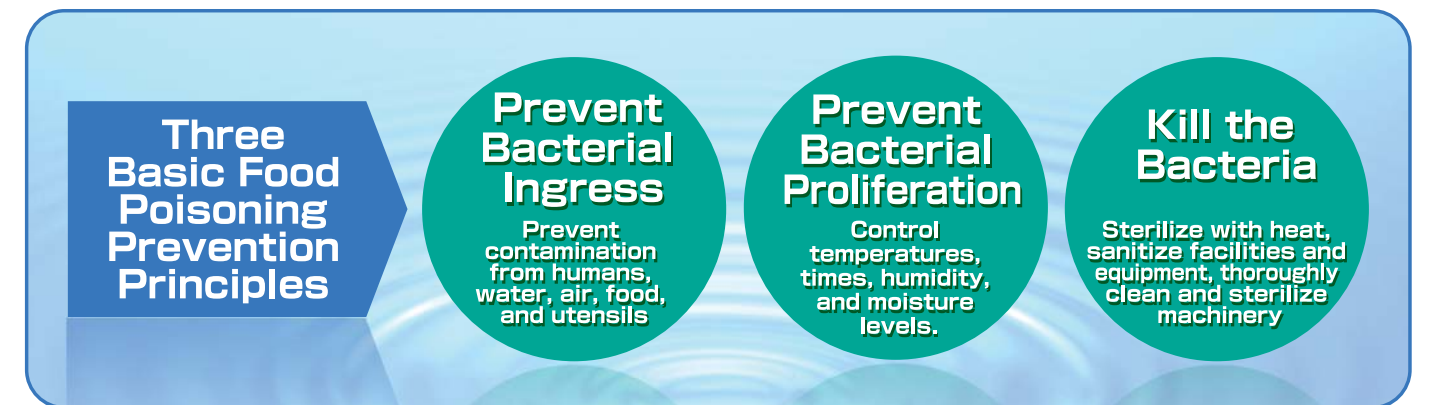
## How does bacteria food poisoning occur?

■ In the course of major food processing operations

Critical Aspects	Processes in which bacterial ingress should be prevented	Processes in which bacterial proliferation should be prevented	Processes in which bacteria should be killed
Primary Contamination	<b>Stocking and Inspection</b> Improper management of workers or inadequate inspections during stocking of foods		
	<b>Preparation</b> Insufficient washing of ingredients in the processing stages "Cross-contamination" of meat, fish, and vegetables		
Secondary Contamination		<b>Storage</b> Excessively high temperatures during freezing and refrigeration	
			<b>Cooking</b> Inadequate heat used in cooking
	<b>Serving</b> Insufficient cleansing of hands and finger or presence of wounds		<b>Cutting boards, knives, and other implements in food processing not cleaned sufficiently</b>

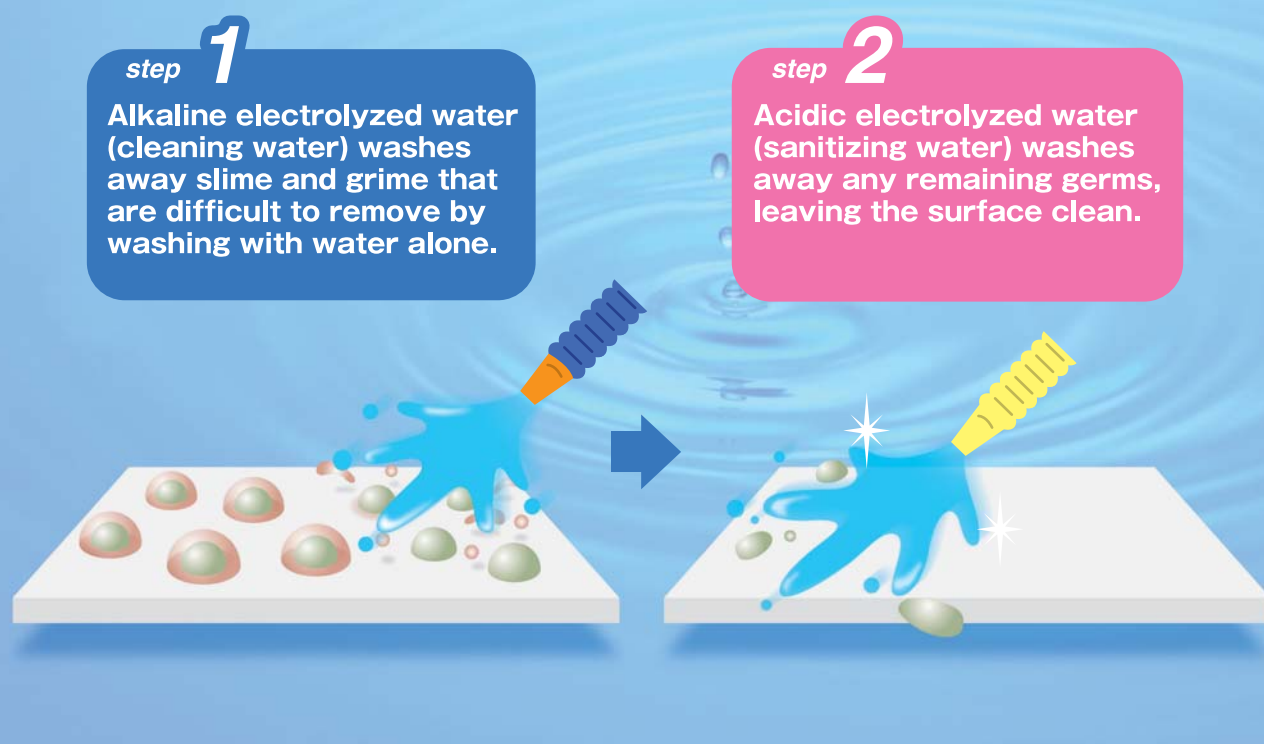
## This is how to prevent bacterial food poisoning.

Maintaining these three basic food poisoning prevention principles is critical in preventing primary and secondary contamination.



# What Are the Effects of Electrolyzed Water?

Each of the two types of electrolyzed water generated by ROX Series units has different effects. Using the two types separately according to their respective qualities or in combination produces excellent results in improving efficiency in sterilizing food, washing and disinfecting cooking utensils, and other related tasks.



## Effective for Washing

## Alkaline Electrolyzed Water (Cleaning Water)

Alkaline electrolyzed water (cleaning water) contains as an active ingredient a small amount of sodium hydroxide (NaOH) capable of dissolving proteins and emulsifying oil and fats. It is also useful for neutralization following disinfecting with acidic electrolyzed water (sanitizing water).

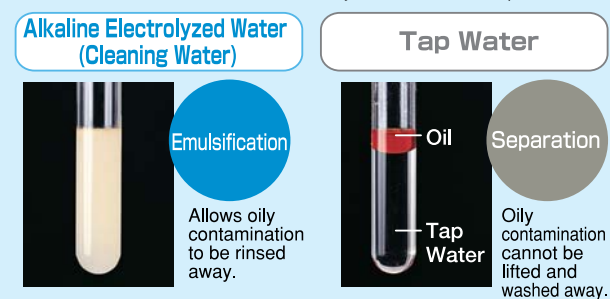
■ Dissolves and emulsifies proteins, fats, and oils.

Alkaline electrolyzed water (cleaning water) dissolves and emulsifies proteins, fats and oils, and other organic matter difficult to remove with regular water and washes them away.

### Comparison of Emulsification of Oil with Alkaline Electrolyzed Water (Cleaning Water) and Tap Water

1 ml of Chinese chili oil was mixed into 10 ml alkaline electrolyzed water (cleaning water) and 10 ml tap water. The oil in the tap water separates, while emulsification of the oil begins immediately in the alkaline electrolyzed water (cleaning water).

※The actual state of emulsification may differ than that depicted here.



## Effective for Disinfecting

## Acidic Electrolyzed Water (Sanitizing Water)

The sodium hypochlorite (HClO) in acidic electrolyzed water (sanitizing water) sterilizes approximately 80 times faster than sodium\* hypochlorite solutions of the same concentration.

※ \*Water Purification Technologies": Gihodo Shuppan, 1885

■ Exhibits more powerful antimicrobial efficacy than sodium hypochlorite.

While the abundant hypochlorite in acidic electrolyzed water (sanitizing water) from ROX systems contains the same effective chlorine in chlorine ions (ClO-) of which sodium hypochlorite contains large numbers, there is a huge difference in antiseptic efficacy, with the hypochlorite in acidic electrolyzed water (sanitizing water) exhibiting much greater antimicrobial power.

※Policies for Handling of Sodium Hypochlorite": Japan Water Works Association, 1981

■ Low residues means greater assurance of safety.

### Comparison of Residue for Acidic Electrolyzed Water (Sanitizing Water) and Sodium Hypochlorite (Test performed by Hoshizaki)

Following sterilization of apple wedges (approximately 600g) with sodium hypochlorite (pH9.3, A.C.C. 200 mg/kg) and acidic electrolyzed water (sanitizing water) (pH2.6, A.C.C.30mg/kg), the apple pieces were washed for approximately 15 seconds in tap water, and the chlorine residue was checked using chlorine test paper (10-50 mg/kg).

#### Acidic Electrolyzed Water (Sanitizing water)

No discoloration



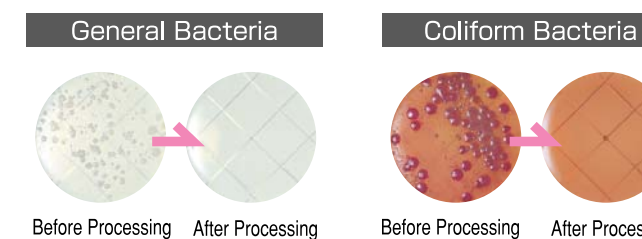
#### Sodium Hypochlorite

Color turns blue



■ Shown to be powerful in preventing secondary contamination

Results of testing by Hoshizaki using agar food stamps



A cutting board surface was washed for approximately 30 seconds with ROX acidic electrolyzed water (sanitizing water). You can see the reduction in colonies of general bacteria and E. coli.

### ■ Sterilization Efficacy Test

(Acidic Electrolyzed Water (Sanitizing Water) Sterilization Efficacy Test) [Shimane Industrial Experiment Station]

Type of Bacteria	Initial Bacterial Count (organisms/gram)	Processing Time			
		30 sec.	1 min.	2 min.	5 min.
<i>Escherichia coli</i>	$7.1 \times 10^6$	<300	<300	<300	<300
<i>Staphylococcus aureus</i>	$5.4 \times 10^6$	<300	<300	<300	<300
<i>Salmonella enteritidis</i>	$3.3 \times 10^6$	<300	<300	<300	<300
<i>Pseudomonas aeruginosa</i>	$7.0 \times 10^6$	<300	<300	<300	<300
<i>Bacillus subtilis</i>	$5.3 \times 10^6$	<300	<300	<300	<300
<i>Saccharomyces cerevisiae</i>	$7.3 \times 10^5$	<300	<300	<300	<300
<i>Candida tropicalis</i>	$5.3 \times 10^5$	<300	<300	<300	<300
<i>Penicillium islandicum</i>	$5.8 \times 10^4$	$1.7 \times 10^3$	<300	<300	<300

※Values for live organisms in 1 ml.

※Using acidic electrolyzed water (sanitizing water) of pH2.7, ORP 1144 mV, ACC 20 mg/kg, at 26.5°C.

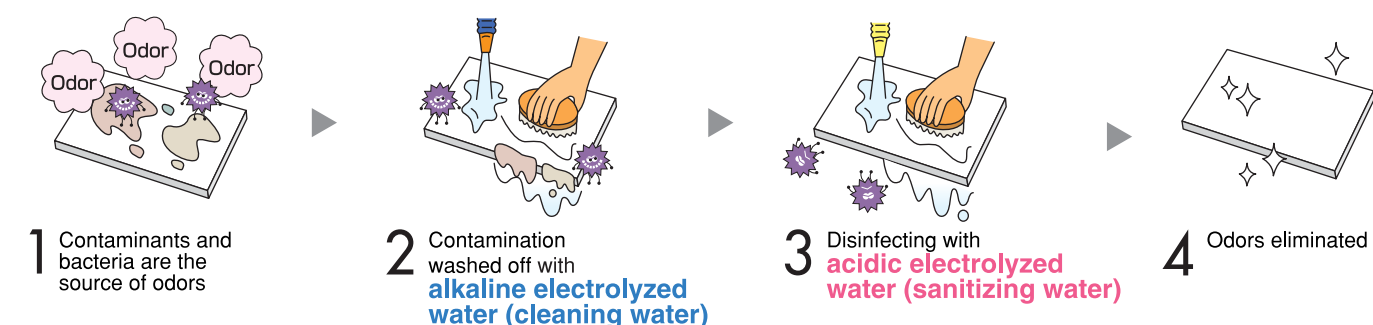
※The figure "<300" indicates that bacterial growth was not recognized in liquid diluted ten times.

## Odor-Killing Power

## Alkaline (Cleaning Water) & Acidic (Sanitizing Water) Electrolyzed Water

Offensive odors are caused by bacterial proliferation and deterioration of proteins, fats and oils, and other substances. Washing with alkaline electrolyzed water (cleaning water) and then disinfecting with acidic electrolyzed water (sanitizing water) is thought to enable suppression of volatile odors by killing odor-causing germs and oxidizing odors' constituents.

### ■ Attacking/Solving Odors at the Source



# How Do These Systems Differ from Previous Sterilization Methods?

Here is a comparison of the antiseptic efficacy of acidic electrolyzed water (sanitizing water) produced by ROX electrolyzed water production systems and sodium hypochlorite (diluted).

## Acidic Electrolyzed Water (Sanitizing Water) VS

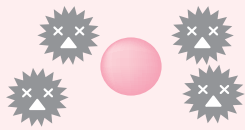


## Sodium Hypochlorite (Diluted)

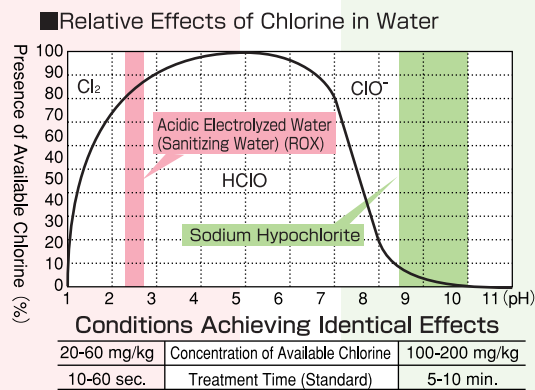
**Greater Efficacy**

Despite acidic electrolyzed water (sanitizing water) having a lower concentration of chlorine than sodium hypochlorite (diluted), it exhibits equivalent sterilizing effectiveness.

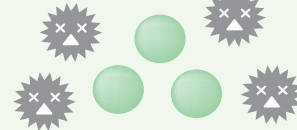
● Main Active Ingredient Sodium hypochlorite (HClO) molecules



Enables shorter treatment times, even at low concentrations



● Main Active Ingredient Sodium hypochlorite ions (ClO<sup>-</sup>)



Shorter processing time required, even at high concentrations

**Fast**

Acidic electrolyzed water (sanitizing water) enables processing in less time

Treatment Time

Approx. **10~60** Seconds

Faster sterilization enables shorter processing times for more rapid operations



Treatment Time

Approx. **5~10** Minutes

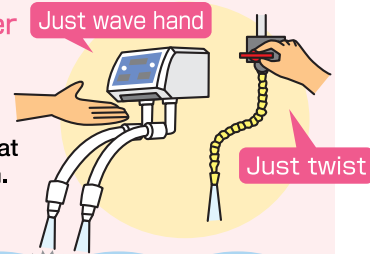
Slow sterilization requires lengthy immersion times.

**Simple**

Acidic electrolyzed water (sanitizing water) requires no dilution—simply pour!

Electrolyzed water output simply by generator

Constantly produced at uniform concentration. No discrepancies in sterilization.



Requires extra work to dilute.

Discrepancies in sterilization occur easily. Achieving even sterilization effect is difficult.



## Acidic Electrolyzed Water (Sanitizing Water) VS



## Sodium Hypochlorite (Diluted)

**Safer**

Acidic electrolyzed water (sanitizing water) leaves little residue, inhibiting lingering odors.

Residues are minimal, so practically no chlorine odors remain in foods. This enables sterilization while preserving delicious flavors.

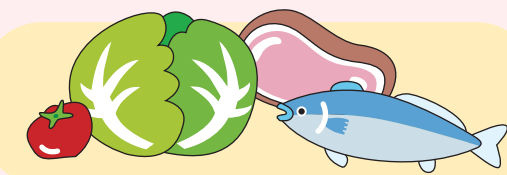


Residues are easily retained, so chlorine odors easily remain in foods.

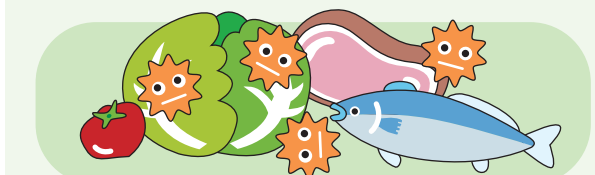
**Safer**

Acidic electrolyzed water (sanitizing water) inhibits generation of byproducts.

The low concentration of available chlorine inhibits generation of organic chlorine compounds and other byproducts.



The alkalinity of available chlorine in high concentrations promotes generation of organic chlorine compounds and other such by-products.



Acidic electrolyzed water (sanitizing water) offers both sterilizing power and ease of use.

Plus, ROX systems **save money** Low cost—just 0.4 yen per liter.

The system utilizes only commercially available salt with tap water and electricity, with no need for any proprietary solutions or other special materials. This keeps running costs down, making these systems suitable for high-volume operations.

Tap Water + Salt + Electricity = **1L ÷ 0.4 yen**

※ Cost based on tap water rates of 366 yen/m<sup>3</sup> (Tokyo waterworks rates), salt cost of 490 yen per 5 kg (Salt Industry Center of Japan), and electricity rates (100 V, single phase) of 24 yen/kWh and at 20°C temperature and saline concentration of 0.1%

# Food Hygiene Using Acidic Electrolyzed Water (Sanitizing Water)

## Measures Against Primary Contamination

### Sterilizing Vegetables

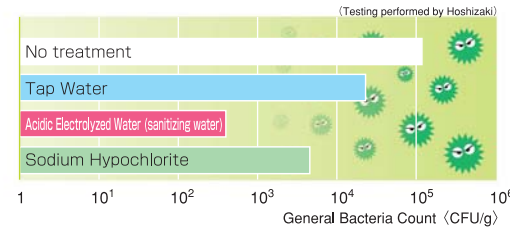
Raw vegetables used in salads, peeled fruit, and other raw food require special care as they are not cooked with any heat. Always make sure these foods are thoroughly sterilized.



#### Cabbage

Wash in and between leaves with acidic electrolyzed water (sanitizing water).

[Examination of Bacterial Counts in Quartered Cabbage]



[Treatment Method]  
 Tap Water 5 min. immersion and agitation  
 Acidic Electrolyzed Water (Sanitizing Water) 1 min. immersion and agitation → 10 sec. rinse  
 Sodium Hypochlorite 5 min. immersion → 10 sec. rinse

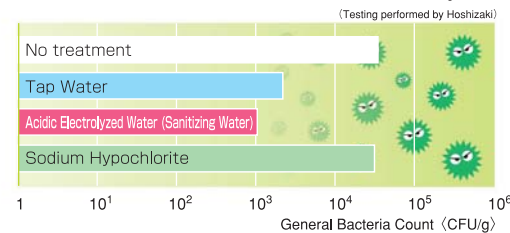
- 1 Remove outer leaves, cut into quarters, and remove the stem.
- 2 Wash pieces submerged in **alkaline electrolyzed water (cleaning water)**.
- 3 Wash pieces submerged in **acidic electrolyzed water (sanitizing water)**.
- 4 Cut with slicer or knife.
- 5 Rinse completely with tap water.



#### Tomatoes

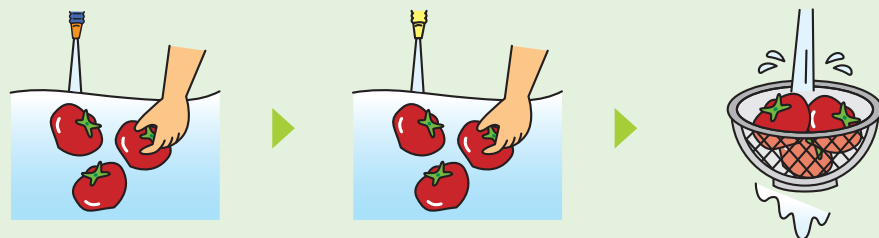
Carefully clean the calyx, where many bacteria form.

[Examination of Bacterial Counts in Tomato Calyces]



[Treatment Method]  
 Tap Water 10 sec. immersion and agitation + scrubbing  
 Acidic Electrolyzed Water (Sanitizing Water) 10 sec. immersion and agitation + scrubbing → 10 sec. rinse  
 Sodium Hypochlorite 5 min. immersion → 10 sec. rinse

- 1 Wash tomatoes submerged in **alkaline electrolyzed water (cleaning water)**.
- 2 Wash tomatoes submerged in **acidic electrolyzed water (sanitizing water)**.
- 3 Rinse completely with tap water.



### Note Regarding Food Sterilization Examination

Based on the premise that sufficient application of heat with predetermined methods in food preparation inhibits incidents of food poisoning, tests were conducted concerning core temperatures of foods consumed or offered uncooked. Targeted solutions examined in the test are shown at the right.

Examined Solution	pH (°C)	Available Chlorine Concentration (mg/kg)
Tap Water	7.0~7.5 (10~12)	0.2~0.4
Acidic Electrolyzed Water (sanitizing water)	2.5~2.7 (10~12)	20~30
Sodium Hypochlorite Solution	9.5~10.2 (10~15)	190~210

### Sterilization of Fish and Eggs

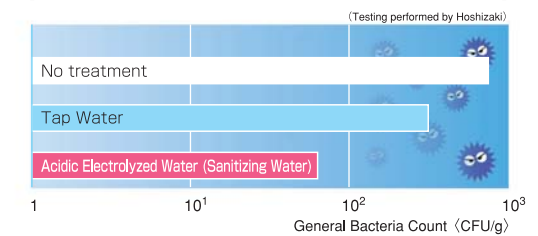
Washing procedures for fish and meat vary according to the state in which the foods are received. Therefore, comprehensive measures including thorough testing along heating, washing, and other methods of sterilization are required to prevent food poisoning.



#### Fish

Acidic electrolyzed water (sanitizing water) is effective in removing slimy matter from fish.

[Examination of Bacterial Counts in Outer Skin of Horse Mackerel]



[Treatment Method]  
 Tap Water 10 sec. immersion and agitation  
 Acidic Electrolyzed Water (Sanitizing Water) 10 sec. immersion and agitation → 10 sec. rinse

- 1 Remove slimy matter from outer surface with **acidic electrolyzed water (sanitizing water)**.
- 2 Remove the fish head and viscera. Rinse with tap water.
- 3 Wash fish submerged in **alkaline electrolyzed water (cleaning water)**.
- 4 Wash fish submerged in **acidic electrolyzed water (sanitizing water)**.
- 5 Rinse completely with tap water.



Effective in sterilizing outer surfaces of block-cut meats.

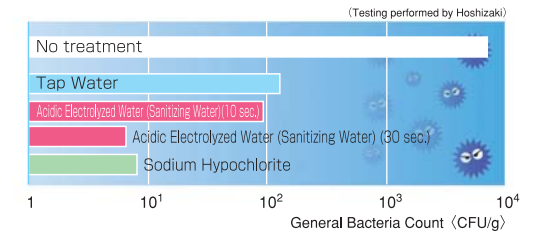
- ※ Although acidic electrolyzed water (sanitizing water) is effective in sterilizing the outer surfaces of vegetables, meat, fish, and other foods, it does not sterilize foods' interior portions.
- ※ Sterilization of block-cut meats, sliced meats, sliced fish, and other foods may result in discoloration of food surfaces or other problems with food quality.
- ※ Foods prepared with heating can be sterilized by heating at the appropriate temperature for the proper duration.
- ※ Following sterilization, dry off remaining moisture and place food in cold storage at the prescribed temperature.



#### Eggs

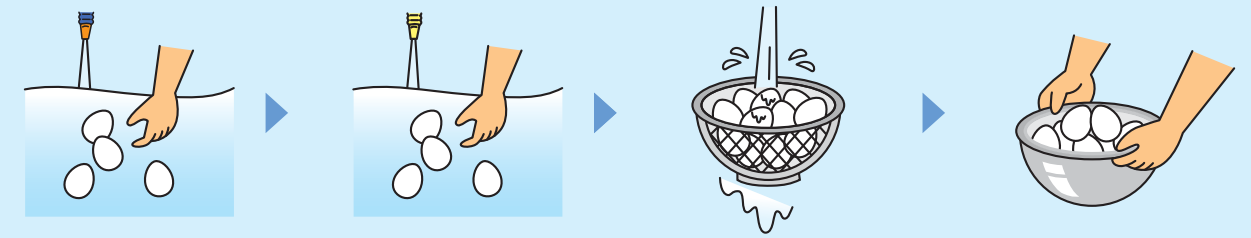
Occurrences of secondary contamination from eggshells is a distinct possibility. Be sure to stir eggs around within the acidic electrolyzed water (sanitizing water).

[Examination of Bacterial Counts in Chicken Eggs (Eggshells)]



[Treatment Method]  
 Tap Water 10 sec. immersion and agitation  
 Acidic Electrolyzed Water (Sanitizing Water) 10 sec./30 sec. immersion and agitation → 10 sec. rinse  
 Sodium Hypochlorite 5 min. immersion → 10 sec. rinse

- 1 Wash eggs submerged in **alkaline electrolyzed water (cleaning water)**.
- 2 Wash eggs submerged in **acidic electrolyzed water (sanitizing water)**.
- 3 Rinse completely with tap water.
- 4 To prevent proliferation of bacteria, remove moisture and store refrigerated.



# Washing and Disinfecting with Alkaline (Cleaning Water) and Acidic (Sanitizing Water) Electrolyzed Water

## Measures Against Secondary Contamination

### Washing and Sterilizing Utensils

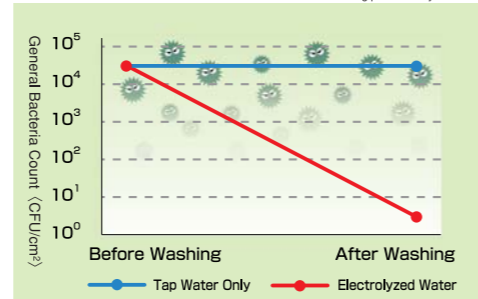
Cooking utensils may become contaminated in preparation and cooking with bacteria from ingredients or food preparers, resulting in recontamination of the processed foods. Preventing such "secondary contamination" requires diligence in sterilization during these procedures.



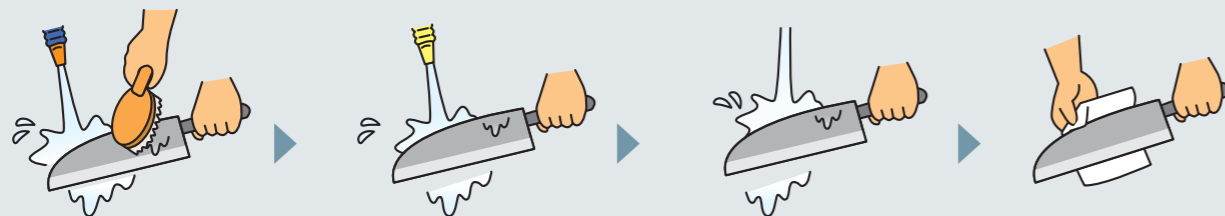
#### Knives

Wash knives thoroughly, including the grips.

[Examination of Bacterial Counts from Processing with Knives] (Testing performed by Hoshizaki)



- Using a scrubber sponge, wash the knife, including the grip, with **alkaline electrolyzed water (cleaning water)**.
- Wash with **acidic electrolyzed water (sanitizing water)**.
- Rinse completely with tap water.
- Wipe off moisture.



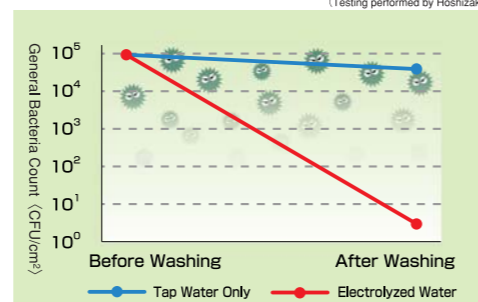
※Do not use this solution if bothered by rust on knives.



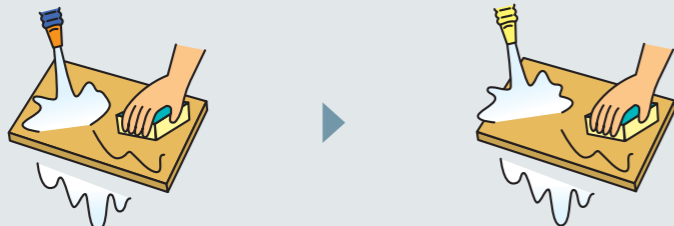
#### Cutting Boards

Be sure to wash in and around knife scores.

[Examination of Bacterial Counts from Use of Cutting Boards] (Testing performed by Hoshizaki)



- Use a scrubber, thoroughly wash in and around knife scores with **alkaline electrolyzed water (cleaning water)**.
- Scrub with **acidic electrolyzed water (sanitizing water)**.



※If contamination is particularly heavy, prewash the cutting board thoroughly with detergent.

### Washing and Sterilizing cloths

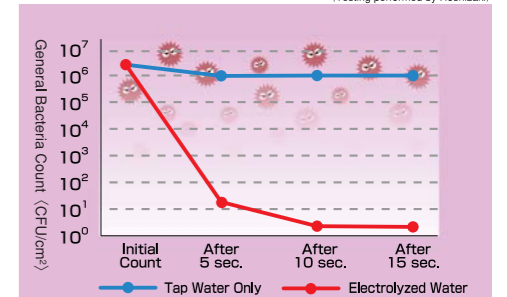
Kitchen cloths and other cloths used to wipe a wide variety of matter may harbor large numbers of bacteria. Sanitary practices should always be maintained with regular sterilization of cloths.



#### Kitchen Cloths

Kneading while washing is critical!

[Treatment of cloths] (Change in Bacterial Counts from Washing in Running Water) (Testing performed by Hoshizaki)



- Knead cloth under running **alkaline electrolyzed water (cleaning water)**.
- Firmly wring cloth.
- Knead cloth under running **acidic electrolyzed water (sanitizing water)**.
- Firmly wring cloth.
- Dry and store.



※Bleaching at regular intervals is recommended.

### Washing and Sterilizing Floors and Drains

Floors are breeding grounds for bacteria flushed from processing or carried in from outside. Ensure proper sanitation management with sterilization at regular intervals.

#### Washing Floors

- After sweeping up coarse debris, scrub the floor with a deck brush while pouring **alkaline electrolyzed water (cleaning water)** over the floor.
- Wash floor with water containing a 1:1 mixture of **alkaline electrolyzed water (cleaning water)** and **acidic electrolyzed water (sanitizing water)**.
- Rinse floor thoroughly with running water, then remove water with a floor wiper. Pay attention to any water coming into contact with metallic portions.

※ Make sure machinery is covered while floors are being washed and take other steps to ensure the water does not come into contact with the machinery.

#### Sink Traps and Drains

Wash with running water containing a 1:1 mixture of **alkaline electrolyzed water (cleaning water)** and **acidic electrolyzed water (sanitizing water)**, then rinse with plain tap water.

※Plastic sink traps should be replaced.  
 ※Rust may form on metal portions; rinse such areas with tap water for a period of time.

#### Stainless Table top

- Spray **alkaline electrolyzed water (cleaning water)** for stainless table top and wipe off with tablecloth for cleaning.
- Spray **acidic electrolyzed water (sanitizing water)** and wipe off with tablecloth for sanitizing.
- Wipe off the surface with tap water soaked tablecloth to prevent rust.

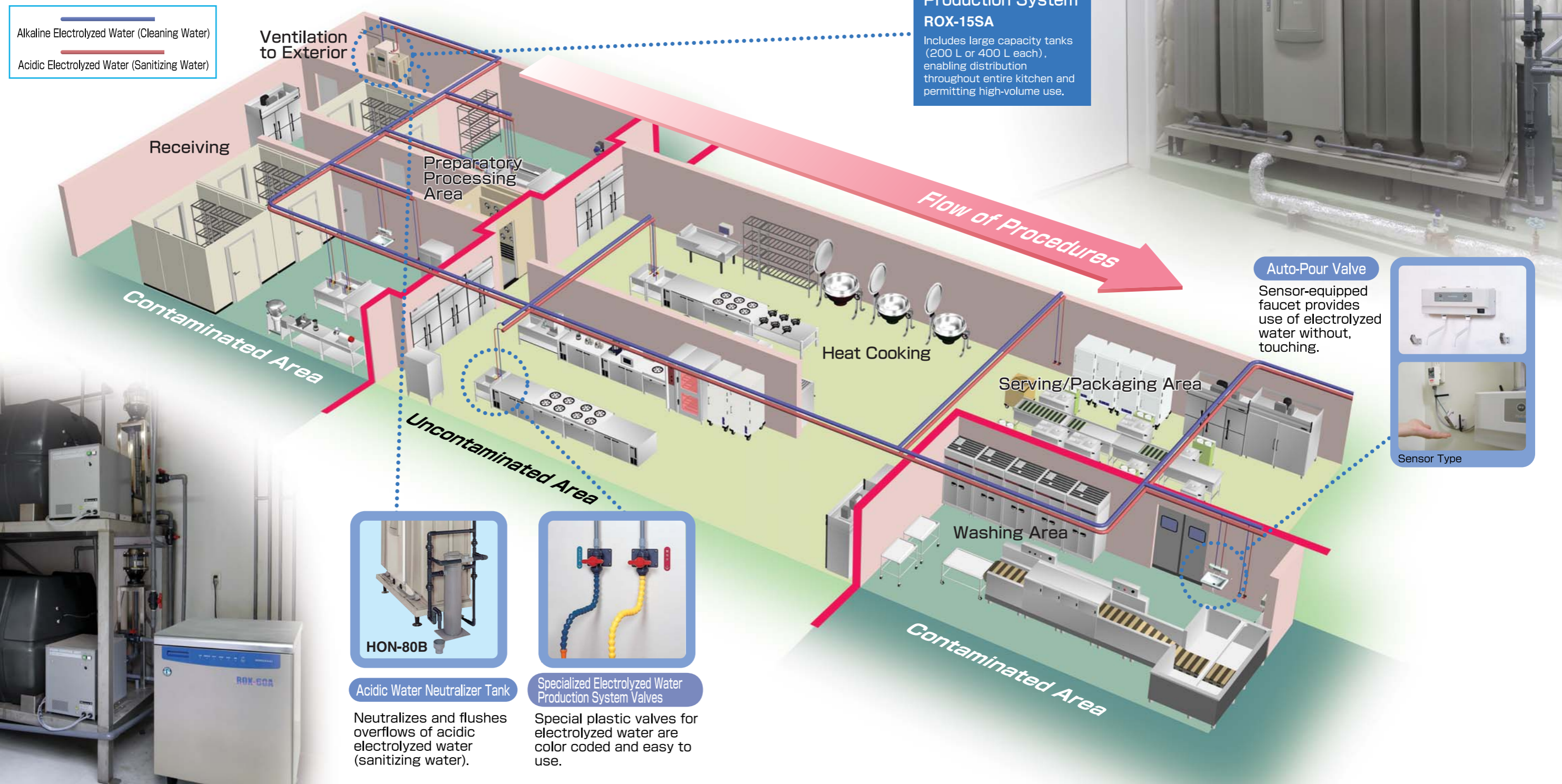
# Developing Systems Matched to Facilities

Systems are widely adaptable to suit facilities' scales and applications. Hoshizaki also offers systems for high-volume processing facilities.

## Water Storage and Piping Systems

High-volume supplies to meet the needs of large-scale food processing facilities

Storage of generated electrolyzed water in tanks enables large supplies suitable for high-volume food processing facilities. Systems can be combined to enable use of multiple faucets.



Alkaline Electrolyzed Water (Cleaning Water)  
Acidic Electrolyzed Water (Sanitizing Water)

**Electrolyzed Water Production System ROX-15SA**  
Includes large capacity tanks (200 L or 400 L each), enabling distribution throughout entire kitchen and permitting high-volume use.

**Auto-Pour Valve**  
Sensor-equipped faucet provides use of electrolyzed water without touching.



**HON-80B**  
**Acidic Water Neutralizer Tank**  
Neutralizes and flushes overflows of acidic electrolyzed water (sanitizing water).



**Specialized Electrolyzed Water Production System Valves**  
Special plastic valves for electrolyzed water are color coded and easy to use.