



Measuring and Certifying Multi-technology Point-Of-Use Device Reduction Claims

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AQUADIAGNOSTICS

Aquadiagnostics Water Research & Technology Center Limited (AWRTCL) - established in 2004, Bangalore.

CREDENTIALS:

First in Asia and the only lab in India with testing capabilities to evaluate water treatment products

NABL accredited potable & domestic water

Now part of IAPMO Group and IAPMO India

TESTING CAPABILITIES:

Analysis of drinking water, waste water, packaged water & food

Evaluation of water treatment devices as per National & International Standards

IS16240:2015

NSF/ANSI 42,53,55,58,62, P231

WQA - S100,200,300,400,

WQIA - IP 100

WHO protocol

IS14724:1999

US EPA Guide Standard for Testing Microbiological Water Purifiers

Promotes Easy Test Kits for drinking water



**CURRENT SCENARIO OF
NATIONAL & INTERNATIONAL STANDARDS
FOR TESTING & CERTIFYING
DRINKING WATER TREATMENT UNITS**



Multi Technology POU systems Voluntary Certifying specifications: **National**

- * IS14724:1991(RA2009) Ultraviolet based Water Purifiers – Specification
- * IS16240:2015 Reverse Osmosis Based Point-of-Use Water Treatment systems – Specification
- * WQIA Protocol : IP 100 Guide Standard and Protocol for Microbiological Evaluation of Drinking Water Treatment Devices



Multi Technology POU systems

Certification standards : **International**

- * NSF/ANSI 42 Drinking Water Treatment Units – **Aesthetic Effects**
- * NSF/ANSI 53 Drinking Water Treatment Units – **Health Effects**
- * NSF/ANSI 55 Ultraviolet Microbiological Water Treatment Systems
- * NSF/ANSI 58 Reverse Osmosis Drinking Water Treatment Systems
- * WQA S - 200 Voluntary Industry standard for Residential & Commercial water filters
- * WQA S - 300 Voluntary Industry standard for Point-Of-Use Low pressure Reverse Osmosis Drinking water systems
- * NSF P231 Microbiological Water Purifiers
- * WHO Evaluating Household Water Treatment Options: Health based targets and microbiological performance specifications:2011
- * US EPA Guide Standard and Protocol for Testing Microbiological Water Purifiers



NSF/ANSI STANDARDS TESTING SECTIONS

4.0 Material extraction: NSF/ANSI 42,53,55,58

5.0 Structural Performance:

- Structural integrity: Components /Units – 150 - 300PSI/15min**
- Cyclic pressure test: 0 to 100 PSI or 150 PSI/10,000 or 100,000 cycles**

6.0 Minimum performance requirements

7.0 Elective performance claims



NSF/ANSI STANDARDS GENERAL TEST CONDITIONS

#	TEST CHARACTERISTICS	REMARKS
1	Structural performance	One unit
2	Contaminant reduction performance claims	Two units
3	Microbial reduction NSF P231	Three units
4	Pressure to be used for testing	60 PSI \pm 3 PSI
5	Test Flow rate	Flow achieved at 60PSI
6	Volume based tests for chemicals reduction under NSF 53	120% with PID and 200% without PID



Overview of Measuring and Certifying Multi- technology point-of-use Device Reduction Claims



MEASURING REDUCTION CLAIMS

STANDARD	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
IS14724:1999 (RA2009)	UV radiation	<i>S. lutea</i> (<i>Micrococcus luteus</i>)	10 ⁶ cfu/100 ml to reduce by 99.9% or 3 log reduction
		Chlorine reduction	After 50 liters of filtration 2 ppm to 0.2ppm
		Turbidity reduction	After 50 Liters of filtration 20-25 NTU to < 5 NTU



MEASURING REDUCTION CLAIMS

STANDARD	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
IS16240:2015	Reverse Osmosis	TDS reduction	1500ppm to 375 ppm (75% reduction)
		Microbial reduction	<i>E.Coli</i> , MS2 phage & Cryptosporidium : 6, 4, 3 logs
		Metal reduction	3-60 times, as applicable, of IS10500:2012 Drinking water Specifications to reduce to acceptable limits. Pb, As(V), Hg, Cd, Cr, Cu
		Pesticide reduction	Pesticides of almost 20 µg/Lin the input water to reduce to reduce to 0.01 µg/L as an individual and 0.05 µg/L as total.
		Iron reduction	3ppm to 0.3 ppm
		Fluoride reduction NO ₃ reduction	6ppm to 1.0ppm 150ppm to 45ppm.

Besides the above SI and Pneumatic pressure tests are also conducted



MEASURING REDUCTION CLAIMS

STANDARD	TREATMENT TECHNOLOGIES	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
WQIA IP-100 Guide Standard and Protocol for Microbiological Evaluation of Drinking Water Treatment Devices	UV, Halogenated, Iodinated, Membranes with size exclusion technologies	Microbial reduction Mechanical filtration Halogen / Disinfection resin UV based	<i>K. terrigena</i> : 5×10^7 cfu/100 ml : 6 logs MS2 phage : 5×10^7 pfu/100ml : 3 log and 4 log on Day 5 and 6 respectively Cyst reduction : Not required 6 log bacteria, 3 log and 4 log (only at 60% estimated capacity sample). 2 log and 3 log (only at 60% estimated capacity sample). Alternatively 2 log and 3 log(only at 60% estimated capacity sample) with 3 micron microspheres. <i>Typical log reduction of MS2 at 50mJ/sq.cm is</i> 2 – 2.5 log



MEASURING REDUCTION CLAIMS

SPECIFICATION	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
NSF/ANSI 42	Carbon filters & Media filters	T.O.C reduction 50%ON/OFF cycle	2 ppm to reduce by $\leq 50\%$
		Chloramine reduction 50%ON/OFF cycle	3.0 ppm to 0.5 mg/L
		Bacteriostatic 6 to 13 weeks 2%ON/98%OFF cycle	Input Water Heterotrophic native bacteria @ 10^1 to 10^6 cfu/ml. The GM of the product water shall not be more than input water
		Iron (Fe^{+2}) and Manganese reduction	3 to 5 ppm to 0.3mg/L. 1 to 2 ppm to 0.05 mg/L
		Zinc Reduction	10 ppm to 5 mg/L
	Sediment filters	Particulate reduction	85% reduction Class:I,II,III,IV,V,VI (≥ 0.5 to < 1 , ≥ 1 to < 5 , ≥ 5 to < 15 micron
			≥ 15 to < 30 , ≥ 30 to 50 , ≥ 50 to < 80 micron



MEASURING REDUCTION CLAIMS

SPECIFICATION	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
NSF/ANSI 53	Carbon & Media cartridges	VOC surrogate (CHCl ₃):51VOCs	0.30 ppm to 0.015ppm
		Metal Reduction	Performed at pH 6.5 & 8.5
		AsIII,AsIV,Ba, Cd,Cr, Cu,Se, Hg,Pb	0.05/0.3ppm to <0.01ppm, 10ppm to 2ppm, 0.03ppm to 0.005ppm,0.3ppm to 0.01ppm 3.0ppm to 1.3ppm, 0.10ppm to 0.05 ppm, 0.006ppm to 0.002ppm,0.15ppm too.01ppm
		Fluoride NO₃+NO₂ - N	8mg/L to 1.5 mg/L 30 mg/l to 10 mg/L
			200% testing W/O PID 120% testing with PID
	Mechanical filtration	Turbidity reduction	10NTU to 0.5NTU up to 75% flow reduction
		Cyst reduction 3 micron microspheres	50,000/L to 99.95%



MEASURING REDUCTION CLAIMS

SPECIFICATION	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
NSF/ANSI 55	UV based Drinking water treatment systems	MS2 phage reduction for Class A system. <i>Saccharomyces ceriviseae</i> for Class B system	Class A system has a UV alarm set point with True UVC sensor. The system can be used on waters that are microbiologically unsafe. Class B system shall not be used on microbiologically unsafe water.



MEASURING REDUCTION CLAIMS

SPECIFICATION	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
NSF/ANSI 58	RO Technology based purification systems	TDS reduction	750±40 ppm of NaCl to 187ppm (75% reduction)
		Metal reduction AsV,AsIII,Ba,Cd,Cr ,Cu,Pb,Se etc	Same as in case of NSF/ANSI 53
		F, NO ₃ -NO ₂ , VOC & Cyst reduction	Same as in case of NSF/ANSI 53
		DPR	Volume of Treated water/day (GPD)
		% RECOVERY	Ratio of treated vs Feed water volumes in 1 hour of running expressed as %.



MEASURING REDUCTION CLAIMS

STANDARD	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER
NSF Protocol P231	UV, HALOGEN, IODINE BASED, SIZE EXCLUSION TREATMENT TECHNOLOGIES LIKE CERAMIC, MEMBRANE etc.	Microbial reduction 14 ½ days Volume % tests 8 sampling points GTW and CTW	<i>K. terrigena</i> (<i>Raoultella terrigena</i>), MS2 phage as surrogate virus Live Cysts of <i>C. parvum</i> or 4-6 micron microspheres 10 ⁷ cfu/100ml : 99.9999% 10 ⁷ pfu/Liter : 99.99% 10 ⁶⁻⁷ /Liter : 99.9% (6 , 4 , 3 log reduction)



MEASURING REDUCTION CLAIMS

STANDARD	TREATMENT TECHNOLOGY	REDUCTION CLAIMS	ACCEPTABLE LIMIT IN PRODUCT WATER		
WHO - 2011	DISINFECTION TECHNOLOGY	<i>Campylobacter jejuni</i> Rota Virus, Cryptosporidium	BACTERIA VIRUSES PROTOZOA		
		Highly Protective	≥4	≥5	≥4
		Protective	≥2	≥3	≥2
		Interim	Achieves “protective “ target for Two Classes of pathogens and results in health gains		



IAPMO INDIA INITIATIVES

International standards vs. Indian Water Conditions

- **Operating pressure: 30 PSI**
- **Service flow: As per manufacturer's recommendation**
- **Volume % performance tests**
- **More compliance with field conditions**



IAPMO INDIA

Aims to

Bring out many such standards for POU Water systems and Standalone filters to safeguard health of Indian consumers

PROSPECTIVE TITLES

1. RO systems Service Life performance including water efficiency standard
2. Chemical contaminant removal filters/systems – performance standard : F, NO₃-NO₂, Fe, Heavy metals etc.



IAPMO INDIA

Seeks **helping hand** from Water Industry,
Regulatory agencies, Voluntary
organizations to adopt standards and
help evolving them as mandatory to
ensure customers getting right products
for safety of their health.



THANK YOU