FRESENIUS MEDICAL CARE

DIALYSIS MACHINE MAINTENANCE AND UPKEEP, RO SYSTEM AND QUALITY CHECK

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FRESENIUS MEDICAL CARE

RO SYSTEM AND QUALITY CHECK

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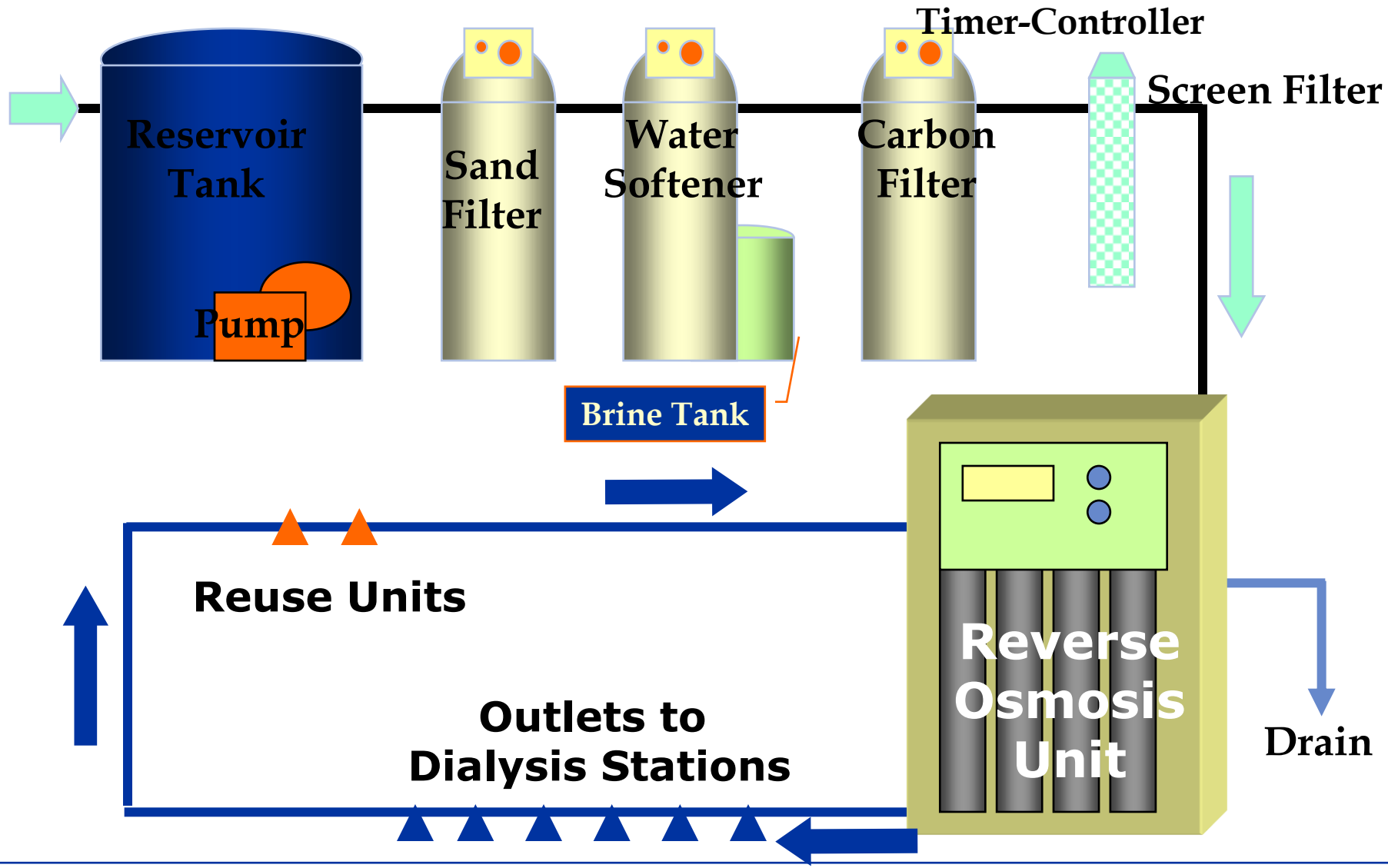
RO SYSTEM AND QUALITY CHECK

1 REVERSE OSMOSIS SYSTEM DESIGN

IS THE DESIGN OF THE WATER TREATMENT SYSTEM PERFECT?



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RO SYSTEM AND QUALITY CHECK

2 ROLE OF WATER USED IN DIALYSIS

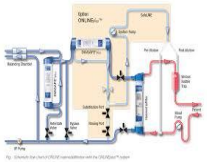
ROLE OF WATER IN HD

To mix Part A and B and produce dialysate solution (by HD machine)

To re-process the consumables during reuse

To dissolve and make bicarbonate fluid

To produce substitution fluid for HF & HDF online



ACHIEVING THE ISO STANDARDS

The 4 stages of water purification:

1. **Prefiltration** – this consists of the equipment that is located before the Reverse Osmosis machine. Prefiltration prepares the incoming municipal water for Reverse Osmosis purification

2. **Reverse Osmosis** – large structure with membranes designed to filter out most chemical and microbial contaminants

3. **Distribution Loop** – the plumbing system that delivers purified water to the dialysis machine

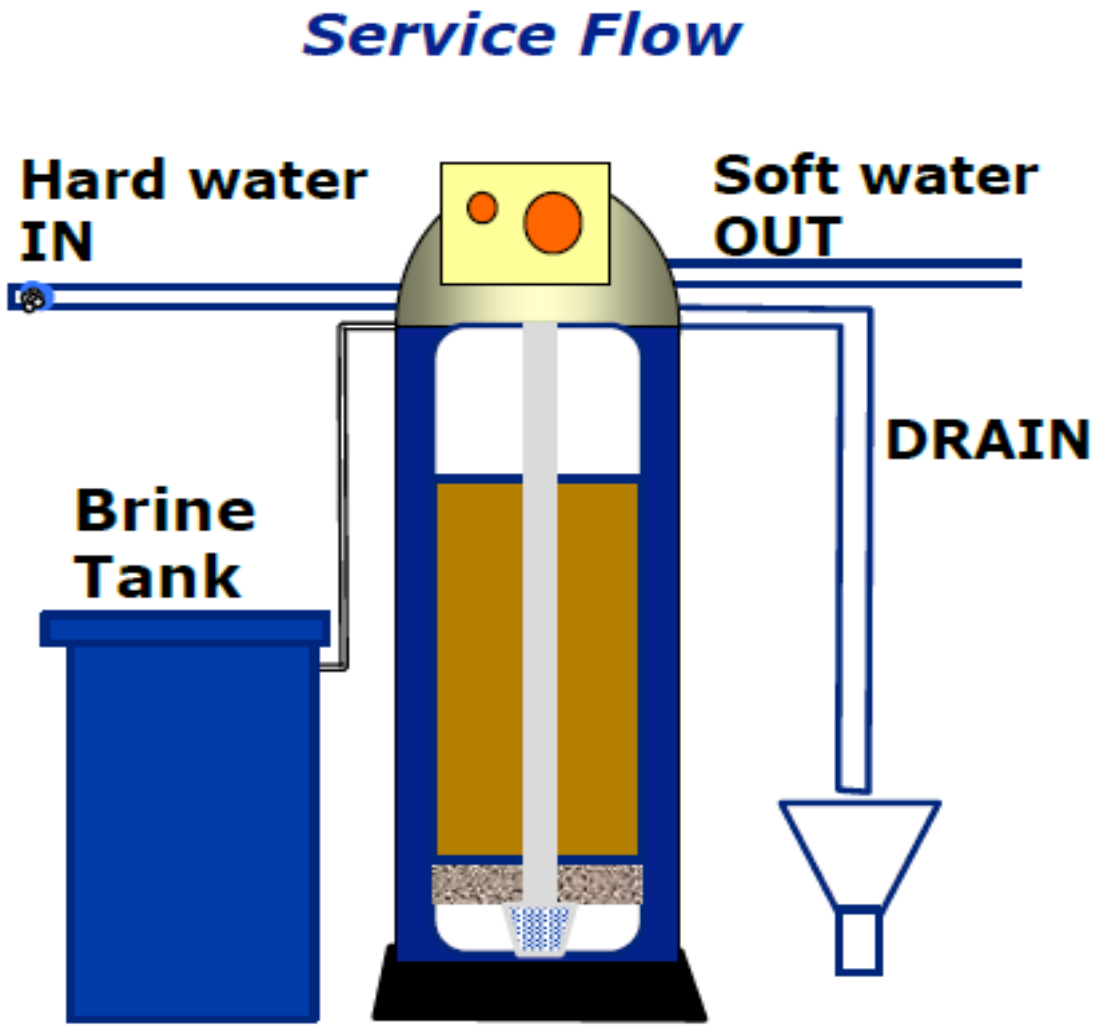
4. **Ultrafilter** – extremely fine filter that removes microbial contaminants before the dialysis fluid reaches the patient

PARTICLE / SAND FILTER

- First component in a water treatment system
- Protects the system from blockage by physical particles with the form of either disposable cartridges or multimedia columns
- Removes particles ranging in size from 500 microns down to about 5 microns

WATER SOFTENERS

- Removes Ca++ & Mg++ and replaces with Na+
- Process continues until exchange resin is exhausted
- Regeneration: salt solution passes through the resin, pushing Ca++ & Ma++ ions to drain
- Ca++ & Mg++ will scale RO membrane if not removed



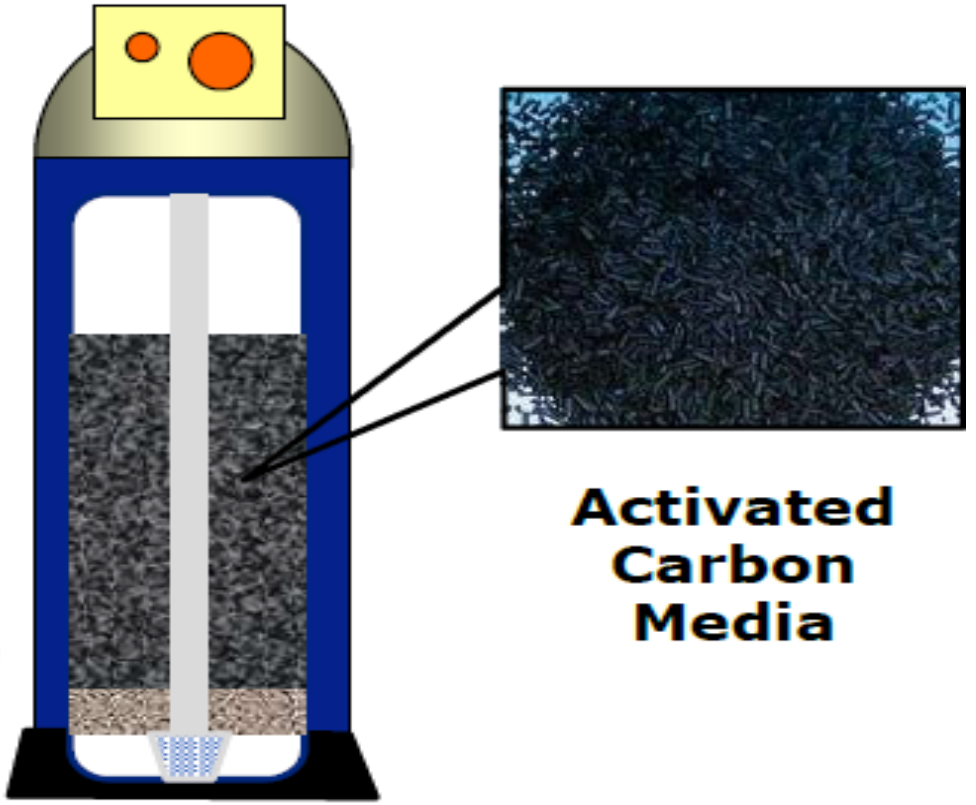
BRINE TANK

"Salt designated as rock salt should not be used for softener regeneration since it is not refined and typically contains sediments and other impurities that may damage O-rings and pistons and clog orifices in the softener control head"

ISO 23500: 2011 E, p19

DE-CHLORINATION: ACTIVATED CARBON FILTER

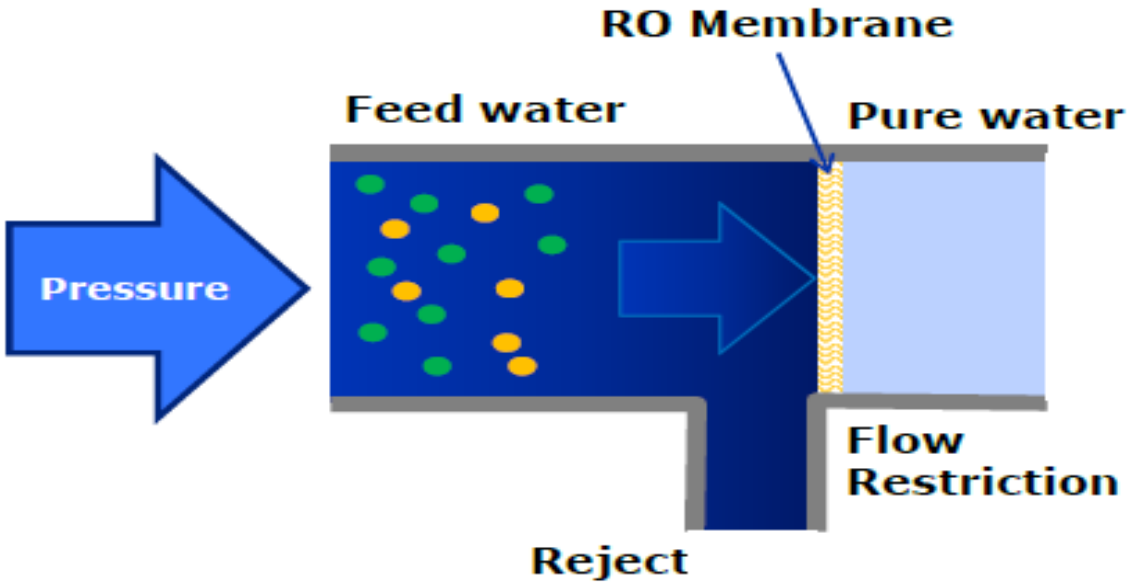
- A necessary component
- Removes chlorine & chloramine
- Chlorines cause haemolysis
- Haemolysis causes death
- Works on adsorption principle
- Requires frequent backwash to reduce the risk of bacterial growth



"Only activated carbon with minimum iodine level of 900 shall be used"

REVERSE OSMOSIS IN ACTION

- One single stream feeds the RO system
- Two streams exit: Dialysis Water and Reject Water
- Purified water will be delivered to the patients
- All particles larger than 200 Daltons are filtered
- Reject water is discarded to the drain



- 90-99% of dissolved contaminants are removed along with ~99% of bacteria, viruses, pyrogens, organics and colloids

Membrane – TFC 4040 OR 8040 – Chlorine resistant, pH tolerant

ULTRAVIOLET RADIATION (OPTION)

- U.V. lamps produce radiation at frequencies that kill bacteria and are put in systems that utilize treated water storage tanks; storage tanks can encourage growth of bacteria due to the slow movement of water in such systems

- U.V. lamps **kill bacteria** which in turn produces endotoxin; this requires the use of ultra filters placed in the output line to collect the endotoxin

- These are sub 1 micron in pore size, normally 0.2 micron or less

- **Remark:** Permeate storage tank with ultraviolet radiation is **not** recommended.

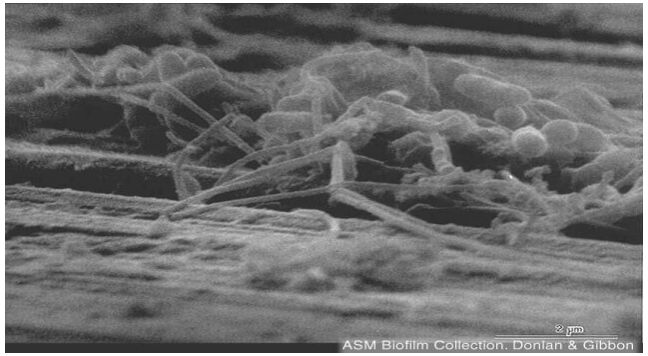
DISTRIBUTION LOOP/DELIVERY SYSTEM

Material

- Shall NOT contain brass, aluminum, zinc, copper
- PEX is recommended - cost, life expectancy, resistance to heat

Design

- Avoid 900 angles - reduces flow velocity
- Avoid dead ends



The design should ensure that the flow rate in the pipework is fast enough to reduce the likelihood of bacterial growth in the pipes; **Biofilms** are created when bacterial cells adhere to the internal surface or the pipes which then replicate and produce extra-cellular polysaccharides

RING MAIN DISTRIBUTION

- BIOFILM once formed clings to the surface of the pipes and continues to produce sticky matrix which can be very difficult to remove because the sticky substance forms in effect a protective layer.

- Regular testing of the ring main water for bacteriology can give an indication of such a build up so that early disinfection of the ring can be performed.

- Regular disinfection and cleaning of the ring main is recommended, irrespective of bacteriology results.

Raw Water	Dialysis Water (Permeate)	Dialysis Fluid (Dialysate)	Ultrapure Dialysis Fluid (Ultrapure Dialysate)	Dialysers	Substitution Fluid
	Limit values				
Standards for fluids used in dialysis (ISO &AAMI)					
CFU/mL	<100	<100	<0.1	-	$<10^{-6}$
EU/mL	<0.25	<0.5	<0.03	-	<0.03
References	**ISO 23500**				
		ISO 23500			
				ISO 23500	

International Organization for Standardization

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RO SYSTEM AND QUALITY CHECK

3 RO SYSTEM AND QUALITY CHECK

ROUTINE MONITORING - WTP

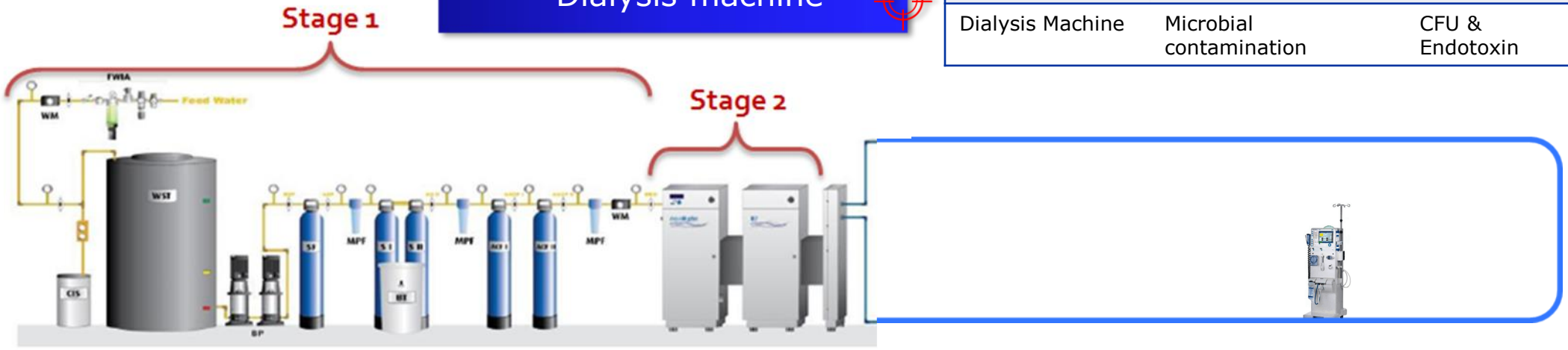
Test Point 1 - Raw Water	Test	Frequency
Monitoring Electrolyte Contamination	Chemical Analysis	**Annually** unless changes occur to water supply
Test Point 2 – Post Water Softener	**Test**	**Frequency**
Monitoring Salt Level in brine tank	Visual inspection	**Twice a Week or after each regeneration**
Monitoring Water Hardness	Hardness Test Kit	**Daily and before** each dialysis shift
Test Point 3 - Post Activated Carbon Filter 1	**Test**	**Frequency**
Monitoring Total Chlorine	Chlorine Test Kit	**Daily and before** each dialysis shift
Test Point 4 – Particle Filter	**Test**	**Frequency**
Monitoring Pressure drop	Visual Inspection	**Daily**
Test point 5 – Reverse Osmosis Unit	**Test**	**Frequency**
Dialysis Water Conductivity	Visual inspection	**Daily**
Rejection Rate	Visual inspection	**Daily**
Electrolytic Contamination	Chemical analysis	**Annually** unless changes to RO unit occur

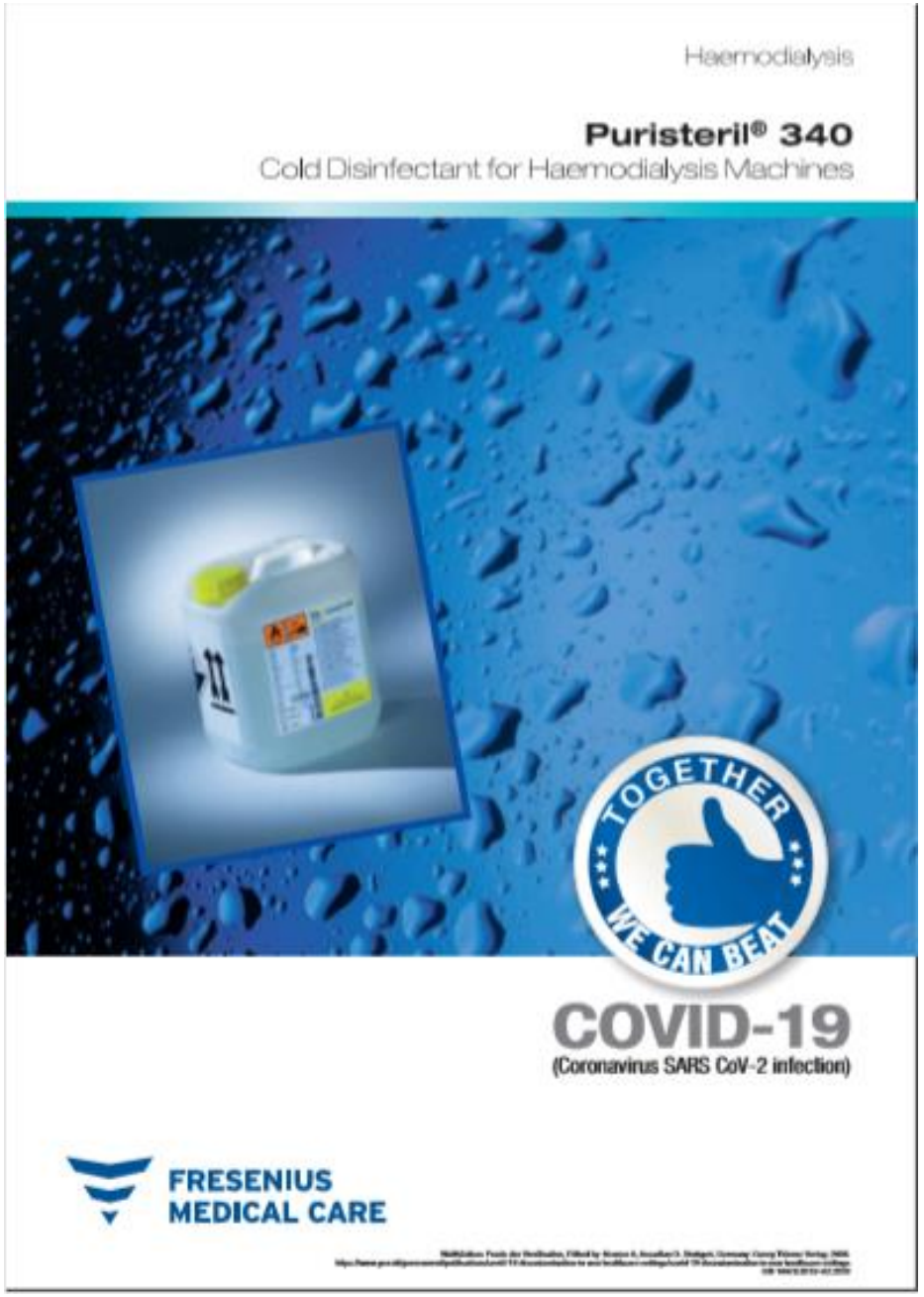
Monitoring of microbes in WTU loop- Monthly checks are recommended

ROUTINE WATER TESTING AND MONITORING TEST POINTS

- Raw water
- Water Softener
- Active Carbon Filter
- RO Unit
- After storage tank
- Middle of the loop
- End of the loop
- Dialysis machine

Test Point	Description	Test Type	Frequency
Feed water	Electrolytic contamination	Chemical analysis	Annually, or when changes occur to the water supply
Post Water Softener	Water hardness	Hardness test kit	Daily at the end of the treatment day
	Brine tank salt level	Visual inspection	Daily or after each regeneration
Post Carbon 1	Total Chlorine	Total Chlorine test kit	Before each dialysis shift
Post Particle Filter	Pressure drop	Visual reading	Daily
Reverse osmosis	Dialysis water conductivity	Visual reading	Daily
	Rejection rate	Visual reading	Daily
	Microbial contamination	CFU & Endotoxin	Monthly or as per local policy
Dialysis Machine	Microbial contamination	CFU & Endotoxin	Yearly or as per local policy





Puristeril® 340

Disinfecting Agent for Haemodialysis Machines Based on Peracetic Acid

Superior efficacy

- Puristeril® 340 shows the superior efficacy of a peracetic acid-based disinfectant.
- Peracetic acid is widely used for disinfection due to its exceptionally broad spectrum of microbiocidal activity at low concentrations and short exposure times.
- Puristeril® 340 decomposes in a non-toxic way. The following degradation reactions take place:

$2\ CH_3COOOH$ Peracetic acid	⇨	O_2 Oxygen $+ 2\ CH_3COOH$ Acetic acid
CH_3COOOH Peracetic acid $+H_2O$ Water	⇨	H_2O_2 Hydrogen Peroxide $+ CH_3COOH$ Acetic acid
$2\ H_2O_2$ Hydrogen Peroxide	⇨	O_2 Oxygen $+ 2\ H_2O$ Water

- After use Puristeril® 340 is easily removable by rinsing with water.
- Due to the low pH value, the necessary decalcification of haemodialysis machines is easily achieved.
- Puristeril® 340 is designed for cold disinfection. In principle it can be used for all haemodialysis systems like haemodialysis machines, water treatment devices and circuit pipes.

Specification

Puristeril® 340 contains peracetic acid and hydrogen peroxide.

Disinfection

Puristeril® 340 is bactericidal, fungicidal, sporicidal, virucidal (incl. HBV/HCV/HIV/SARC CoV-2).

Use Puristeril® 340 in accordance with the instructions provided by the manufacturer of the machine.

Puristeril® 340 can be used in all Fresenius Medical Care 2008, 4008 and 5008 haemodialysis machines as well as the GENIUS® system.

For disinfection of water treatment systems, proceed according to the manufacturer's instruction.

Testing for residual disinfectant

For safety reasons, a test to show the absence of residual disinfectant residues must be performed after the completion of the disinfection procedure. The absence of Puristeril® 340 is detectable by potassium iodide starch paper (art.no. 508 521 3).

Stability and storage

Properly stored, the disinfectant remains fully effective for 18 months after production. Keep container sealed at all times and store in an upright position. If possible, store in well-aired rooms at 5 to 25°C. Do not expose to direct sunlight.

Order information

Article	Quantity	Art. No.
Puristeril® 340	1 × 5 kg	508 562 1 (multilingual)
Puristeril® 340	1 × 10 kg	508 563 1 (multilingual)
Puristeril® 340 GENIUS®	1 × 3 kg	508 567 1 (multilingual)

Evaluations are available on request.

FRESENIUS MEDICAL CARE

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Tel.:+910124 6642500 Fax:+910124 6642506
www.freseniusmedicalcare.asia email:Products.India@fmc-asia.com

Corporate Office : 14th Floor, SAS Tower-B, The Medicity, Sec-38, Gurugram-122001
Tel. :0124 - 6642500 Fax :0124 - 6642506

PAA

- **Specific advantage:**
  Exceptionally broad spectrum of antimicrobial action in low concentrations within short period of time; also **very good against bacterial spores and viruses**; non-toxic decomposition

- **Principle of action:**
  Damage of the cell wall through oxidation of membrane proteins, resulting in oxidation of liberated fatty acids, proteins, DNA, etc. Damage of the envelope of enveloped viruses as well as oxidation of the coat proteins.

- **DILUTION**
- **250 LITRES of RO water in the tank – one can of Puristeril@340**
- **Dwelling time 1 – 2 hour**
- **Keep the motor ON position – let it recirculate.**

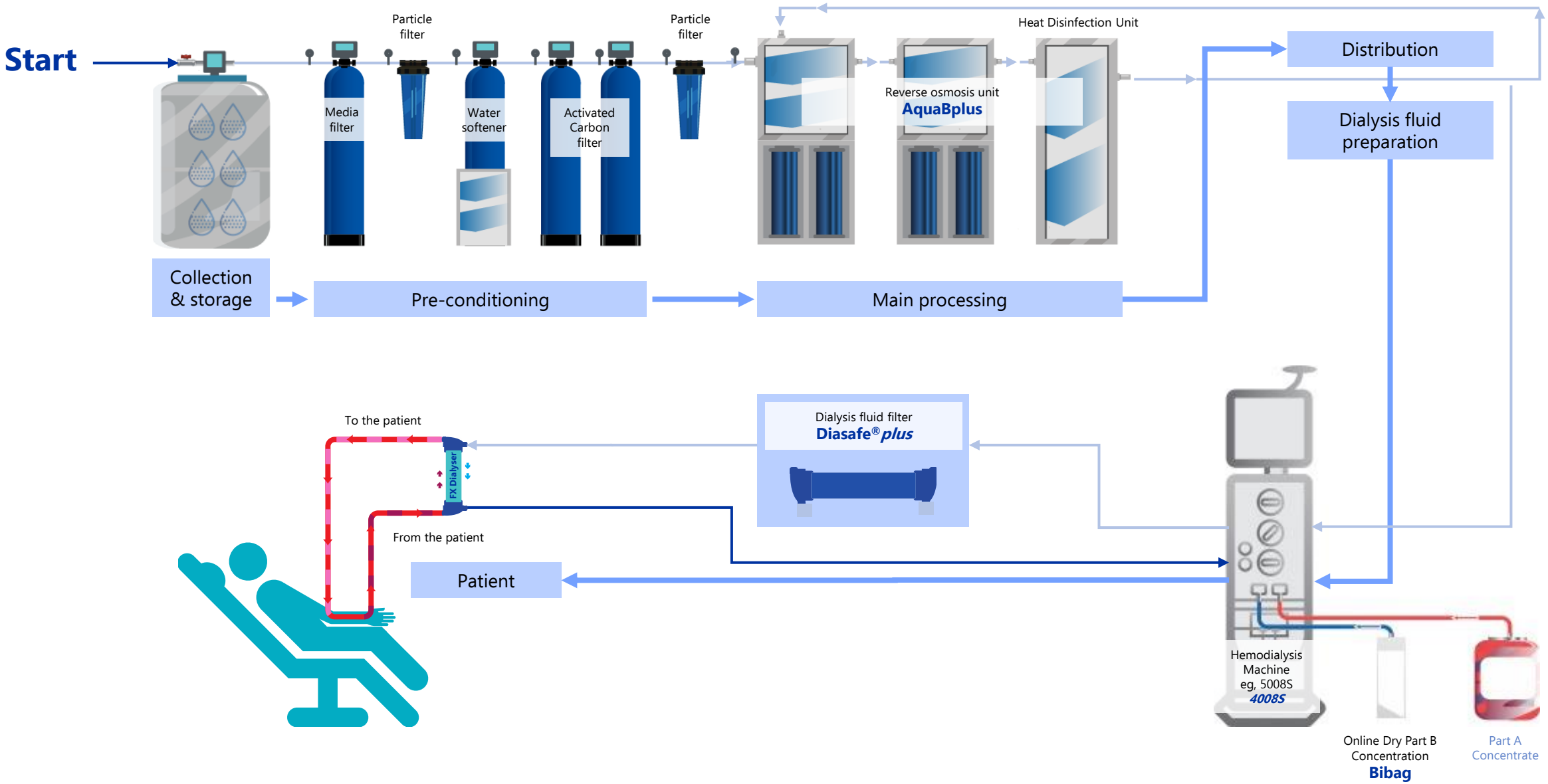
- **Reprocessing of dialyzer**
- **400 mL PAA+ 9600 mL RO water – 4%**
- **200 mL PAA+ 4800 mL RO water – 4%**

PAA – RESIDUAL TEST

Residual test with Potassium Iodide Starch Paper

- Potassium iodide starch paper is a filter paper impregnated with potassium iodide and starch for the detection of oxidizing agents like peracetic acid, nitrite and free chlorine.
- Potassium iodide is oxidized forming free iodide which reacts with the starch forming a blue-violet iodide-starch-complex.
- The colour turns from white into blue-violet.
- The Potassium Iodide Starch Paper is used by dipping it into the solution or by dotting the solution onto the paper.

FRESENIUS MEDICAL CARE HELPS YOU ACHIEVE AN ISO STANDARD FOR UPDF



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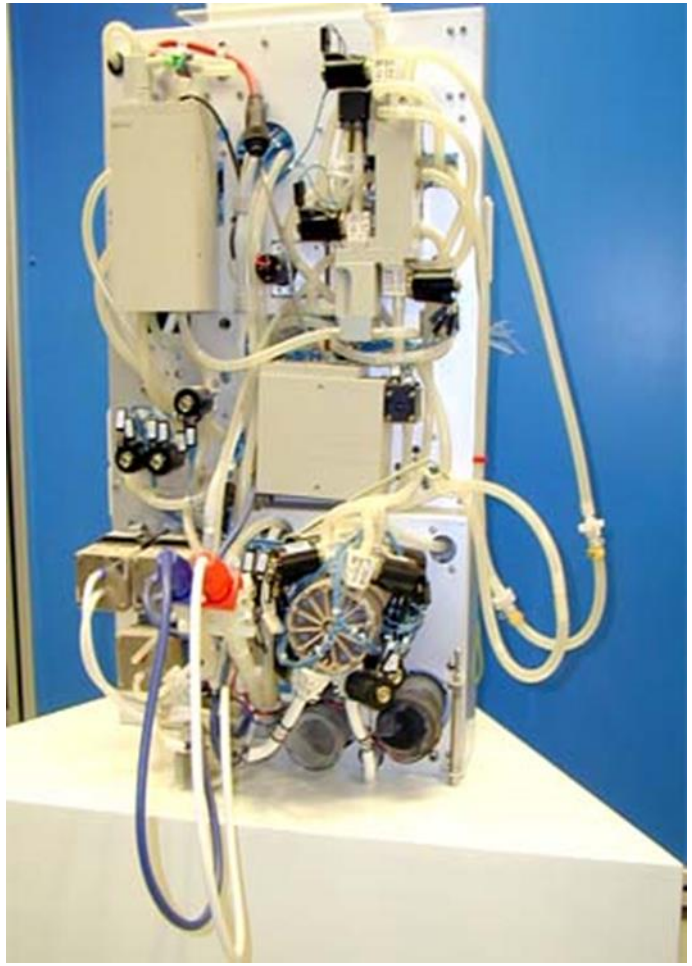
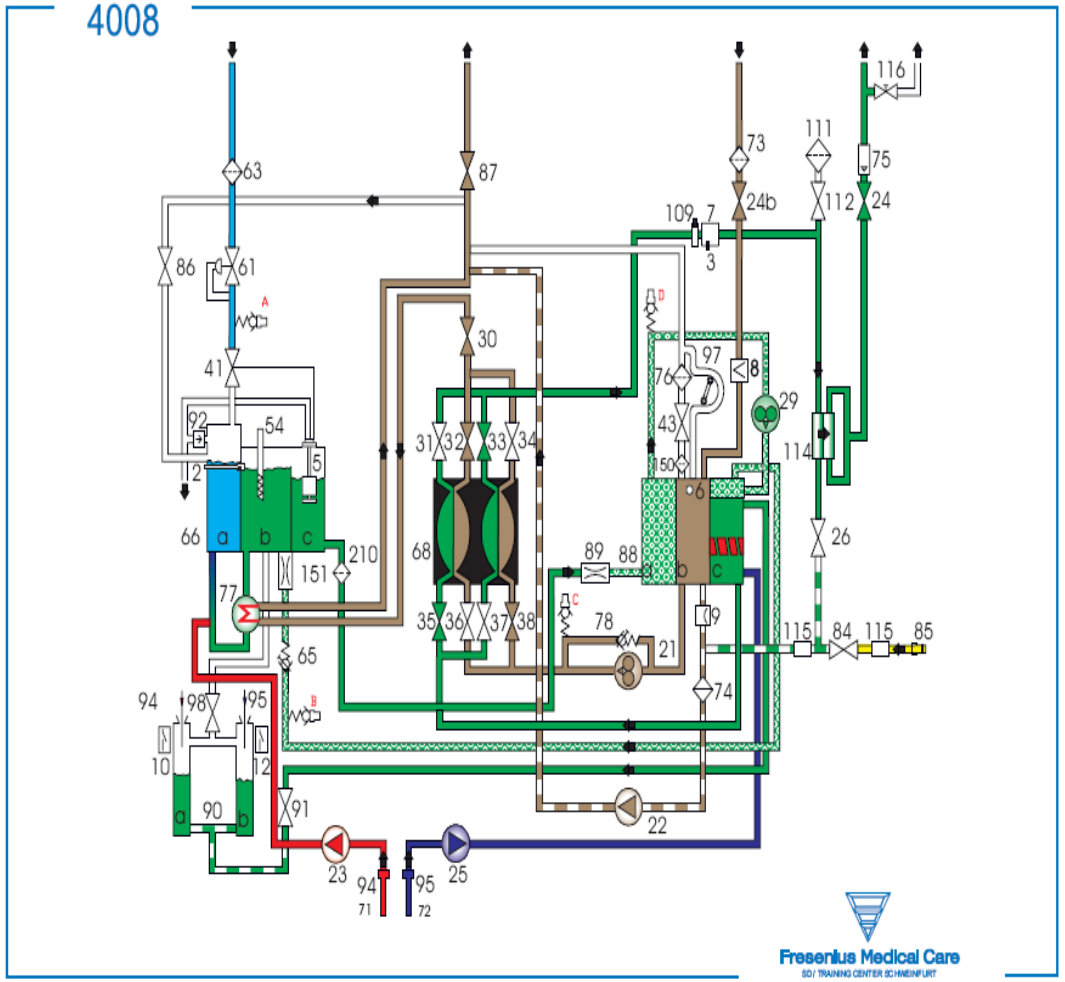
DIALYSIS MACHINE MAINTENANCE AND UPKEEP

4 DIALYSIS MACHINE MAINTENANCE

HYDRAULICS

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Fresenius Medical Care

WHAT IS DISINFECTION & DECALCIFICATION

Disinfection

Removal or killing of Microbiological Contamination like Micro-organisms, growth of Biofilm, Protein Deposits.

Cross Contamination Across PATIENTS.

Decalcification

Removal of chemical salts like Calcium carbonate, Magnesium carbonate, Calcium bicarbonate, Magnesium bicarbonate.

Blockage of tubing, rusting which leads to non-functioning of moving parts & deposits on Sensors leads to there accuracy in MACHINE.

TYPES OF CLEANING/DISINFECTION FOR HD MACHINES

There are two types of cleaning /Disinfection

Internal and External

Internal cleaning/disinfection it includes inner surfaces where only liquid can reach and done automatically by machine itself with help of Machine program

External cleaning/disinfection it includes all or specific outer surface of the machine/equipment usually done by user manually.

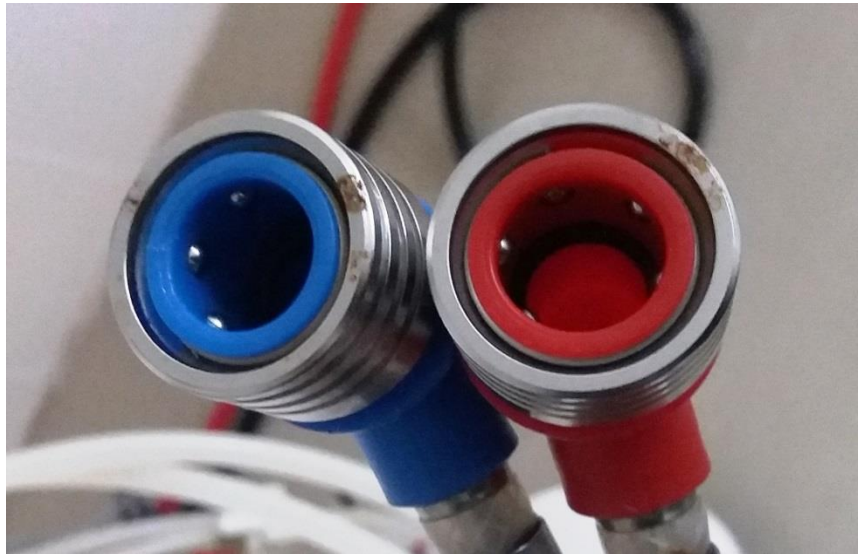
SURFACE CLEANING/DISINFECTION (EXTERNAL)

After the treatment, the exterior of the hemodialysis system and the

options used must be disinfected.

The following components require regular cleaning:

– the dialyzer couplings and the shunt interlock



EXTERNAL DISINFECTION

- – the sealing area of the bi*b*ag® connector

– the sealing area of the concentrate suction tubes (concentrate / bicarbonate)

- **External Fan Filter** – Remove plastic guard. Remove foam insert and brush vigorously to remove all signs of lint and debris, replace foam insert and plastic guard.

SURFACE DISINFECTION – ATTENTION TO DETAIL

The following components require extra care during the surface cleaning:

- BPM cuff and holder
- The dialyser couplings and the shunt interlock
- The sealing area of the Bibag connector

The sealing area of the concentrate suction tubes





Partner for
disinfection

WETTASK® with Bacillol® 25 Surface Wiping System - (Pre-saturated)

Instant disinfection in 25 seconds. The compact, self-contained closed bucket gives hygienic wet wiping system that's safe, simple and reliable.

WETTASK® with **Bacillol®** 25 Surface Wipes is a hygienic disinfecting system. These wipes are special researched wipes, pre-saturated with the surface disinfectant **Bacillol®** 25 which is time tested, aldehyde free, quick acting, effective against bacteria, fungi, viruses incl. HIV, Rota, Herpes, etc. and dries without visible residue.

WETTASK® with Bacillol® 25 Wiping System (Pre-saturated)

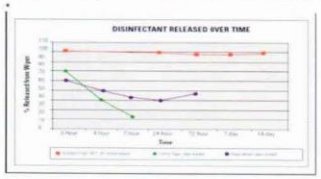
Convenient instant disinfection in 25 seconds

Salient features

- **WETTASK®** wipes, soaked in **Bacillol®** 25, a time tested instant disinfectant, for uniform application for surface disinfection.
- **Bacillol®** 25; **Aldehyde-free surface disinfectant wipes, effective against bacteria, fungi, viruses including HIV, Rota, Herpes, etc.**
- **WETTASK®** wipes are made from special researched material which releases over 90% of the active disinfectant on the surface to ensure effective disinfection.
- For controlled chemical usage and target disinfection.
- 'Closed bucket system' for total hygienic disinfection.
- Reduces exposure to chemical vapors and splashes.
- Complies with Guideliness of Infection Control Health Care Facilities (CDC - USA)
- Picks up maximum dirt (documentated)

Why WETTASK® wipes in a 'closed bucket system'?

- APIC cautions : Reusing a used cloth, will definitely promote contamination and microbial spread.
- WETTASK® wipes are low lint wipes with low absorption of disinfectants, and excellent release properties* , resistant to abrasions or tears or damage during use.
- No laundering of rags, no disinfection of contaminated mops, no exposure to chemicals
- No wastage of time.
- Compared to the spray technique, this gives special target disinfection, with no wastage.



(comparison of cloth with wipes)

Areas of Application

- **Bacillol®** 25 Wipes, a convenient portable system has wide usage and can be used for instant focused disinfection on water-sensitive-surfaces, frequent 'hand contact' surfaces, and hot zone surfaces.
- **Bacillol®** 25 Wipes is ideal for usage in all Critical / Non Critical areas of the Hospitals, for e.g. ICU / ICCU / NICU.
- **Bacillol®** 25 Wipes can be used for instant and effective disinfection of Imaging machines, C.T. scanners, HIV endangered areas, Pharmaceutical sterile sections and Food Processing areas.

Composition :

Each 100gms of **Bacillol®** 25 contains :

- Ethanol : 10 gms
- 2-Propanol : 9 gms
- 1-Propanol : 6 gms

Packing :

Each bucket contains :
90 pull outs of Wettask® wipes soaked in 1 Ltr of **Bacillol®** 25. Each pull out is 12" x 12.5" made of specially researched material.

Precautions :

CLOSE THE LID TIGHTLY AFTER EACH USE TO AVOID DRYING

Just 1 Wipe Per Procedure !

FRESENIUS MEDICAL CARE

DIALYSIS MACHINE MAINTENANCE AND UPKEEP

5 DISINFECTANT

CHOICE OF DISINFECTANT

❑ Cold Disinfectant

Puristeril 340

Mixture of Peracetic acid, Acetic acid & Hydrogen peroxide

Sporotal®100

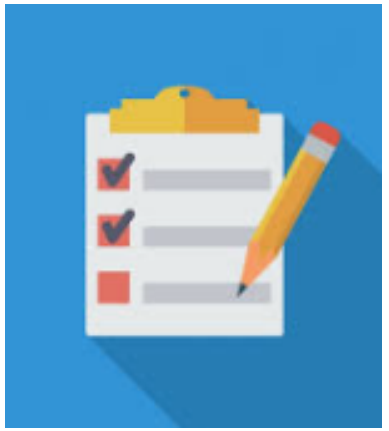
Sodium Hypochlorite 3.5%

❑ Hot Disinfectant

Citrosteril

Mixture of Citric acid, Lactic acid & Malic acid.

MACHINE DISINFECTION AND CLEANING

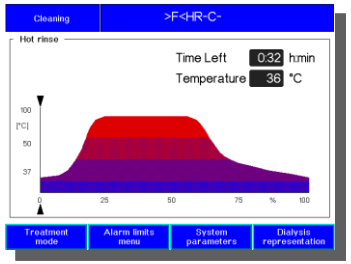


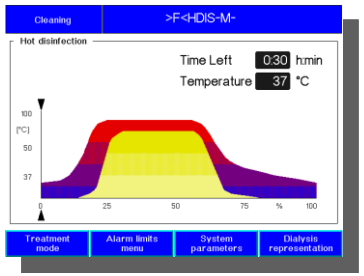
MANDATORY STEPS

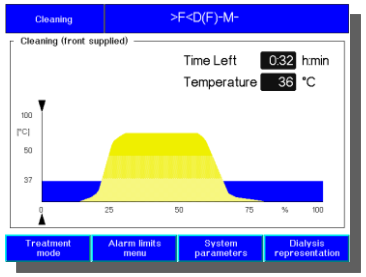
- After Each treatment machine heat disinfection is preferred.
- If machine is not being used for more than 72 hrs Immediate disinfection should be carried out.
- Weekly degreasing should be carried out with sodium hypo (5%).
- Sodium Hypo solution must be administered via the acid wand at the front of the machine only.
- **Sodium hypo must not be heated,**
- Gloves and Protective glasses must be worn while handling the bleach,

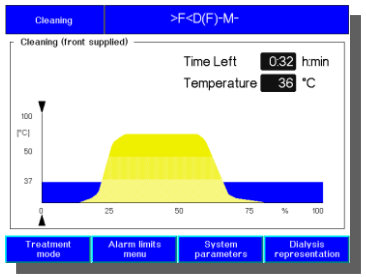
❖ Machine Disinfection status mention in Haemodialysis record sheet.

DISINFECTING PROGRAM









Hot rinse (recirculation): 85°C

- No agent required
- Between treatments when decalcification is not required
- ONCE IN A DAILY 30 MINUTES PROGRAM

Heat Disinfection (recirculation): 85°C

- Citrosteril®
- Good for disinfecting and decalcifying between treatments
- After Every Treatment 30 MINS PROGRAM

Cleaning BLEACH ® (recirculation): 37°C

- ® (Sodium hypochlorite)
- Good for disinfecting and degreasing (once a week) or after blood leakage. Not for decalcifying
- ONCE IN A WEEK 30 MINS PROGRAM

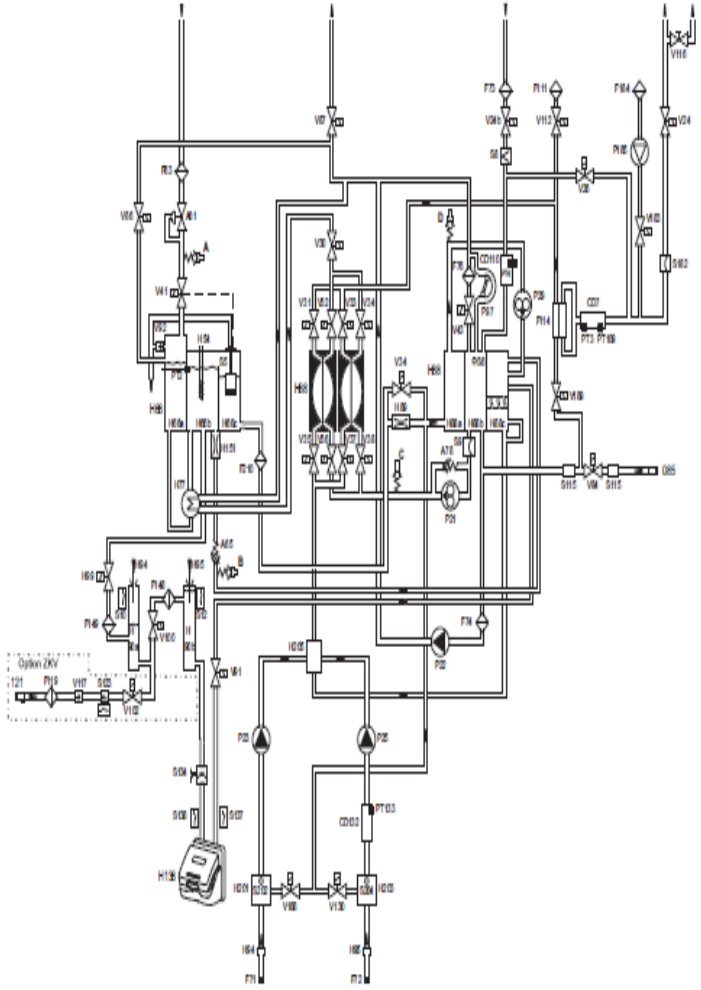
Cold Disinfection (recirculation): 37°C

- Puristeril®340
- Good for disinfecting and decalcification between treatments
- IF NEEDED DISINFECTION PROGRAM

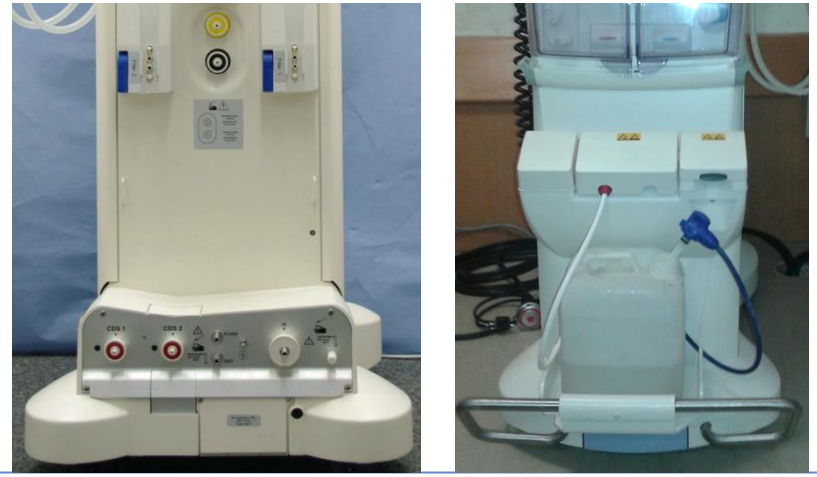
WHAT IS DISINFECTED?

- Balancing chamber
- Flow pump
- Degassing pump
- UF pump
- Concentrate pumps (acid & bicarbonate)
- Rinse chambers (red & blue)
- Concentrate suction tubes (red & blue and) heater block
- DIASAFE *plus* filter(s)

Complete Hydraulics



DISINFECTANT CHEMICAL PORT SELECTION

4008 Series	5008 series
Rear **YELLOW** port for Citrosteril (Pgm2&4) and Puristeril (Pgm 1&3)	Rear **YELLOW** port 1 for Citrosteril (Hot) or Puristeril (Cold)
Conc.(**RED** suction tube) for Sporotal 100 OR Sodium Hypochlorite (Pgm 5) **front supplied**(follow the message display on screen).	Rear **BLACK** port 2 or Conc.(**BLUE** suction tube) for Sporotal 100 OR Sodium Hypochlorite **front supplied** (follow the message display on screen).
	

DISINFECTANT CONSUMPTION

	Disinfectant:	Puristeril®340		Citrosteril®		Sporotal®
	Dialysis Program:	**1**	**3**	**2**	**4**	**5**
4008S	**w/o Diasafe® 4008**	50 ml. **88 tx.**	50 ml.	50 ml. **100 tx.**	50 ml.	37 ml.
S Machine Arrt Plus	**DIASAFE*plus***	66 ml. **66 tx.**	66 ml.	66 ml. **66 tx.**	66 ml.	49 ml.
	ONLINE*plus*	82 ml. **54 tx.**	82 ml.	82 ml. **61 tx.**	82 ml.	61 ml.

5008/S Series	Puristeril/Citrosteril/ Diasteril	Sporotal®
	90 ml.	65 ml

Note: Citrosteril is 5 litre canister
Puristeril is 4.4 litre canister

DIALYSIS MACHINE CLEANING REQUIREMENTS

FRESENIUS MEDICAL CARE

Clinical Quality

Form No:	AP-MA-CQ-IPC~001	Form Title:	BEST PRACTICE

INFECTION PREVENTION & CONTROL COMMITTEE (IP&CC)	BEST PRACTICE ADVICE ISSUE No. 002 (V2)	Issued - August 2014 Updated – January 2018 Next Review – January 2021 Lisa Webb - Director Clinical Quality & Chair IP&CC

Haemodialysis Machine Disinfection

FOCUS AREA	CLINICAL PRACTICE AREA OF CONCERN	BEST PRACTICE RECOMMENDATION	RATIONALE
Haemodialysis machine disinfection – **ROUTINE DISINFECTION CYCLE**	4008 - HOT Disinfect 5008 - HEAT Disinfect	**BEST PRACTICE** • **Haemodialysis machines are to be disinfected with Citrosteril ® in conjunction with heat disinfection before each patient treatment**	Citrosteril ® is a potent thermo chemical disinfectant solution. Due to the excellent removal of CaCO3 Citrosteril® decalcifies and disinfects the machine in one process. It is non-toxic and exclusively composed of natural ingredients, hence it is 100% biodegradable.
Haemodialysis machine disinfection – **REGULAR CLEANING**	The following components require regular cleaning: • The dialyser couplings and the shunt interlock • The sealing area of the Bibag connector • The sealing area of the concentrate suction tubes • Air vent (filter) located on the back of the machine	**BEST PRACTICE** • **This should occur between every patient treatment as part of the surface disinfection of the machine** • **These components can be cleaned using a wipe that contains a maximum of 45% ethanol. Use a clean wet wipe for the couplings and seals.** **NOTE: A REGULAR DISINFECTION MUST BE PERFORMED AFTER CLEANING THE DIALYSATE COMPONENTS**	To remove the bio burden, dust and dirt that may exist and to decontaminate the surface of potential pathogens. To remove dust and dirt build up in the machine air vent to prevent dispersing of dust into the machine components. *References: 5008 Operating Instructions Vs: 4.5 Edition – 10/06.12 PN: M49475* *4008 Operating Instructions Vs: 11.1 Edition – 4/12.10 PN: M44 475 1 0123*

Created	Last Review Date	By Whom	Next Review Date	Version No	Locations
07/02/2014	26/01/2017	FME-AP Clinical Quality Team	Jan 2020	V3	CQ Team O:drive & AP Intranet

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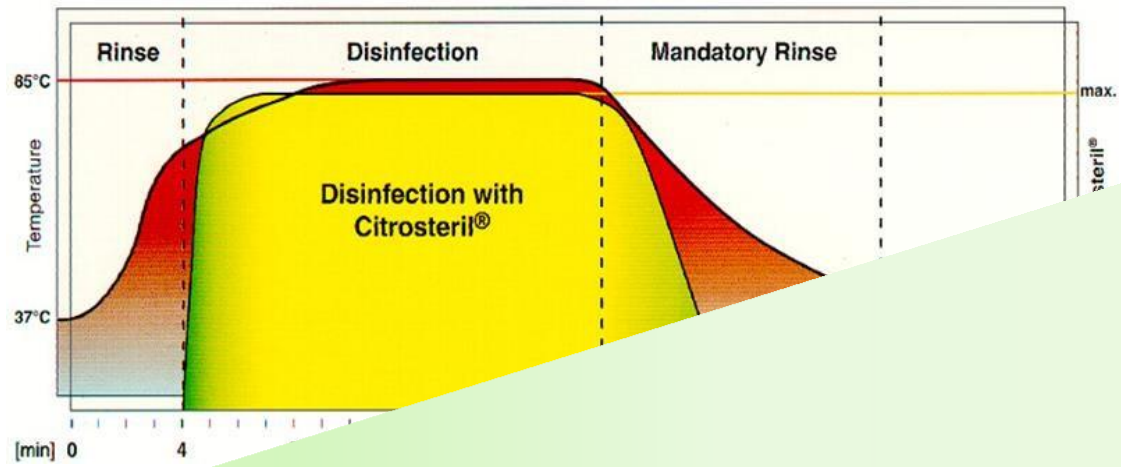
REQUIRED ACTIVITIES FOR HD SYSTEMS (INTERNAL CLEANING)

Name of the disinfectant		Citrosteril
Composition 21g citric acid 1-hydrate; lactic acid, malic acid		Mixture of Citric acid, Lactic acid & Malic acid.
		Material compatibility (4008, 5008,6008 DIASAFE®plus)
Required temperature		84°C
Antimicrobial action (Disinfection)	Bactericidal	YES
	Sporocidal	YES
	Virucidal against enveloped viruses (incl. SARS-CoV-2 HBV/HCV/HIV)	YES
Additionally for HD machines (Decalcification)	Removal of calcium or magnesium carbonate deposits	YES



Recommendation:
Haemodialysis machines to be disinfected with Citrosteril using **heat disinfection** mode before / after each dialysis

Wallhäußers Praxis der Sterilisation. Edited by: Kramer A, Assadian O. Stuttgart, Germany: Georg Thieme Verlag; 2008

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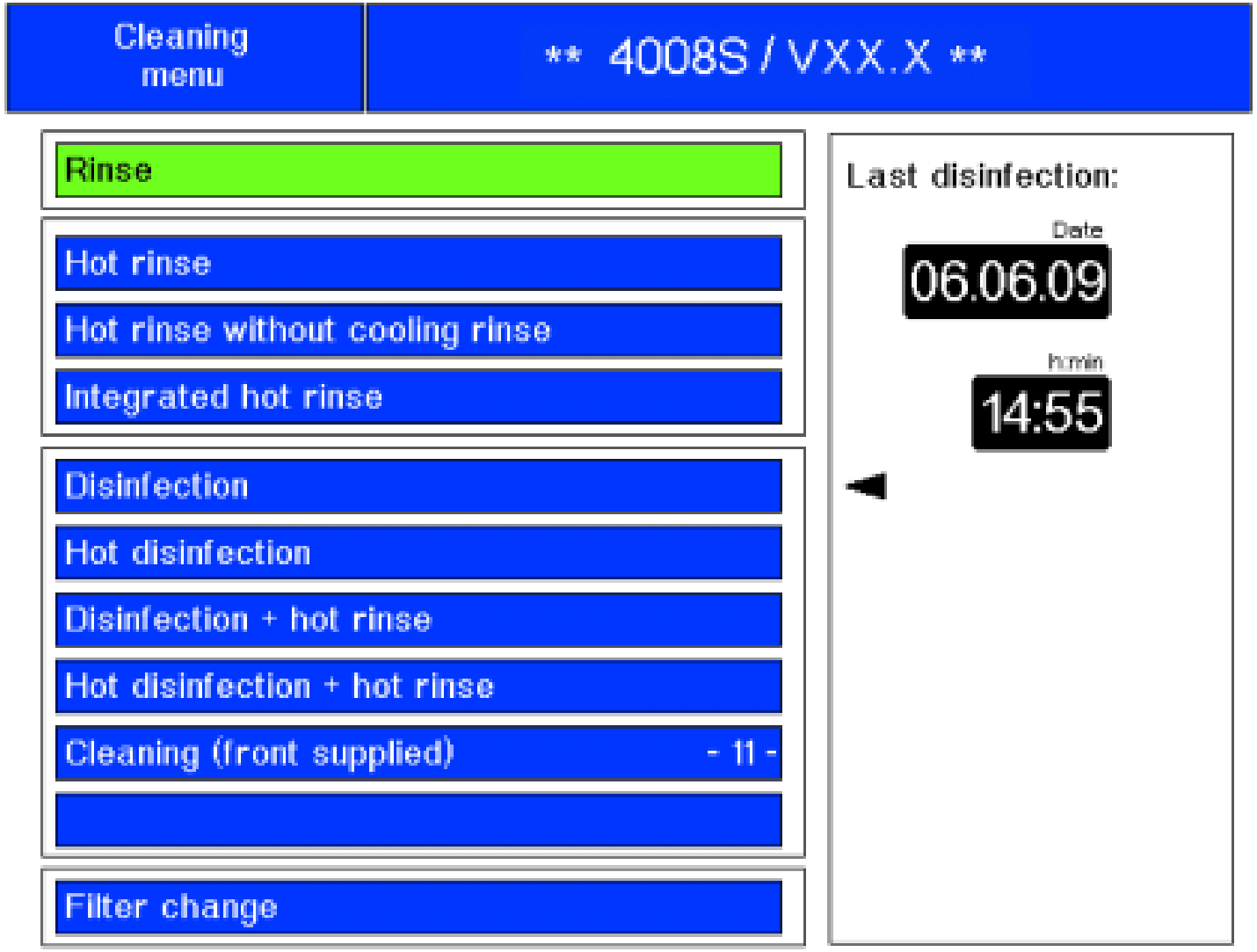
DIALYSIS MACHINE MAINTENANCE AND UPKEEP

6 RO WATER USED FOR RINSING

INTERNAL DISINFECTION PROGRAM



Disinfection Program

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RO WATER USED IN DIALYSIS MACHINE MAINTENANCE AND UPKEEP

7 SUMMARY

SUMMARY

- ✓ Quality of dialysis fluid is critical to the delivery of effective HD treatment to dialysis patients.
- ✓ As recommended by the ISO guidelines, a high-quality standard can be efficiently maintained by a validated water treatment system with the appropriate disinfection protocol, right disinfectant and compliance to quality control procedures.
- ✓ Regular Dialysis machine maintenance (PM) should be considered in every institution to deliver smooth functioning of the therapy.
- ✓ **Proper maintenance of RO water system and Regular disinfection protocol of Dialysis machine will ensure patient's safety and better patient's outcomes.**

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thank you!

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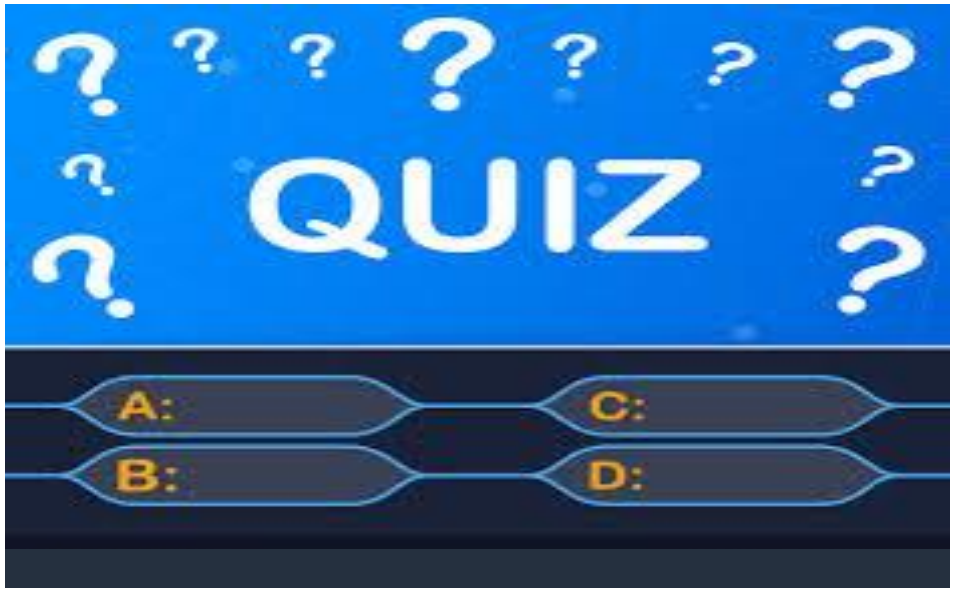
READY FOR A
QUIZ ?


QUIZ TIME


THE
VIRTUAL
QUIZ


GK Quiz


QUIZ
TIME!


QUIZ
A:
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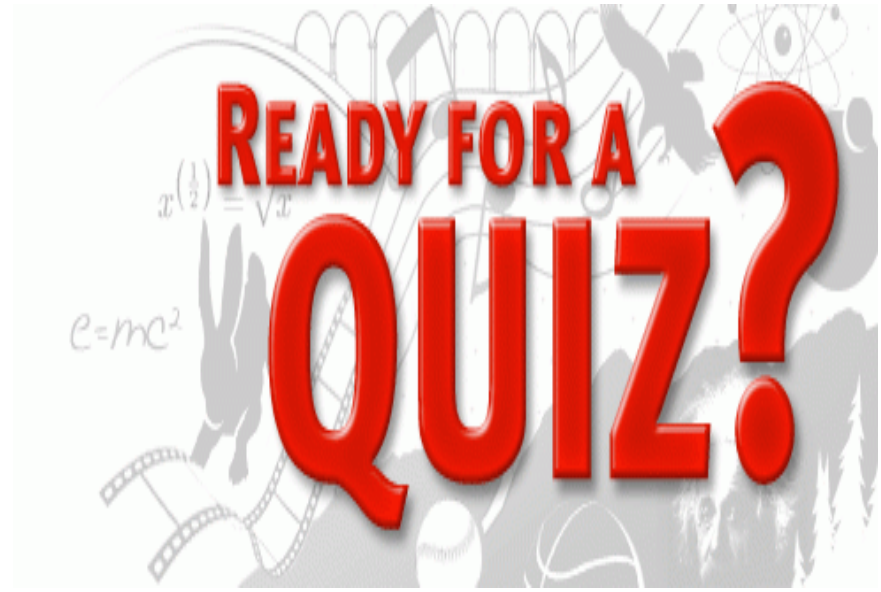
READY FOR A
QUIZ?


Quiz


QUIZ


QUIZ

QUIZ

1. Biofilm build up in the WTS can be prevented or slowed down by regular disinfection of the loop and tank

a. True

b. False

QUIZ

2. Which of the following is correct about “ULTRAPURE DIALYSATE FLUID” as specified by ISO standard?

a . < 100 CFU/mL and 50 EU/mL

b. 100 CFU/mL and 0.5 EU/mL

c. <10 CFU/mL and < 1EU/mL

d. < 0.1 CFU/mL and < 0.03 / mL

QUIZ

3. RO water systems, loop disinfection, should be disinfected regularly – choose the best answer?

   a. Bimonthly

   b. Weekly

   c. Monthly

   d. Daily

QUIZ

4. RO water systems – Raw water / RO water – chemical contaminants to be tested regularly – choose the best answer?

   a. Yearly

   b. Weekly

   c. Monthly

   d. Daily

QUIZ

5. RO water systems –RO water – Hardness / chlorine / chloramines to be tested regularly – choose the best answer?

   a. Every shift if ONLINE RO Systems

   b. Weekly

   c. Every day

   d. Monthly

QUIZ

6. Dialysis machine should be disinfected – choose the best answer?

   a. Start of the day

   b. Weekly

   c. After each session

   d. End of the day.

QUIZ

7. Which disinfectant is recommended for Dialysis machine - choose the best answer?

   a. Citric based disinfectant

   b. Peracetic acid disinfectant

   c. Bleach

   d. Rinse at 37 degrees celsius.

QUIZ

8. Disinfectant should have both the properties of descaling (decalcification) and disinfection of the hydraulics or the distribution loop of the dialysis unit

   a. True b. False

thank you!

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