



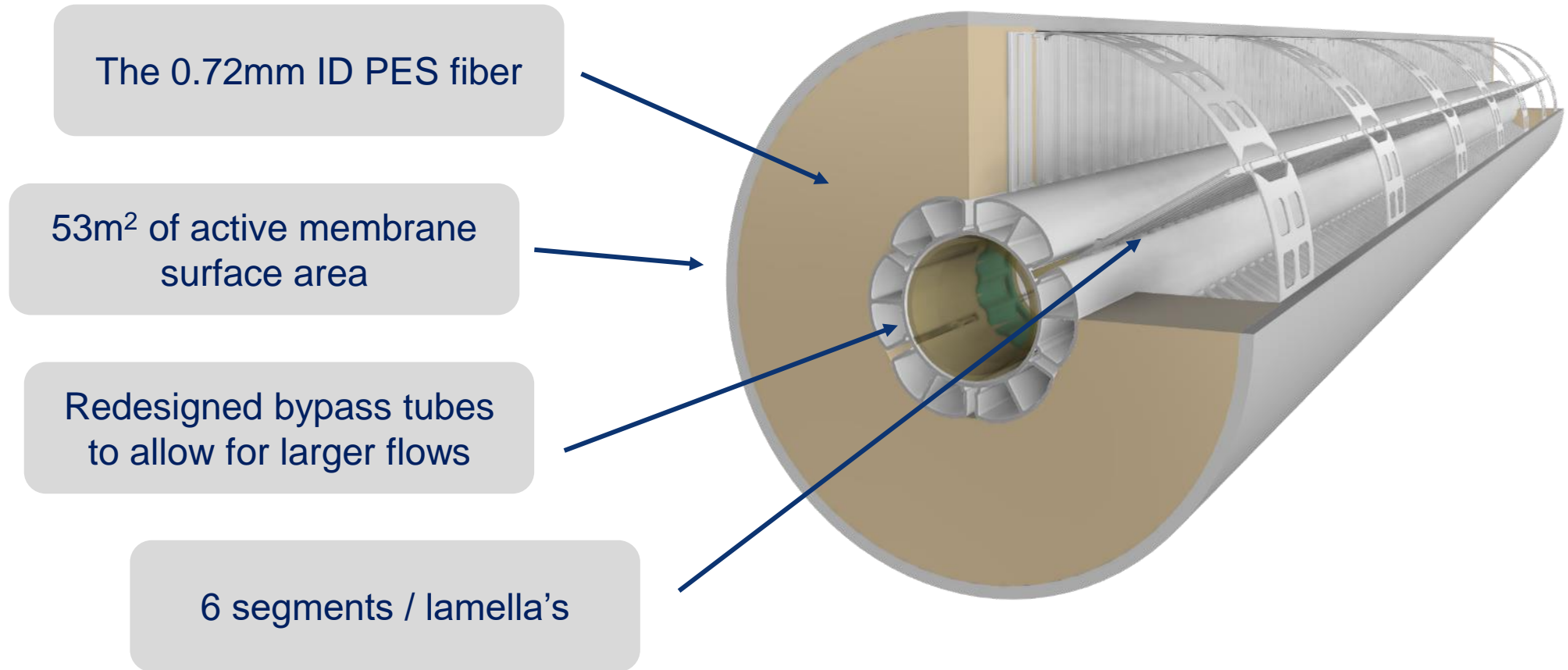
# PENTAIR X-FLOW XF53 MEMBRANE ELEMENT

Replacement element for Pentair X-Flow XF40 installed base

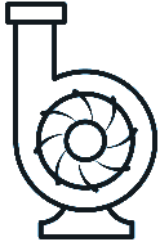


# Pentair X-Flow XF53 – what is new?

Installation dimensions remain unchanged



# XF53 replacement scenarios



Feed  
pump capacity



Backwash  
pump capacity

- Scenario 1 – Maintain current settings
- Scenario 2 – Increase plant robustness
- Scenario 3 – Decrease OpEx
- Scenario 4 – Increase capacity
- Scenario 5 – Maximize plant utilization



# XF53 replacement scenarios

*Surface water (5 NTU; Temperature avg 20 degC)	Installed Base	Membrane surface area-to-area replacement		Membrane element quantity-to-quantity replacement		5. Maximize plant utilization
		1. Maintain current settings	2. Increase plant robustness	3. Decrease OpEx	4. Increase capacity	
Membrane element type	XF40	XF53	XF53	XF53	XF53	XF53
Number of units	8	8	6	8	8	
Membrane Housings per unit	24	18	24	24	24	
Elements per Housing	4	4	4	4	4	
Number of elements in plant	768	576	576	768	768	
Total membrane surface area (m2)	30,720	30,528	30,528	40,704	40,704	
Gross filtration flux (lmh)	85	85	85	63	85	
Average yearly filtration TMP (bar)	0.37	0.37	0.37	0.28	0.37	
Filtration time (min)	40	40	40	60	40	
CEB frequency (hrs once)	24	24	24	36	24	
Recovery	94.8%	94.8%	94.8%	95.3%	94.8%	
Permeate capacity (m3/h)	2340	2340	2340	2340	3150	
Pump Capacity Requirements						
Feed pump capacity (m3/h)	2,611	2,611	2,611	2,564	3,460	Max available capacity
Backwash pump capacity (m3/h)	922	916	1,221	1,221	1,221	Max available capacity
<b>XF53 Replacement Benefits</b>						
Membrane element quantity decrease	-	-25%	-25%	-	-	
Footprint decrease	-	-	-25%	-	-	
Average energy demand decrease (based on TMP)	-	-	-	-24.3%	-	
Average chemical consumption (based on CEB frequency)	-	-	-	-33.3%	-	
Permeate production increase (m3/h)	-	-	-	-	34.6%	

# Scenario 1 - Maintain current settings

## Reduction of UF housings and elements

- Reload with 25% less elements
- Dismantle 25% of vessels per skid
- Total plant membrane surface area remains unchanged
- Total skid membrane surface area remains unchanged
- Maintain operation of plant
- Lowest Replacement Cost Scenario

Feed pump capacity	=
Backwash pump capacity	=

*Surface water (5 NTU; Temperature avg 20 degC)	Installed Base	Membrane surface area-to-area replacement	
		1. Maintain current settings	2. Increase plant robustness
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Pump Capacity Requirements			
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Backwash pump capacity (m3/h)	922	916	1,221
<b>XF53 Replacement Benefits</b>			
Membrane element quantity decrease	-	-25%	-25%
Footprint decrease	-	-	-25%
Average energy demand decrease (based on TMP)	-	-	-
Average chemical consumption (based on CEB frequency)	-	-	-
Permeate production increase (m3/h)	-	-	-

# Scenario 2 – Increase plant robustness

## Reduction in no. of UF skids in operation

- Reload skids fully with XF53
- Total skid membrane surface area increases with 32.5%
- Reload part of skids
- Options in described case:
  - Dismantle 2 skids and safe footprint
  - Dismantle 1 skid, refurbish key ancillaries and use one skid as stand-by → safe footprint, increase plant continuity and performance
- Lowest Replacement Cost Scenario for membranes
- Backwash pump capacity increases
- Capacity remains unchanged with more stable operation

Feed pump capacity	=
Backwash pump capacity	↑

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		1. Maintain current settings	2. Increase plant robustness
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Pump Capacity Requirements			
Feed pump capacity (m3/h)	2,611	2,611	2,611
Backwash pump capacity (m3/h)	922	916	1,221
<b>XF53 Replacement Benefits</b>			
Membrane element quantity decrease	-	-25%	-25%
Footprint decrease	-	-	-25%
Average energy demand decrease (based on TMP)	-	-	-
Average chemical consumption (based on CEB frequency)	-	-	-
Permeate production increase (m3/h)	-	-	-

# Scenario 3 – Decrease OpEx

## Lower flux and CEB frequency



- Reload all skids in full, with XF53
- Lower the filtration flux with approx 25%
- Lowest OpEx replacement scenario:
  - Lower TMP, hence lower energy demand
  - Lower CEB frequency, hence lower chemical consumption
  - Slight recovery increase
- Plant capacity remains unchanged
- Backwash pump capacity increases

Feed pump capacity	=
Backwash pump capacity	↑

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		3. Decrease OpEx	4. Increase capacity
Membrane element type	XF40	XF53	XF53
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Pump Capacity Requirements			
Feed pump capacity (m3/h)	2,611	2,564	3,460
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<b>XF53 Replacement Benefits</b>			
Membrane element quantity decrease	-	-	-
Footprint decrease	-	-	-
Average energy demand decrease (based on TMP)	-	-24.3%	-
Average chemical consumption (based on CEB frequency)	-	-33.3%	-
Permeate production increase (m3/h)	-	-	34.6%

# Scenario 4 – Increase capacity

Maintain no. of UF housings and elements, increase m2 and maintain flux

Feed pump capacity	
Backwash pump capacity	

- Reload all skids in full, with XF53
- Maintain process settings
- Increase capacity by approx 35%:
  - Without adding skids
- Backwash pump capacity increases
- Feed pump capacity increases

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<b>XF53 Replacement Benefits</b>			
Membrane element quantity decrease	-	-	-
Footprint decrease	-	-	-
Average energy demand decrease (based on TMP)	-	-24.3%	-
Average chemical consumption (based on CEB frequency)	-	-33.3%	-
Permeate production increase (m3/h)	-	-	34.6%



# Scenario 5 – Maximize plant utilization

## Load m2 up to max (feed or backwash) capacity

Feed pump capacity	=
Backwash pump capacity	=

- Assessment of capacity of:
  - Feed pump
  - Backwash pump
- Identify potential ‘over capacity’
- Reload membrane surface to what identified pump capacities allow

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Permeate capacity (m3/h)	2340	
Pump Capacity Requirements		
Feed pump capacity (m3/h)	2,611	Max available capacity
Backwash pump capacity (m3/h)	922	Max available capacity
<b>XF53 Replacement Benefits</b>		
Membrane element quantity decrease	-	
Footprint decrease	-	
Average energy demand decrease (based on TMP)	-	
Average chemical consumption (based on CEB frequency)	-	
Permeate production increase (m3/h)	-	



**PENTAIR**