

Quotation for the supply of UltraViolet Treatment Equipment

The following summarizes the quote from an agent of Trojan Technologies. Some comments and explanation have been inserted in the text. Those additions are in blue text.

Two issues:

- Water hardness – water hardness decreases sleeve service life due to fouling. The maximum recommendation from a manufacturer's publication reflects the manufacturer's recommended service interval. So, there is no real maximum hardness as long as the owner/operator is willing to put the necessary effort into keeping the sleeve clean.
- Reliability- All mechanical/electrical devices fail. The consequences of a failure in our application are severe. In the case of a central treating system, a prudent operator would design a system with some redundancy to assure quality water. (In the case of a point of entry system the installation would most likely include no sparing, just automated shutdown.) An owner of a treating system would need to decide whether to install hot spares or cold spares. (Hot spares are those that are installed, hooked up, ready to go with something like the flip of a switch or opening a valve. A cold spare is a spare device, and/or spare parts, on a shelf in a warehouse, on hand, ready to facilitate repairs or replacements.) It is recommended both a hot spare and inventory of consumable parts and those parts with a high probability of failure (like quartz sleeves and bulbs) be included in any central treatment option.
- If the owner chooses to install hot spares, the optional combinations might be:

Total capacity	Capacity of each unit	Units required in service	Units installed as spares	Total units installed	Total capacity installed
100	100	1	1	2	200
100	50	2	1	3	150
100	33 1/3	3	1	4	133
100	25	4	1	5	125

There is an optimum combination of units to provide service with a hot spare. The prudent operator will seek to provide the optimum combination yielding overall best value balancing initial capital, ongoing operating expense and requiring a reasonable level of maintenance effort. Among the many factors, the FCID will consider how the UVT system aligns with the filtration system. That is, if there are 2 in service filtration trains, is it best to "pair" it with 2 in service UVT trains? That could minimize valving and piping between the filters and the UVT. This question will be answered only when the filter options are known.

For the central treating case:

Option 1: One + One TrojanUV SwiftSC B series (100% redundancy)

Two (2) SwiftSC B04 with automatic wiping system - one duty, one stand by = **\$69,580.68**

- Includes, travel, start-up and commissioning of the two units and a set of spare parts (lamp, sleeves, o-rings)
- The life expectancy for the B04 lamps is 12,000 hrs (16 months)
- <200 ppm hardness is Trojan's recommendation
- 6 months of cleaning for the sleeves could be possible because of the automatic wiping system but it is difficult to predict as fouling is site specific. Even with the automatic wiping system, manual chemical cleaning will be required
- DVGW Validation

Option 2: Two + One Pro 50 (50% redundancy, if acceptable)

Three (3) Viqua Pro 50 units – two on duty, one stand by = **\$16,589.76**

- Viqua offers a performance guarantee and the start-up for Viqua systems is not normally required but, we can quote it if you'd like.
- Includes a set of spare parts (lamps, sleeves)
- The life expectancy for the Pro50 lamps is 2 years
- <120 ppm hardness is Viqua's recommendation (Our water hardness meets max spec.)
- 6 month cleaning period is unlikely since there is no automatic wiping system on this UV system and your hardness is close to Viqua's max recommendation. A 3-month cleaning period might be more practical
- USEPA Validation

Option 3: Two + Two Pro 50 (100% redundancy) (one too many with 4x50%)

Four (4) Viqua Pro 50 units – two on duty, Two on stand by = **\$21,999.68**

- Viqua offers a performance guarantee and the start-up for Viqua systems is not normally required but, we can quote it if you'd like
- Includes a set of spare parts (lamps, sleeves)
- The life expectancy for the Pro50 lamps is 2 years
- <120 ppm hardness is Viqua's recommendation
- 6 month cleaning period is unlikely since there is no automatic wiping system on this UV system and your hardness is close to Viqua's max recommendation. A 3-month cleaning period might be more practical
- USEPA Validation

For the POE case:

We recommend the following Viqua UV reactors.

Viqua Pro 10 – treats 10 GPM = **\$2,421.24** (my current recommendation)

Viqua Pro 20 – treats 20 GPM = **\$2,950.80**

Viqua Pro 30 – treats 30 GPM = **\$3,713.60**

- Prices include a set of spare parts (lamps, sleeves) for each UV system

- The life expectancy for the Pro series lamps is 2 years
- <120 ppm hardness is Viqua's recommendation
- NSF 55 Class A certification. This is what we believe would be required for a POE UV system by your health authority ([It is understood that Interior Health does require NSF 55 UV systems](#))

Concerning relevant metrics to treatment effectiveness, below are the main water quality items we are concerned about when it comes to UV disinfection:

Iron (Fe) Content:	< 0.3 mg/L
Manganese (Mn) Content :	< 0.05 mg/L
Hardness:	< 200 mg/L as CaCO ₃ (note this is for Trojan with auto wiper, Viqua is 120 mg/L)
pH Range:	6.5 to 8.5
Turbidity:	<5 NTU

As far as the sleeve cleaning procedures, for the SwiftSC B series, the automatic wiping system cleans([this is relevant to central treating only](#)) the sleeves periodically and reduces the fouling on them. Manual chemical cleaning will be required eventually though which we recommend using CLR with a lint-free cloth or nothing more abrasive than a loofah.