

Excelight

**UV Disinfection by
Waterite Technologies**
www.waterite.com

RESIDENTIAL UV WATER DISINFECTION SYSTEMS OWNER'S MANUAL[©]



***For Excelight UV system models
EL411AK, EL720AK and EL1129AK***



IMPORTANT!

**READ AND UNDERSTAND TERMS OF THE MANUFACTURER'S WARRANTY
ON PAGE 11 OF THIS MANUAL.**

Congratulations!

Your new Excelight UV disinfection system is made from the highest quality components available and is designed to provide many years of reliable service. Please take the time to read this manual completely so that you may provide the correct installation and maintenance, ensuring optimal system safety, performance and life.

WARNING!

WHERE MICROBIOLOGICALLY ACTIVE WATER IS KNOWN TO EXIST IT IS HIGHLY RECOMMENDED THAT AT LEAST ONE ADDITIONAL DISINFECTION BARRIER SUCH AS CHLORINATION OR ABSOLUTE FILTRATION IS USED TO TREAT DRINKING WATER, IN ADDITION TO UV TREATMENT. CAREFULLY MAINTAIN ALL WATER TREATMENT EQUIPMENT AND HAVE DRINKING WATER TESTED REGULARLY.



UV RADIATION HAZARD

NEVER OPERATE A UV LAMP OUTSIDE THE DISINFECTION CHAMBER. EXPOSURE TO UV LIGHT CAN RESULT IN SERIOUS INJURY AND EXTREME BURNING OF THE SKIN AND EYES



Excelight UV disinfection systems are equipped with both visual and audible lamp failure alarms. For your safety, it is necessary that you determine that the audible alarm can be heard where you use the water treated by the unit.

In order to optimize the disinfection performance, you must only use the unit with water that meets or exceeds the minimum standard and replace the UV lamp at recommended intervals. Failure to follow these guidelines will result in reduced disinfection performance.

Excelight UV ballasts can be ordered with an optional output on the power source that connects to a solenoid valve. This valve when activated will shut off the flow of water when an alarm condition is present, or the UV power source loses power for any reason, preventing you from using any untreated water.

SAFETY INSTRUCTIONS

1. Do not plug in unit if any of the external surfaces or electrical components are wet.
2. To avoid possible electric shock, special care should be taken since water may be present near electrical equipment. Unless referred to in these instructions, do not attempt repairs to the unit yourself. Contact the manufacture for service advice.
3. Do not operate this system if it has a damaged electrical cord or plug is malfunctioning, or has been dropped or damaged in any way.
4. Do not use this unit for anything other than its intended potable water application. The use of attachments not recommended, approved, or sold by the manufacturer/distributor may result in an unsafe condition.
5. Before doing any cleaning or maintenance, always unplug the unit.
6. Protect your unit from freezing. Drain all water from unit if freezing temperatures exist.

RAW WATER QUALITY

It is strongly recommended that you have your raw water professionally tested for dissolved mineral content, turbidity and microbiological activity. Your UV disinfection system requires clean, clear water for optimum performance. You should only operate your unit if the source water meets the following minimum standards:

Turbidity	<1 NTU
Suspended Solids	<5mg/L
Colour	None
Total Iron	<0.3mg/L
Manganese	<0.05 mg/L
Tannins	<0.1 mg/L
Hardness	<7 gpg

Where raw water conditions do not meet these minimum standards, pre-treatment equipment such as an inline or automatic filter, ion exchange softener or an RO system must be installed. Consult with your local water treatment specialist for advice.

Where microbiological activity is indicated to be present in your water source, it is highly recommended that additional disinfection barriers be used in addition to your UV system. This could include water well chlorination using a pellet dispenser, inline chlorine injection using a dosing pump and a contact tank, <1-micron absolute filtration or ozone injection. The use of multiple barriers will assure safe drinking water in the event of the failure of any one of the disinfection methods.

INSTALLATION CAUTIONS



1. Connect your UV light to a grounded (3-pronged) receptacle (120V/60Hz) (a **GFI is highly recommended**) and ensure that the lamp connector ground wire is connected to the grounding stud on the end of the reactor vessel.
2. Excelight UV disinfection devices are designed to be installed on the cold water line only.
3. Install the Excelight UV disinfection system indoors in a protected area where the temperature does not fall below 4°C (40°F) and the humidity level is low (to prevent condensation on the chamber). This unit functions optimally 9-29°C (49-85°F)
4. Use Teflon tape on all plumbing connections. **Do not use other sealants.**

INSTALLATION PROCEDURE

Your UV disinfection system should be the last component in your water treatment system, downstream from all other equipment. Choose a location for installation with easy access to a 120VAC electrical outlet. Note the direction of water flow in the supply line. Refer to figure 1 for the typical installation diagram and ensure that you have all the fittings necessary for your installation.

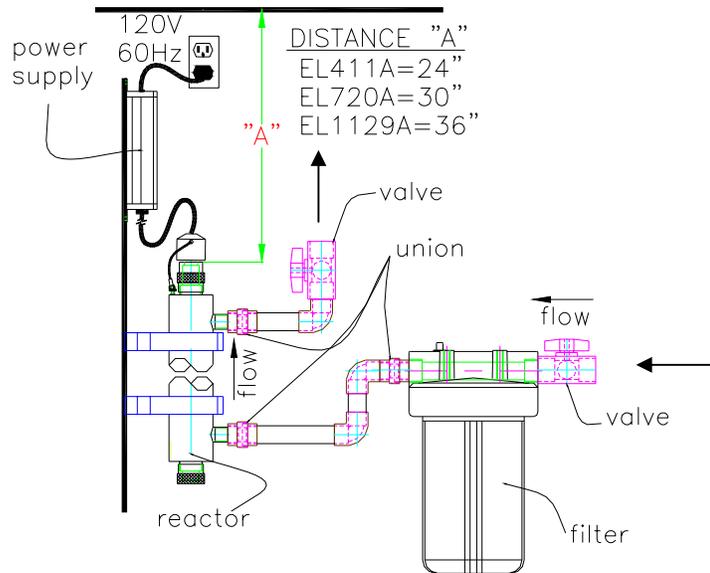


Figure 1.

The minimum distance ("A") for clearance is necessary to remove the UV lamp from the reactor. If this is not practical the reactor can be removed from the mounting clips for maintenance. Use of unions on the inlet and outlet will facilitate this removal. See figure 1.

1. Shut off the main water supply valve.
2. Mount the unit to the wall in the selected location using the brackets and screws provided.
3. Mount the power supply beside or above the reactor vessel to assure that any leaks cannot migrate to the power source. Never mount the power supply below the reactor chamber. **DO NOT PLUG IN AT THIS TIME.**
4. The unit must be installed so that the inlet and outlet ports are accessible. If mounted vertically the lamp connection must be at the highest point. This will assure that any dripping condensation or possible leaks will not migrate to the lamp harness or electrical connections. See figure 2.
5. If mounted vertically, the water inlet port must be the lowest port. This allows air to escape the housing, and ensures proper flow past the UV lamp. If the system mounted horizontally, either port can be used as the feed port. See figure 2.
6. Install new plumbing as shown in figure 1. Note: If installing a pre-filter, use a 5 micron filter and ensure the direction of water flow is correct.

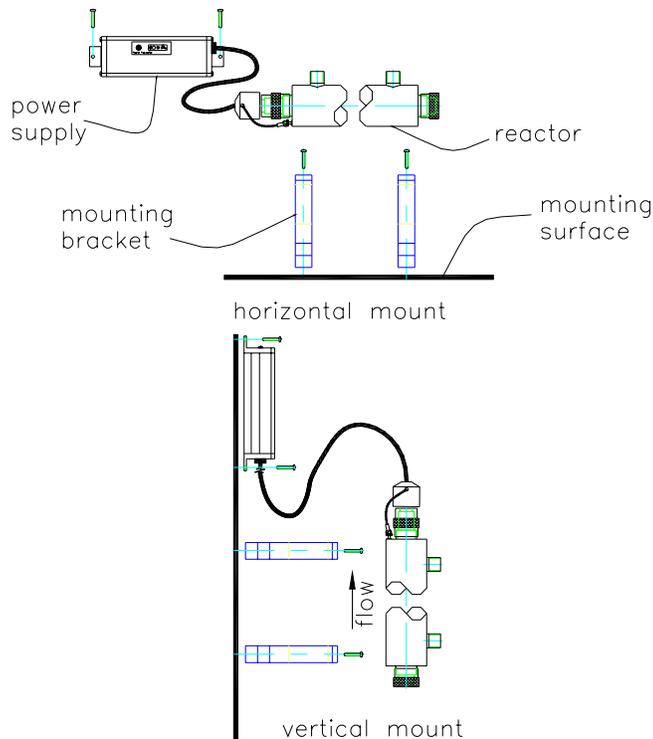


Figure 2.

WARNING:

If soldering copper pipes, do not allow heat near plastic or nylon threads or fittings.

7. Remove the electrical end cap. Note that the quartz sleeve has been factory installed.

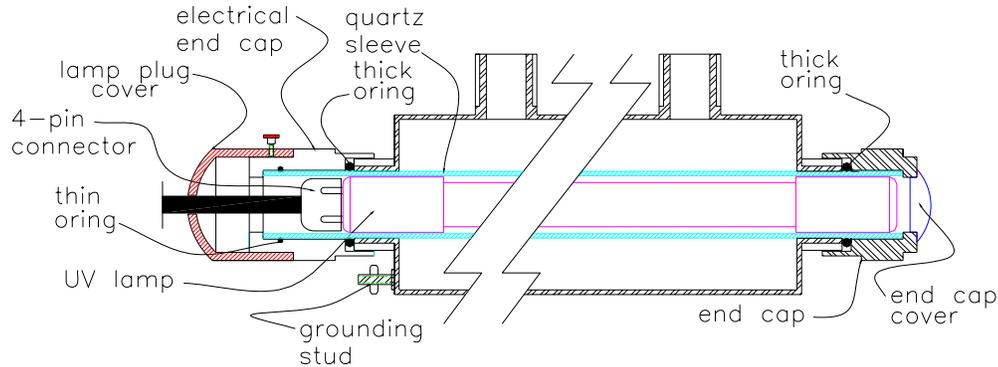


Figure 3.

8. Remove the lamp from its protective packaging. Clean lamp exterior with a clean cloth. Be careful not to leave fingerprints on the lamp. Connect the 4-pin electrical connector to the pins on the UV lamp. Insert the lamp through the opening at the end of the electrical end cap until the connector is inside the end cap.
9. Loosen the setscrew on the side of the lamp plug cover, and place the cover over the ledge of the electrical end cap. Tighten the setscrew.
10. Remove the nut on the grounding stud and place the grounding wire (green & yellow) onto the stud. Replace the nut and tighten.
11. Ensure the valves on either side of the disinfection unit are closed. Open the main supply valve. Open the valve on the discharge side of the disinfection unit. Open the valve slowly on the feed side of the disinfection unit. Check for leaks. If any leaks are present, close valves and repair.
12. Connect UV power source to a 120v receptacle. The UV power source audible alarm will sound 3 times before igniting the lamp.
- 13. Your Excelight UV Disinfection System is now ready for use. Before service begins all household plumbing lines should be disinfected.**
14. Momentarily operate the unit with the lamp disconnected to allow you to validate the adequacy of the audible alarm function in your installation. You should be able to hear it from other parts of the house, so that you will be easily alerted in the event the lamp fails.

PLUMBING SYSTEM DISINFECTION PROCEDURE



THE FOLLOWING DISINFECTION PROCEDURE IS GENERALLY ACCEPTED AS BEING SUITABLE FOR THE DISINFECTION OF PLUMBING SYSTEMS KNOWN TO BE CONTAMINATED.

IF YOU ARE UNCERTAIN ABOUT THE EFFECTIVENESS OF THIS PROCEDURE YOU ARE ADVISED TO CONTACT YOUR LOCAL HEALTH AUTHORITY RESPONSIBLE FOR WATER SAFETY.

During the UV disinfection process the only place disinfection takes place is within the reactor chamber. There is no residual disinfectant capacity. Therefore it is necessary to chemically disinfect the plumbing system prior to the initialization of the UV system.

1. Turn the UV system shut off valves to the closed position.
2. The disinfection of the plumbing system is most readily accomplished by removing the 5 micron pre-filter cartridge and adding 250-500ml (1-2 cups) of a standard 5% concentration of unscented household bleach into the empty filter housing and re-attaching.
3. Verify that the UV system is connected to the AC power voltage and operating properly.
4. Turn the valves to the open position and let the water flow.
5. Open all faucets, fixtures and appliances in turn until you can easily smell chlorine. This includes outside faucets, laundry machines, showerheads and any device or appliance attached to the plumbing system. Close the fixtures and let the system sit for 30-60 minutes. **Do not use or consume system water during this process.**
6. Close the valves on the UV system. Re-install the pre-filter. Open the valves and flush all fixtures and lines thoroughly.

The introduction of a chlorine disinfectant to a hot water heater that has been used with untreated water, or water with excessive amounts of iron, manganese or other organic materials may lead to the oxidation of these particulates. If you feel that these conditions may apply to your installation, a thorough flushing of the hot water tank after the disinfection should be undertaken to eliminate the oxidized material from the system. Consider replacing an aged hot water tank at this time.

UV POWER SOURCE FEATURES

The microprocessor controlled power source supplied with your Excelight System has both visual and audible alarm enunciation to indicate lamp operation/failure and an integral annual lamp change reminder timer.

UV Power Source Initialization Sequence

When AC power is applied to the UV power source, the lamp is ignited as indicated by the **green** Lamp-On LED after which a self test of the annual lamp change reminder timer LED and alarm buzzer consisting of three buzzer beeps and three **red** timer LED flashes. If a solenoid is connected to the UV power source it will activate on the completion of the self-test sequence.

Normal Operation:

During normal operation only the **green** Lamp On LED is illuminated.

Lamp Failure:

When the UV power source detects a lamp failure or enters the auto shut down mode due to abnormal operating conditions, the alarm buzzer sounds and the **green** Lamp On LED is extinguished. If connected, the solenoid will terminate water flow to the household plumbing at this time.

NOTE:

The UV power source is designed to shut down if the AC input voltage is outside its operating limits. When a lamp failure alarm is activated you should unplug the unit from the AC power source, wait fifteen seconds and then reconnect the AC power source. If the failure was due to the “Out of Limits AC Power”, the unit will re-ignite the lamp and operate normally.

Lamp Timer Operation:

The annual lamp change reminder timer will run for approximately one full year. At the end of this one-year period, the lamp change timer will flash and the buzzer will sound. The flashing **red** LED indicates that the timer function has entered its 28-day grace period. Pushing the timer button during this grace period will silence the alarm buzzer for a seven-day period but the **red** LED will continue to flash. The buzzer reset can be activated a maximum of four times during the 28-day grace period. Under no circumstances does the grace period exceed 28-days. At the expiry of the grace period the UV power source indicates the lamp change alarm by illuminating the **red** timer LED continuously and sounding the buzzer. **Note:** The UV lamp is not shut down in this alarm mode and the solenoid valve drive is not disabled.

Time Remaining:

When the lamp change reminder timer is not in the 28-day grace period or lamp change alarm mode, the number of months of lamp life remaining can be determined by pressing the timer push button and counting the number of times the **red** timer LED flashes. See “Resetting of Lamp Change Timer” in the Operating and Maintenance section following.

OPERATING AND MAINTENANCE

Your Excelight UV System is “ON” continuously during normal operation. After periods of not using your water supply exceeding two to three days, it is recommended to open all faucets and flush your plumbing system for one to two minutes.

WARNING!

ULTRAVIOLET LAMP REPLACEMENT

THE ULTRAVIOLET LAMP INSIDE THE REACTOR CHAMBER WILL OPERATE EFFECTIVELY ROUND THE CLOCK, FOR APPROXIMATELY ONE YEAR OR 8000 HOURS. THE LAMP WILL LIGHT LONGER THAN THAT, HOWEVER, THE UV LIGHT PENETRATION MAY FALL BELOW THE PRESCRIBED SAFETY LEVEL. THEREFORE, ANNUAL LAMP REPLACEMENT IS NECESSARY REGARDLESS OF APPARENT LAMP CONDITION.

Replacing the UV Lamp And Cleaning The Quartz Sleeve:

1. Unplug the system from the electrical outlet and turn off the water supply to the unit.
2. Carefully extract the lamp connector from the electrical end cap assembly to just expose the top of the UV lamp. While holding the lamp base firmly, disconnect the lamp 4-pin connector. Lamp base can be very hot - be careful not to drop the lamp into the quartz as both are easily broken.
3. Carefully slide the lamp out of the quartz sleeve and discard.
4. Loosen and remove both end caps. Roll back the o-rings at both ends and remove. Carefully extract the quartz sleeve it from the reactor housing. **The quartz sleeve is very fragile and is easily chipped or broken - use extreme caution when installing or removing it from the reactor vessel.**

NOTE:

Do not touch the lamp or quartz sleeve with your fingers. Handle by the ends only or wear soft non-abrasive gloves.

5. Clean the quartz sleeve with vinegar or a readily available scale-removing product. (Lime Away, CLR)
6. Examine the quartz sleeve o-rings. If they look worn or cracked, replace. Re-install the quartz sleeve.
7. Install new lamp by reversing the procedure described in item #2 above.
8. Slowly open shutoff valves and purge the air from the system.
9. Ensure there are no leaks at the end caps before connecting the power to the system.

Resetting the Lamp Change Timer:

The lamp change reminder timer is reset by disconnecting the UV power source from the AC power supply, waiting for fifteen seconds and then reconnecting the AC power supply with the timer button depressed. The UV power source will emit a slid three-second beep indicating that the reset was successful.

NOTE:

It is not possible to reset the lamp change timer unless the timer is in the grace or lamp change alarm mode. If you need to reset the lamp change reminder timer prior to the full one-year time period expiring due to premature lamp failure, there are special instructions included with all replacement lamps describing the necessary procedure.

SYSTEM REPLACEMENT PARTS**EXCELIGHT System Replacement UV Lamps*****Standard 4-pin, 9000 rated hours***

Excelight EL411A UV Lamp, 20W/450mm	EL411L
Excelight EL720A UV Lamp, 32W/645mm	EL720L
Excelight EL1129A UV Lamp, 39W/845mm	EL1129L

EXCELIGHT Quartz Sleeves***DOE, silicone o-rings included***

Excelight EL411A Quartz Sleeve, 535mm	EL411Q
Excelight EL720A Quartz Sleeve, 665mm	EL720Q
Excelight EL1129A Quartz Sleeve, 890mm	EL1129Q

EXCELIGHT Ballasts***115V/60hz, grounded plug, CSA Approved***

Excelight Ballast, 420mV, 110V/60hz	EL411B
Excelight Ballast, 420mV, 110V/60hz, w/ Solenoid Output	EL411BS

Other EXCELIGHT Replacement Parts

Excelight Sleeve Cap	EL411C
Mounting Clip	WP-25
Sleeve o-ring kit	EL411RK

UV DOSAGE CHART FOR 3-LOG ORGANISM INACTIVATION

Approximate ultraviolet energy levels at 254-nanometer units wavelength required for 99.9% destruction of various microorganisms UV energy in mj/cm² :

BACTERIA		MOULD SPORE	
Agrobacterium tumefaciens	8,500	Aspergillus flavus (yellowish green)	99,000
Bacillus anthracis	8,700	Aspergillus glaucus (bluish green)	88,000
Bacillus mrgaterium (vegetative)	2,500	Aspergillus niger (black)	330,000
Bacillus mrgaterium (spore)	52,000	Mucor ramosissimus (white gray)	35,200
Bacillus subtilis (vegetative)	11,000	Penicillum digitatum (olive)	88,000
Bacillus subtilis (spore)	58,000	Penicillum expensum (olive)	22,000
Clostridium tetani	22,000	Penicillum roqueforti (green)	26,400
Corynebacterium diptheriae	6,500	Rhizopus nigricans (black)	220,000
Echerichia coli	7,000	-	-
Legionella bozimanii	3,500	-	-
Legionella dumoffii	5,500	-	-
Legionella gormanii	4,900	ALGAE	
Legionella micdadel	3,100	Chlorella vulgaris (algae)	22,000
Legionella longbeachae	2,900	-	-
Legionella pneumophila	3,800	-	-
Legionella interrogans (infectious jaundice)	6,000	-	-
Mycobacterium tuberculosis	10,000	PROTOZOA	
Neisseria catarrhaiis	8,500	Nematode eggs	92,000
Proteus vulgaris	6,600	Paramecium	200,000
Pseudomonas aeruginosa (laboratory strain)	3,900		

BACTERIA			
Pseudomonas aeruginosa (environmental strain)	10,500		
Salmonella enteritidis	7,600	VIRUS	
Salmonella paratyphi (Enteric fever)	6,100	Bacteriophage (E.coli)	6,600
Salmonella typhimurium	15,200	Hepatitis virus	8,000
Salmonella typhosa (Typhoid fever)	6,000	Influenza virus	6,600
Sarcina lutea	26,400	Poliovirus	21,000
Serratia marcescens	6,200	Rotavirus	24,000
Shigella dysenteriae (Dysentery)	4,200	Tobacco mosaic virus	440,000
Shigella flexneri (Dysentery)	3,400	Virus of Infectious Hepatitis	8,000
Staphylococcus aureus	7,000	YEAST	
Streptococcus faecalis	10,000	Baker's yeast	8,800
Streptococcus hemolyticus	5,500	Brewer's yeast	6,600
Streptococcus lactis	8,800	Common yeast cake	13,200
Streptococcus viridans	3,800	Saccharomyces ellipsoideus	13,200
Vibrio cholerae	6,500	Saccharomyces sp.	17,600

The approximate dosages / flow rate for Excelight units, with clear water are:

EL411AK: 11GPM@16mj/cm² 6GPM@30mj/ cm² 4GPM@40mj/ cm²

EL720AK: 15GPM@16mj/cm² 8GPM@30mj/ cm² 6GPM@40mj/ cm²

EL1129AK: 22GPM@16mj/ cm² 12GPM@30mj/ cm² 9GPM@40mj/ cm²

Disinfection chamber hydraulic performance may limit maximum flow rate. Flow restrictors may be used to limit flow rate through chamber to ensure dosage.

A 16mj/cm² dose is suitable for reducing non-pathogenic nuisance organisms only.

A 30mj/cm² Industry Standard Dose - This is the dosage produced by 2.5" diameter disinfection chambers when designed using the 1966 US Department of Health UV disinfection Policy Statement.

A 40mj/cm² dosage is now required in NSF/ANSI Standard 55.

WATERITE UV SYSTEM LIMITED WARRANTY

Waterite Excelight UV Disinfection Systems are warranted to free from defects of workmanship and provided with a material warranty for the period of one year. Warranty commences from date of purchase. Proof of purchase required.

Waterite Technologies will repair or replace, at its option, any defective parts covered by the warranty. Shipping and handling are not included in the warranty. They will be collected from you by your dealer. Replacement parts provided under warranty will be sent to your Waterite Technologies Dealer.

Parts repaired or replaced under this warranty will be covered under warranty until the end of the original warranty period. The warranty is also subject to the conditions and limitations outlined under the heading "General Conditions and Limitations" below.

Warranty For Replacement Lamps and Parts

Waterite Technologies warrants replacement lamps, purchased for annual routine maintenance and other parts purchase to repair product components that are no longer covered by the original warranty, to be free from defects in material and workmanship for a period of three months from the date of purchase. During this time, Waterite Technologies will repair, or replace at its option, a defective replacement lamp or part free of charge except for shipping and handling charges. The warranty period on replacement lamps and parts will be verified using date codes and/or purchase receipts, Your Waterite Excelight Dealer will advise you on whether the defective item needs to be returned to Waterite technologies for failure analysis.

General Conditions and Limitations

None of the above warranties cover damage by improper use or maintenance accidents, acts of God, or minor scratches or imperfections that do not materially impair the operation of the product. The warranties also do not cover products that are not installed as outlined in the applicable product owner's manual.

These limited warranties outline the exclusive remedy for all claims based on a failure or defect in any of these products. They are in lieu of all other warranties whether written, oral, implied or statutory.

Under no circumstances shall Waterite Technologies have any liability for liquidated damages for collateral, consequential, or special damages or for loss of profits, or for actual losses or for loss of production or progress of construction, regardless of the cause of such damages or losses. In any event, Waterite Technologies aggregate total liability shall not exceed the specified product purchase price. The purchaser agrees to indemnify and hold harmless Waterite Technologies from all claims by third parties in excess of these limitations.

Waterite Technologies does not assume any liability for personal injury or property damage caused by the use or misuse of its products. Waterite Technologies shall not in any event be liable for special, incidental, indirect, or consequential damages. Waterite Technologies liability shall, in all instances, be limited to replacement of the defective product or part and this liability will terminate upon the expiration of the applicable warranty period.



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