

Appendix 1B - Requirements table Water treatment unit to AKM			Supplier name: <i>To be filled out by the supplier</i>	
AKM room:	D6.003 (can include D6.002)			
Description: The Department of Comparative Medicine (AKM) at UiT — The Arctic University of Norway seeks to procure a wastewater disinfection system designed to treat effluent from the animal research facility, including wastewater from zebrafish housing systems and connected laboratories. For general information and legislative requirements, information on water quality and tank dimentions and technical and building related information, see Appendix 1A, section 1.2.				
A = Absolute requirements that must be fulfilled. Absolute requirements are not evaluated. Suppliers that do not fulfil all absolute requirements will be rejected from the competition.				
B = Requirements that will be evaluated based on the suppliers proposed solution.				
Provide a complete description of the proposed water treatment system as part of the tender submission. The description shall cover the full scope of procurement (including delivery, installation, commissioning, validation, training, warranty and service) and address all relevant technical, operational, safety, enviromental and regulatory aspects. Respond to each section below individually and include all necessary documentation and detailed drawings.				
1.0	Quality - legislative requirements		A-requirements are complied with	Suppliers proposed solution, including any comments and, where applicable, precise references to supporting details in the tender
Water treatment method	The specific water treatment method proposed by the supplier must comply with the national legislation cited in the tender and with the requirements set out in Attachment 1, FOR 1997 02 20 192, FOR-2022-04-05-624 and FOR-2001-12-21-1602 and Attachment 5, Veileder - Hvordan krav nedfelt i vannbehandlingsforskriften kan oppfylles. AKM operates a freshwater facility for Zebrafish (Danio rerio) and Medaka (Oryzias latipes); therefore, the supplier must propose a method that is approved for freshwater systems. The following two methods in the text below apply. The supplier shall describe and provide documentary evidence for the selected method (heat or chlorine based system) in the tender submission, including a clear description of the water treatment unit’s design and operation (treatment principle, capacity, control and monitoring strategy and safety measures). 1)Heat treatment at the following temperature/holding-time combinations: 80 °C for a minimum of 4 minutes 85 °C for a minimum of 3 minutes 90 °C for a minimum of 2 minutes 95 °C for a minimum of 1 minute 100 °C for a minimum of 30 seconds 2)For freshwater additionally: Chlorination, residual chlorine ≥ 25 mg/l after a contact time of ≥ 30 minutes	A		
GMO	The water treatment unit shall comply with national regulations governing the contained use of genetically modified (GM) animals — in particular GM aquatic species — as referenced in FOR-2001-12-21-1602, with primary focus on — without being limited to Vedlegg I (in the legislation document), named "Spesifikke inneslutningstiltak for akvatiske dyr". The system shall be designed and operated to prevent any escape or unauthorised release of GM animals (including fish, eggs and larvae). No GM animals shall be discharged to the municipal sewer or storm drains. The supplier shall deliver a complete technical solution that prevents release of GM animals from the treatment system and provide a solution or filtration system capable of retaining zebrafish and medaka eggs down to 0.5 mm diameter (specify mesh/opening size, material and expected retention efficiency). See also 2.12 for questions regarding filter specifications.	A		
2.0	Quality - technical requirements for all systems	The following section specifies the general technical requirements that apply to all treatment systems, whether the disinfection system is based on thermal or chemical solutions.		
2.1	Estimated daily wastewater from the zebrafish facility is approximately 950 L/day; the disinfection system must be designed to accommodate a flow of up to 1,000 L/day. Suppliers shall design the disinfection system to ensure continuous standard operation of the Zebrafish housing facility for a minimum of 72 hours (3 days) in the event of a primary-system failure or servicing and cleaning of the unit(s), at the facility’s standard operating daily flow 1,000 L/day. If the solution is based on a emergency tank system the backup must comply with applicable legislative requirements, the back-up must be automatically activatet on fault detection (e.g. filter blockage or pump failure) and include a manual override. The same control and validation requirements that apply to main system shall apply if water may be released directly from an emergency tank reservoir. Describe the proposed solution and provide a functional schematic, capacity/sizing, activation logic and fail safe controls, treatment parameters, sampling/verification and logging procedures. No water is allowed to go to drain before it has passed a complete treatment. Overflow protection of tanks can not go to drain. Provide complete drawings and related specifications.	A		

2.2	The unit shall include a system to monitor, verify, and document that the disinfection or treatment parameters specified in Attachment 1 are achieved, including disinfectant concentration (mg/L) and or temperature (°C), and required contact time. The supplier shall describe the design, operation, monitoring, and recording functions of this system. Where chemical disinfection is proposed, the supplier shall provide a concise description of the method, including the chemicals used, estimated daily consumption at normal operating capacity, and the assumptions used (design flow and operating hours). The supplier shall also state the expected residual chlorine concentration in discharged water (mg/L), the method and quantity of neutralising chemical (if relevant) required to reduce chlorine residuals before discharge, and the expected by-products.	A		
2.3	The tender will be evaluated based on the supplier’s documented ability to disinfect 1,000 L of water efficiently and reliably using the proposed thermal and/or chlorine-based disinfection method. Provide a brief, step-by-step calculation showing how the treatment time has been determined. With a result showing typical expected treatment time and conservative (worst-case) treatment time All assumptions, design parameters, and limitations used in the calculations should be clearly stated.	B		
2.4	The unit shall ensure uniform distribution of temperature and/or chemical disinfectant concentration throughout the tank(s), preventing stagnation or stratification under all operating conditions. Describe how the unit ensures even distribution of the selected disinfection method (chlorine based or thermal) throughout the tank(s).	A		
2.5	The tender will be evaluated based on the simplicity, safety, and usability of the equipment’s activation, start-up, shutdown, and emergency stop procedures. The safety operation functions must be according to demands in Attachment 5, Veileder - Hvordan krav nedfelt i vannbehandlingsforskriften kan oppfylles. Particular emphasis will be placed on the number of steps required for activation and start-up, with fewer, clear, intuitive, and operator-safe steps receiving a higher evaluation. The normal shutdown procedure will also be assessed with regard to ease of use, reliability and operator safety. For emergency stop functionality, the tender will be evaluated on whether the emergency stop button is clearly visible, easily accessible, easy to identify, and simple to activate in an emergency situation. Additional safety features beyond the minimum requirements, such as externally located emergency shutdown controls, remote shutdown capability and safety interlocks, will be considered positively and result in a higher score. Provide a detailed description on how this is solved.	B		
2.6	The unit shall be equipped with an alarm system capable of interfacing with the buildings management system (BMS, also called SD system) and follow the guide and demans for alarms in Attachment 5, Veileder - Hvordan krav nedfelt i vannbehandlingsforskriften kan oppfylles and the minimum requirements in Appendix 1A, section 1.2.3.7 (specification on building system management/SD). The supplier shall provide a complete description of the alarm system including sensor alarms and all monitored alarm conditions, applicable trigger thresholds, and the alarm severity level assigned to each event. For each alarm condition, the supplier shall specify the automatic system response, such as unit shutdown, changeover to standby operation, isolation, dosing stop, or other relevant protective actions. The supplier shall also provide examples of the alarm messages that will be transmitted to mobile phones, including the alarm description, affected unit or component, alarm severity, time of occurrence, and any automatic action initiated by the system. In addition the tender must describe the available communication interfaces and protocols for integration with the facility’s BMS/SD system, including any licensing requirements or additional hardware required.	A		
2.7	The supplier will be evaluated on how clearly alarm messages and operating information are presented to users. Higher scores will be given for solutions with clear and easy-to-understand alarm messages on a local display located on or near the water treatment unit. The display for example can show the alarm condition, severity, affected component, and required action. The supplier will also be evaluated on whether relevant operating and logged parameters, such as water temperature, chlorine residual, flow, and pressure, can be viewed on the local display. Additional points will be given if alarms and operating data can be accessed remotely from an external computer or other authorised device used by animal care or technical staff. Visual alarms, such as indicator lights or on-screen alerts, are preferred.	B		

2.8	The unit must be equipped with the sensors and information necessary for safe, reliable, and effective operation. The unit must have automatic valves with feedback for open/closed position. The supplier shall describe the complete sensor system, including all sensors installed and their purpose. This may include but not limited to water level, flow, pressure, filter-clogging, temperature, residual chlorine, and leak-detection sensors. For each sensor, the supplier shall state the sensor type/model, measurement range, installation location, measurement or sampling method, and any redundancy provided. Clear messages and alarms for each part that needs change or attention after running hours/cycles must be given. The unit needs control mechanism preventing water to be filled to holding tank if discharge valve is not closed. Water can not be filled to holding tank during treatment or during emptying of treated water. If a deviation happens during treatment e.g. change in concentration or water is filled to holding tank a reset of holding time and treatment must occur.	A		
2.9	Higher points will be awarded to suppliers offering a solution that automatically detects and records the start, completion, and discharge of the water treatment process to the municipal sewer network. Additional points will be awarded for a digital logging system that records the number of treatment cycles per day and per month, indicates whether a treatment process is currently active, and enables authorised users to remotely access, review, and export this data from an external computer, such as a workstation at the main facility or a university campus office. Please describe.	B		
2.10	The supplier shall provide a dedicated, accessible sampling point downstream of the final water treatment verification sensors and upstream of the discharge valve to enable representative sampling and on site testing prior to release to the communal pipes. The supplier shall provide a sampling point of the treated water. The sample port must be designed to avoid cross contamination, avoid creation of bio film or false positives (for example by including an isolating valve and purge/flushing capability, automatic in place disinfection, sterile single use sampling consumables or other solution) and must allow sampling without interrupting or contaminating the treated flow. Collected samples volume requirements must be at least 500ml. Collected water sample must be after all treatment processes are fully completed.	A		
2.11	To comply with the GMO containment requirements described in the section on genetically modified animals, the unit must include a filtration system capable of retaining larger particles, including zebrafish eggs and adult fish. Two-stage or redundant filtration solutions can be proposed as solution, such as a coarse pre-filter combined with a fine screen, duplex filters, or self-cleaning filters. Other reliable filter solutions can also be suggested. The proposed solution shall minimise the risk of clogging and reduce the need for manual cleaning. The supplier shall describe the proposed filtration system, including the filter design, materials, pore size, cleaning method, and expected cleaning frequency.	A		
2.12	The supplier shall describe the units compatibility with chemicals, disinfectants and process agents relevant to normal operation. State any chemicals, disinfectants or process agents the unit is not compatible with. For each relevant substance, the supplier shall provide: name, maximum permissible concentration and exposure time, reason for incompatibility (e.g. material corrosion, seal swelling, accelerated wear), recommended mitigation or alternative chemicals, required system modifications or protective measures, and any impact on warranty coverage or maintenance requirements. The supplier shall provide relevant supporting documentation, including material compatibility data, product documentation and/or manufacturer statements. Suppliers will be evaluated based on the extent to which the proposed unit demonstrates robust compatibility with relevant chemicals and process agents, the clarity and completeness of the documentation provided, and the practicality of any proposed mitigation measures.	B		
3.0	Quality - Specific technical requirements for chemical based solutions			
3.1	Higher points will be awarded for fully automated chlorine dosing in both the main and secondary/emergency tanks. Semi-automatic and manual dosing solutions will receive lower scores. Additional points will be awarded for solutions that minimise or neutralise residual chlorine before discharge to the sewer. The supplier shall describe the dosing system and state whether chlorine neutralisation is included. If so, the supplier shall specify the neutralising chemical, dosing rate, and expected by-products.	B		
4.0	Quality - building infrastructure and environment			

Electrical installations	The available electrical supply for room D6.003 is specified in Appendix 1A, section 1.2.3. Suppliers may, if required for the operation of the proposed water disinfection unit, propose upgrades to the electrical supply (for example, higher capacity mains, dedicated circuits etc.). The supplier shall clearly describe any proposed upgrades including details of the electric solution including required connected load (kW), design current (A), and any significant starting current characteristics associated with the proposed water disinfection unit and in to ensure continuous operation during a power failure. Please note that, if electrical upgrades are necessary, the purchaser will assess any associated costs and include them in the evaluation under the award criteria "Total price". All proposals must comply with applicable Norwegian regulations and standards like FOR-1998-11-06-1060 (https://lovdata.no/dokument/SF/forskrift/1998-11-06-1060).	A		
Piping and plumbing installations	Provide concise, verifiable specifications for the drainpipe system required to safely convey disinfected wastewater (heated and/or chlorinated) to the building drains. For heat based treatments, state the expected outlet temperature and specify the pipe materials, pipe wall thickness and installation details required to withstand these temperatures. For chemical solutions, provide a solution for long term chemical exposure without pipe damage, deformation or reduced hydraulic capacity. Alternatively, describe a cooling or chemical neutralizing solution (if relevant), including method, controls, expected outlet temperature after treatment or chemical residue and verification tests. Please note that, if replacement or modification of the room's drainpipes is required, the purchaser will assess any associated costs and include them in the evaluation under the award criteria "Total price". All proposals must comply with applicable Norwegian regulations and standards like TEK17 and FOR-2016-05-25-1963 (https://lovdata.no/dokument/LF/forskrift/2016-05-25-1963).	A		
Spacing and dimensions	Appendix 1A, section 1.2.3 specifies the dimensions for room D6.003. Suppliers may propose using the adjacent room D6.002 if required for equipment placement, operation and/or maintenance. The supplier must state clearly whether the additional space is necessary and, if so, specify the required wall opening dimensions and any other structural changes (e.g. door removal, floor or ceiling penetrations). Please note that, if extra construction work is required, the purchaser will assess any associated costs and include them in the evaluation under the award criteria "Total price".	A		
Ventilation	Room D6.003 currently has no active ventilation. Room temperature in D6.003 must remain below 22°C at all times and the air must be safe and clean for operators. If ventilation is required, provide a concise specification including: required airflow, expected heat load, humidity control needs, and any required local extraction, filtration or gas scrubbing (e.g. activated carbon) for chemical/chlorine emissions. Include proposed termination points, monitoring and controls (like airflow, chlorine sensors, fan fail alarms). The purchaser will assess ventilation requirements based on knowledge of building insulation and ventilation data, given the datasheet(s) of equipment offered in the tender, so as to calculate additional costs regarding necessary establishment of cooling and ventilation units. Please note that, if installation or structural works are required, the purchaser will assess any associated costs and include them in the evaluation under the award criteria "Total price". All proposals must comply with applicable Norwegian regulations and standards TAK17 (https://www.dibk.no/regelverk/byggteknisk-forskrift-tek17/13/i/13-1).	A		
Noise	The tender will be evaluated based on the unit's operational noise levels and the measures taken to minimize noise. Lower documented noise levels will receive higher scores. The supplier shall provide measured or estimated sound pressure levels in dB(A), measured at a height of 1 m and at a distance of 1–2 m from the disinfection unit, for idle, normal, and peak operating conditions. The supplier shall state the measurement method and standard used, for example ISO 3744 or ISO 11202.	B		
UPS and SD	PLS/data control units/panels/displays etc. that handles operations of the installation must have a local UPS (uninterruptible power supply) and the system must be able to communicate to SD, and an alarm hierarchy must be set up for notifying security and operating personnel. Top system in this facility is Schneider. The power reserve for the UPS must be at least 72 hours. Additionally describe the consequences of a loss of power, including any interruption of an ongoing treatment cycle, and explain the procedures required to safely restore operation following reinstatement of power.	A		
5.0	Quality - validation and documentation			

5.1	Suppliers shall provide all required documentation, validation testing and certifications according to the requirements set in Attachment 5, section 2 and section 4, Veileder - Hvordan krav nedfelt i vannbehandlingsforskriften kan oppfylles, and must actively support AKM in obtaining regulatory approval for the wastewater disinfection unit. This support shall include preparing and submitting application materials and supporting evidence, supplying validation test plans, test reports and relevant certificates, responding promptly to requests for additional information, participating in meetings, site visits, inspections and commissioning activities with the approving authorities, implementing corrective actions or supplementary testing if required.	A		
5.2	The water disinfection unit, after installation and before handover, must be fully commissioned, run in, tested and validated, and delivered ready for use in accordance with the stated functional description and intended applications. Commissioning shall include performance and safety tests, calibration of controls/sensors, and delivery of validation records, operating instructions and maintenance documentation as described in Attachment 5, section 2 and section 4, Veileder - Hvordan krav nedfelt i vannbehandlingsforskriften kan oppfylles.	A		
5.3	Validation: The supplier shall supply performance validation reports (laboratory and/or on site) demonstrating that the filtration and containment measures reliably prevent passage of eggs and larvae at the declared flow rates and operational conditions.	A		
5.4	The supplier must specify alarm logging, time stamping and data retention procedures for audit and validation, and provide test, verification and maintenance procedures for the approval process. The supplier must be able to record operational shutdowns/malfunctions and provide details on available data export functionality.	A		
5.5	Chlorine based systems Describe the complete validation process and testing method for chlorine based treatment. Specify the residual chlorine monitoring method and state whether residual chlorine is detected automatically or requires manual testing. Indicate whether the system includes or requires chemicals or procedures to neutralize residual chlorine prior to discharge. Explain how all measurements, alarms and sampling events are logged, and include chain of custody procedures and details of any accredited laboratories used for confirmatory testing. Where available, attach prior validation reports, validation protocols and SOPs from other installations.	A		
5.6	Thermal (heat) systems Describe a complete validation and testing method for thermal treatment. Define the validated time–temperature profile and logging requirements, and describe the microbiological test methods (e.g., CFU counts, plaque assay or TCID50), sampling plans and laboratory analysis procedures. State whether monitoring and testing are automatic or require manual intervention. Where available, provide previous field validation protocols, SOPs, procedures for periodic re validation, and any prior validation reports or case studies and details of any accredited laboratories used for confirmatory testing.	A		
6.0	Service			
6.1	The mandatory service requirements are given in Appendix 1A, section 1.5.2. Provide a concise description of how service will be carried out and what is included in the service agreement. This shall include: - The scope and frequency of routine tasks (inspections, functional tests, calibrations, software updates, preventive part replacements and cleaning) - The parts/consumables included in the agreement and annually replaced - Parts requiring less regular replacement (and how often, e.g. every 2nd or 3rd year) - The service and validation procedures for the microbiological sampling point - For chemical based solutions, the service procedures for method used to test chemical residues - An example of the service documentation to be provided following each visit	A		
6.2	Specify any additional services required to comply with regulatory or safety obligations (for example third party pressure testing, inspections or certifications). State whether these services are included in the price or must be procured separately. For each required external service, provide: a brief description of the work, the proposed service provider or required qualifications, estimated cost, lead time, and responsibility for issuing and retaining test certificates, inspection reports, and other required records. All third party providers and test reports must meet the relevant Norwegian regulatory and accreditation requirements (like Forskrift 10.10.2017 nr. 1631).	A		
6.3	The unit shall be designed to provide safe, unobstructed access for inspection, operation and maintenance. It must offer adequate service clearances on all sides, removable panels or doors for access to wear parts, ergonomic access heights, lifting points or handling fixtures for heavy components, and clearly marked service points (valves, drains, sensors, electrical disconnections). The supplier shall submit maintenance access drawings showing required clearances, required special tools or lifting equipment, and any recommended local site provisions. All designs must support safe, efficient servicing in accordance with applicable Norwegian safety regulations.	A		
6.4	The tender will be evaluated based on any warranty period offered in excess of the minimum requirement of two (2) years. Higher scores will be awarded for longer warranty periods. The supplier shall state the offered warranty period in whole years, in accordance with the warranty requirements set out in Appendix 1A, section 1.5.1.	B		

6.5	In the event of a failure, the supplier shall, within seventy-two (72) hours of receiving notice from the purchaser, attend on site and take the necessary measures to restore the unit to operational condition.	A		
6.6	The tender will be evaluated based on the supplier’s guaranteed response time for on-site emergency repair requests. In accordance with section 6.5 above, the maximum permitted response time is seventy-two (72) hours. Higher scores will be awarded to suppliers that offer shorter guaranteed response time. The supplier shall state the offered response time in whole hours.	B		
7.0	Environmental considerations			
7.1	The supplier shall guarantee the availability of spare parts for the water disinfection unit for a minimum period of ten years from the completion of the delivery.	A		
7.2	The supplier shall provide a concise list of the most common wear parts (including filters that normally require replacement) and their expected replacement frequency, together with pricing and delivery data for the 10 most frequently replaced items (prices will be evaluated under the award criteria "Total price"). For each of the 10 parts, provide: part number and short description, expected life (hours/cycles or months), recommended replacement interval, estimated lead time (days) to delivery in Norway, minimum order quantity, recommended on site stock level, and supplier/brand. Include contact details for spare parts ordering and typical response time for urgent deliveries.	A		
7.3	Describe the environmental sustainability aspects of the offered unit throughout its life cycle. The description shall, as a minimum, include 1) the proportion of recycled and/or recyclable materials used in the unit and its main components, 2) measures to reduce environmental impacts related to raw-material sourcing, manufacturing, packaging, and transportation, and 3) measures that promote resource efficiency, durability, repairability, reuse, recycling, and responsible end-of-life management. Provide relevant environmental documentation, such as environmental product declarations, third-party certifications, material declarations, carbon-footprint data, and/or documented environmental management systems. Suppliers that demonstrate a higher documented proportion of recycled materials, longer lifespan and more comprehensive, relevant, and verifiable environmental measures will receive a higher score in the evaluation.	B		