Appendix 1

Objective: A ceramic membrane system for filtration and diafiltration of hydrolysates from enzymatic processes and blood, if conceivable, with ranges in molecular sizes as diverse as ultra-, micro- and particle-filtration but primarily bought for ultrafiltration.

Scope: The tender shall include the transport, delivery, installation and necessary on-site testing of the equipment, adequate training of personnel in operating the equipment, and support after delivery.

Place for delivery: Biotep, Kaldfjorden, Tromsø

Time of delivery: Nofima expect that the apparatus is ready for use at the latest in August 2021. If the tenderer cannot perform within this time, this may lead to exclusion of the tender but not automatically.

Tender: In its response the tenderer shall include a:

- plan for transport and installation of the equipment, and expected time of delivery
- description including answers/comments to all of the requirements below, and a further description where appropriate – highlighting the functionality of the system and its user friendliness. The description should also include any additional functionality or other options that adds value for the Buyer.

Requirements for the apparatus:

- One apparatus designed to fit in a slot not exceeding 2200x3400 mm.
- Mounted on suitable rack of steel quality 304 or similar/better
- All parts of the instrument with access to product must comply with DIN 11850/EN10357
- Designed to use Ceramic membranes. Please specify number of membranes for operation and price of purchase (standalone) for a set of MWCO=15 kDa membranes.
- Describe if any membranes are delivered along with the equipment and whether the buyer has any option to choose pore size of membrane.
- Please briefly specify procedure for membrane replacement and estimated work-load in hours.
- Gaskets must be EPDM or higher quality
- Electronic system must comply with NEK 400
- The system will be used for filtering complicated biological matrices e.g. blood in addition to hydrolysates. The system must be able to handle the pressures that build up from the concentration of biological liquids, especially blood. All this must be performed without severe drop in feed flow, i.e. a system for prevention of residue buildup on membranes must be in order. Please specify briefly how this technology works.
- Automatic CIP. Please specify time needed to perform CIP.

- The system must be able to work with feed of temperatures ranging from 4-80 °C and the ability to keep the temperature low/high throughout operation is an advantage.
- Feed pace 1 m^3/h for hydrolysates, slower is accepted for other more complex matrices. Please describe expected feed pace.
- Guaranteed production time must be specified with an indication of how long theoretic production time may be during average operation: dry-matter content approximately 5%, marine co-products after enzymatic hydrolysis.
- Please describe the demands are on users of the equipment, ie. If the level of knowledge is sufficient after initial training.
- User friendliness will be evaluated and considered.
- Give an indication of what support is offered during warranty period and response time.
- Specify conceivable range of membranes applicable to system from the lowest to the highest MWCO and particle/µm-range, ie. Which of the following ranges will the system handle of nano-, ultra-, micro-, and particlefiltration.
- Pumps from Alfa Laval are extensively used Biotep and a large reserve of spare parts exist from this manufacturer. If another pump manufacturer is used, please describe a recommended storage of parts and related costs.

Attributes that may add value and contribute positively;

- Possibility of diafiltration
- Modular design to allow the expansion with more filters over time
- Heating/heat exchange, insulation of tanks and tubes to prevent temperature drop during operation. If this is achieved differently, please indicate.