# Annex No. 1 of the Tender documentation for below-threshold public contract ‘Continual Distillation’

The continual distillation apparatus will be used for the distillation separation of higher amount of substance mixtures, materials for the research experiments and products from the operation of research units. It will also be used for the preparation of marketing samples of new products.

The distillation shall apply mostly to hydrocarbon mixtures within wide range of carbon chain length, from pentane fractions to petroleum fractions, medium distillates, aromatics (including multi-nuclear – e.g. naphthalene and its alkyl derivates), to wax fractions from the Fischer-Tropsch synthesis. Also destilled will be the mixtures of oxygenic substances from biomass processing with the content of alcohols, esters, ethers, aldehydes, ketones, phenols, and fatty acids.

1. **Minimum technical requirements:**

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| **Requirements** | **Statement of the bidder (the bidder shall define the specifications fulfilled by the offered equipment)** |
| **Instrument** |
| A column with minimum internal diameter of 50 mm consisting of three sections connected by means of a dismountable method, with feed-point locations (2 totally) between adjacent sections |  |
| The interior of the column is filled with distillation packing, which can be removed without the destruction of the column or any of its parts, selected to ensure the total column efficiency reaching at least 50 theoretical stages under optimum operation conditions, tested on hydrocarbon mixtures.  |  |
| The possibility to operate at atmospheric and reduced pressure as well |  |
| Lower limit of operating pressure of 2,0 mbar |  |
|  Upper limit of the column operating temperature at least 250 °C |  |
| The construction of feed-point locations assuring the liquid input in the column axis |  |
| The construction of distillation column with a mantle providing adiabatic mode, i.e. with the lowest possible heat loss through the column wall, and with the heat loss compensation by additional electrical heating with independent regulation for each column section  |  |
| Construction material of all parts in direct contact with the processed media should be resistant to hydrocarbons, organic acids, and aldehydes.  |  |
| Device for vacuum generation and control |  |
| Feed pump for dozing liquid within the range 0,5 – 2 l/h |  |
| Feed tank with minimum volume of 30 l, operating at the pressure range 100 - 110 kPa, with tempering option within the range 0 to 150 °C (including the delivery of external device-thermostat for tempering and with the option of gas space inertization  |  |
| The feed tubing enabling optional use of both feed-point locations with the possibility to heat the tubes up to 150 °C |  |
| Feed pre-heater (as close to the column entry as possible) – with the outlet temperature of 150 °C for the feed value of 2l/h (calculated for medium oil distillate)[[1]](#endnote-2) |  |
| Removable distillation head and re-boiler |  |
| Distillation head, tempered by cooling (heating) liquid within the temperature range 0 °C to 100 °C (including the delivery of an external device-thermostat for tempering) |  |
| The construction enabling the setting and control of the reflux to distillate ratio within the range 0 to 10:1 |  |
| Possibility of tempering of the gas tube-lines of the distillation head and all distillate withdrawing lines (up to the apparatus border) within temperature range 0°C to 100 °C. In optimum, the system connectable to the thermostat providing cooling (heating) of the distillation head. |  |
| Electrically heated re-boiler with the possibility of distillation residue withdrawing from the re-boiler bottom |  |
| Re-boiler volume within 2-4 l |  |
| Re-boiler operating temperature up to 300°C. |  |
| The system of continual withdrawing of distillation residue operating within the whole range of the column operating pressures with adjustable flow within range from 0,1 to 1,5 l/h, with the cooler for pre-cooling the distillation residue from maximum boiler temperature to 50 to 100 °C. |  |
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| **Measurement and control system** |
| Monitoring and electronic archiving of temperature values on the distillation head, in the re-boiler, and at the feed points  |  |
| Measuring control, and archiving of measured pressure values on the column head |  |
| Measuring, archiving of the pressure difference on the column |  |
| Electronic regulation of the re-boiler power input |  |
| Electronic regulation of the column power input - independent regulation of each section as well as temperature measuring in each section |  |
| Column reflux control  |  |
| Setting all controlled values by means of PC |  |
| The control and measuring of the feed and the re-boiler residue flow values - archiving the measured values by means of PC |  |
| The collection and archiving of all measured values by means of PC |  |
| The possibility to export of the measured values and stored data in a format readable by some Microsoft Office program – ideally Excel |  |
| The control PC device shlould be included in the delivery. |  |
| **Apparatus geometry** |
| Maximum height: 5m |  |
| Maximum width: 2.5 m |  |
| Maximum depth: 0.7 m |  |

1. **The delivery includes the below items:**
* The device installation including all related activities (packaging, transport, disposal of waste),
* Documentation including manual in Czech, Slovak or English language,
* Professional team training for the machine operation (min. 2 employees of the Contracting Authority) at minimum length of 2 working days,
* The warranty period for at least 24 months
* The device will be installed in cubicle 1.19 and connected to cable outlet C.3 (see schemas below).

**Cubicle description 1.19**

Continual distillation will be located in the premises of Chempark, construction 2828, cubicle no. 1.19, with normal dust environment. Basic dimensions of the cubicle - height 5 m x width 4,8 m x depth 3 m. The western side of the cubicle is fitted with socket distribution at height 1 m approx 0,2 m from the sides of northern and southern wall. The northern side, approximately in the wall centre includes three cable outlet (C3, C4, C5) CYKY – J 5x6 with total protection 25A, (LPN – 25C – 3N). Continual distillation is considered for supply cable outlet „C3“. Lighting (lamp units) is located in the western side at approx height 2 m and approx at 5 m. The corner of the northern and western side includes two gas detection sensors at approx height 2 m. The eastern side includes the heating radiator, emergency exhaust - (tube with diameter 0,3 m up to approx height 3,5 m from the floor). The windows are in the southern part, the lower window edge is approx 3,8 m from the floor, and the width of one window is 1,5 m. The cubicle includes two windows with the same dimension. The floor is made of concrete finish and cambered to the drain channel.



CONTINUAL DESTILATION

1. The same thermostat can be used for tempering the whole spray route [↑](#endnote-ref-2)