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**Technical specification**

**Annex No. 1**

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# Introduction:

The subject of this offer is to supply Gravel Pack Job including:

* Preparation of technological procedures for the Gravel Pack Job, Delivery of required materials/equipment – Gravel pack assembly, screens, fluids, gravel pack sand…,
* Preparation and delivery Gravel pack fluids according to fluid report ČNS EN ISO 13503-3,
* Cooperation during completion of packer assembly, tubing, screens with WO crew,
* Cooperation during RIH all assembly for the Gravel pack job with WO crew, setting in required depth, pressurizing of annulus,
* Performance of Gravel pack job,
* Evaluation of Gravel pack job,
* Elaboration of final report.

This offer will be performed during Workover operations on the RWE Gas Storage s.r.o. <http://www.rwe-gasstorage.cz/> wells in this locations:

* **UGS Tvrdonice**

Wells: Z 24, Z 19, Z 34 in the required dates: 15.4.2016 – 31.7.2016

* **UGS Lobodice**

Well: Lo 28 in the required dates: 15.4.2016 – 15.6.2016

* **UGS Štramberk**

Well: Tv 2 in the required dates: 1.8.2016 – 15.11.2016

* **UGS Třanovice**

Wells: Ts 7, Ts 12, Ts 9 in the required dates: 1.8.2016 – 15.11.2016

Required works will be performed during WO. For this selected wells the Contractor of WO will be chosen. (Hereafter WOC).

WOC will elaborate project for WO and HSE plan (<http://www.rwe-gasstorage.cz/cs/3125/>). Contractor of Service of Gravel pack job (hereafter Contractor of Service) will participate on preparation of WO project and HSE plan.

Contractor of Service is obliged to observe the Technical conditions of works … according Annex No.7 and general conditions.

Before performance of each works the Safety meeting will be organize. The employees of contractor will familiar about HSE plan and Blowout Contingency Plan of relevant UGS. In case of dangerous condition, this must be reported according to HSE plan.

WOC guarantee that well is prepared and ready for the installation of gravel pack screens before the operations start.

Contractor of Service during gravel pack job is responsible for status of the well and own equipment.

# Scope of Works

# From Contractor of Gravel pack job:

* To elaborate standard technological procedure and submit it for approval to Client after signing the contract,
* Regularly inform Client about material availability (information about material delivery),
* Invite Client to perform inspection of materials, equipment for the Gravel pack job,
* Ensure all necessary fluids for the Gravel pack job in required quality,
* Ensure transport to location, transport from location and disposals of used Gravel pack fluids,
* State in technological procedures of Gravel pack job requirement for pressure test for used drill pipe. Is attends this pressure test,
* In cooperation with WOC leads and is responsible for exchange of gravel pack fluid and spacer,
* Is prepared when loss of fluids occur and suggests the solution before beginning of works,
* Is responsible for completion of equipment used for Gravel pack job according to technological procedures, (the configuration of equipment must be approved by Client before operations start),
* In cooperation with WOC is responsible for RIH equipment for Gravel pack job to final depth,
* Leads and performs works for setting and pressurizing of Gravel pack assembly in final depth,
* Leads and performs the Gravel pack job according approved technological procedures,
* In case of unsuccessful gravel pack job is obliged to perform corrective actions which will be achieved the required parameters,
* Check anchor tubing seal assembly before tubing is RIH,
* Leads final works relating of anchor tubing seal assembly (connection with packer, disassembly from packer, final connection with packer) in cooperation with WOC,
* Cooperates with WOC in calculation of final space out of tubing,
* At least 7 years’ experience with Gravel pack job at UGS wells for specialists,
* Within 10 working days after performing the Gravel pack job will submit the final report to Client .

# Client ensure:

* on request of Contractor of Service provide the schedule of WO
* ensure tanks for Contractor of Service as states in point 3.3.2,
* ensure evaluation of quality of gravel pack job by logging,

# Requirements of services and material

## Elaboration of Technological procedure for Gravel pack job

Technological procedure of gravel pack job for given well will be elaborated by Contractor of Service and will be submitted for approval no later than 30 days before the beginning of Gravel pack job. Final approval of technological procedures will be provided on HSE meeting before beginning of works.

***Technological procedures of gravel pack job must contain minimally following:***

* technical data about the well
* all used equipment (pump, tank, filtration unit…etc.) for the gravel pack job
* staff of equipment (facility), personal responsibilities,
* assembly of screens column with gravel pack device, breakdown of materials
* schematic drawing of screens columns with gravel pack assembly,
* technological procedures of gravel pack job (tools used for RIH and its testing, process of fluid change, RIH process of gravel pack device with screens column, procedures of setting the gravel pack packer and its testing, gravel pack process, the evaluation process of gravel pack job),
* proceedings in case of unadvisable process requirements for work place and design of connection of gravel pack equipment (Layout of individual equipment such as pump, manifolds, lines…) in A3 form,
* list of material and devices tests,
* time schedule (period) needed to mob. of equipment before gravel pack job start,
* safety rules, fire-fighting equipment/actions, hygienic actions, protective actions, possible accident…,

In technological procedures of gravel pack job will be described the method of ensuring the required purity of fluid entering the well (exp. using the filtration unit or adequate volume of gravel pack fluid without filtration).

In technological procedures of gravel pack job will be stated the fluid quantity, water density, composition of fluid, weight ratio of individual elements on 1m3 and on total quantity of gravel pack fluid.

Change of operational fluid for gravel pack fluid will be performed in two-leveled method (1st level – casing, 2nd level OH) and will be detailed described in technological procedures.

## Material requirements

Contractor of Service will provide the material specified in Annex No. 4. of TD. The Contractor of Service is obliged once a month to send a report about status of material delivery as stated in Annex No. 10 of TD to contact person stated in Contract of works.

Contractor of Service will propose the deadlines of check of delivered material up to 15 days after signing the Contract of works or LoI. The Client retains the right before the beginning of works and during the works to check material, equipment and devices which will be used for gravel pack jobs.

Fluid loss Control devices - is not required for this tender.

## Requirements on gravel pack sand

Requirements of sand grain size/granulometric of gravel sand are stated in Annex No. 11 of TD

The gravel sand must fulfil the conditions according to Standard API RP 58 and Contractor of Service will verify this by certificate from prestigious laboratory before beginning of jobs. The Contractor of Service will also verify performance of turbidness test for gravel sand according to Standard API RP 58. The sand turbidness must be lower than 250 NTU.

Amount of gravel sand for each well for the bid will be state in Annex No. 11 of TD. Minimal required head of gravel sand is 12 m above horizon.

Before the beginning of installation of screens, the Client will hand over the design of Open Hole profile to Contractor of Service.

The Client retains the right to take a sample of propant before and during the gravel pack job to check the parameters of propant and quality of permeability.

## Fluid requirements

The documentation from preparation of gravel pack fluid according to Standard ČSN EN ISO 13503-1 will be provided by Contractor of Service. During the gravel pack job the fluid report according to Standard EN ISO 13503-3 (Fluid requirements) will be kept.

The used fluids will be prepared from pure natural water. Water which will be used for preparation of gravel fluids must fulfil the purity of 2 micrones (5NTU). In water used for these fluids will be the water hardness chemically adjusted and coagulum will be filtered out.

Contractor of WO is responsible for preparation high viscosity plug (spacer).

The offer will be elaborated for fluid in weight us is establish in Annex No. 6.1 to 6.8 of TD for each well. At the end the final price for the used fluids will be calculate according actual consumption.

*Rheology characteristics requirements for gravel pack fluid and Spacer.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Fluid** | **YP (lb/100ft²)** | **pH** | **FNU, NTU**  |
|  **Spacer - high viscosity plug**  | (1,5-2,0)\*YP (Drill –in fluid) |  | max. 20 |
| **Gravel pack fluid** | \_ | 8 - 11 | max. 15 |

The Contractor of Service will have at the disposal the safety sheets of all used admixture for fluid adjustment.

The Contractor of Service is responsible for disposal of gravel pack fluids after finishing gravel pack job.

## Service requirements

**During preparation of gravel pack job**

The Contractor of Serviceis obliged to regularly inform the buyer about material delivery (progress report) and call upon the Client to provide check according the schedule.

The Contractor of Serviceis obliged to elaborate and submit the Technological procedure for gravel pack job to the Client for approval 30 days before work start. To cooperate with Contractor of WO and the Client during the preparation of WO project, HSE plan and attend the HSE meeting (14-18 days before beginning of works).

**Before beginning of Gravel Pack Job**

Before the beginning of Gravel pack Job and at presence of Contractor of WO and Contractor of Servicethe check of purity and completion of tanks. The Contractor of Service is responsible for preparation and transport of gravel pack fluid to the well.

The tanks for this Gravel pack job will be secured by the Client in this scope:

* UGS Tvrdonice - in volume of 40 m3 for pure gravel liquid and 15 m3 for impure liquid
* UGS Lobodice - in volume of 30 m3 for pure gravel liquid and 15 m3 for impure liquid
* UGS Štramberk - in volume of 30 m3 for pure gravel liquid and 15 m3 for impure liquid
* UGS Třanovice - in volume of 30 m3 for pure gravel liquid and 15 m3 for impure liquid

Other tanks which will be needed for gravel pack jobs will be secured by the Contractor of Service and will add this to the offer.

Before the beginning of gravel pack job and at presence of the Client and Contractor of Service the check of material provided by the Contractor of Service.

**Preparation of the well for the Gravel pack job**

The method of change of liquid will be listed in technological procedure of Gravel pack job and will be approved by the Client. The method of change of operational fluid for gravel pack fluid by using the high viscosity plug (Spacer) will be led by the Contractor of Service in cooperation with the Contractor of WO.

Pump unit for change of fluids will be secured by the Contractor of Service for reaching the minimum speed in annulus 130ft/min.

The well will be prepared for the Gravel pack job after reaching the purity of gravel pack fluid 30 NTU at exit of the well. In case of usage of the gel the measurements of turbidity will be modified but the difference between entry and exit parameters will not be higher than 30 NTU. Preparation of the well for gravel pack job will be approved by the Client.

**Completion and RIH of screens column with gravel pack device**

The Contractor of Service before the RIH of screens column and gravel pack device will elaborate the design of real RIH material of screens column and gravel pack device and this will be approved by the Client.

The works connected with completion of screens column and gravel pack device will be led by the Contractor of Service and in cooperation with the Contractor of WO.

The works connected with setting, verification and pressuring of gravel pack device will be led by the Contractor of Service in cooperation with the Contractor of WO. Before setting of gravel pack device, the deputy of the Client will approve the depth of setting the gravel pack packer.

The report of packer pressure test will be a part of the Final report.

For this required works the Contractor of Service will secure needed device for installation and trained staff for the device from the manufacturer of gravel pack device. In case that the Contractor will not have the certificate from the manufacturer, the Contractor is obliged to secure the specialist for handling this device.

**During the gravel pack job**

During the gravel pack job the Contractor of Service will check the purity of gravel pack fluid regularly at the entry and exit at the well also will check and report the quality of gravel pack sand and parameters (pressure, volume and purity of gravel pack fluid) during the gravel pack job, this will also be a part of the Final report.

The purity of the fluid before entry to the well at gravel pack job must succeed 5 NTU, in case of usage of the gel this value will be adjusted according to values measured before the beginning of the gravel pack job. In case that the value of purity of the gravel pack fluid at the entry of the well will not reach 5 NTU, the higher value NTU must be approved by Client.

 Maximum final pressure will be defined in technological procedure of gravel pack job and will be approved by the Client.

**Pull out of the gravel pack device**

The Contractor of Service leads the works connected to release of the gravel pack device which will be provided by the Contractor of WO. The works connected with releasing and pull out of the gravel pack device will be described in the technological procedure.

**Evaluation of Gravel pack job**

 Logging measurements of gravel sand quality and interpretation will be secured by the Client. The successful gravel pack job are when the head of gravel pack sand (propant) is minimum of 12 meters above horizon and the screens column is clean up to shoe of screens column.

In case that the mentioned requirements will not be achieved /reached for successful gravel pack job the Contractor of Service is obliged to on his own cost to perform the actions which will secure the successful achievement of gravel pack job.

**Installation of anchor**

Before the RIH of tubing column the Contractor of Service will check the anchor seal assembly. The connection and verification or disconnection of the anchor will be led by the Contractor of Service and performed by the Contractor of WO. The Contractor of Service participates with the Contractor of WO on elaborating the space out of tubing column and will submit this to the Client for approval.

The Contractor of Service is present during the performance and manipulations with the anchor to the packer and during the pressure test of annulus and tubing.

# Other obligations

After the signing the Contract of Works, the Client submit the planned schedule of WO on the Contractor of Service request. The process of gravel pack job will be performed at presence of Client.

# Requirements of the Final report

 As part of the Final report will be:

* the Report of process of Gravel pack job for each well,
* the Design of screens column with gravel pack packer assembly,
* Technical Unit for each part (element) of screens column and gravel pack packer assembly,
* Declaration of conformity for gravel pack sand (propant),
* Process of gravel pack works : pressure, flow, purity of the liquid,…
* Graphic record of operation of gravel pack from tonometr,
* Analysis of gravel pack sand (propant) according to API RP 58,
* Fluids reports,