



Tomsk Electronic Company  
is certified to the international standard  
BS EN ISO 9001:2008, auditor NQA Russia



Scientific and Manufacturing  
Enterprise

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Designing of Facilities for  
Oil and Gas Industry

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# Solutions for Associated Gas Utilization

## Design Institute of SME TEC develops integrated solutions for associated gas disposal.

Basing on their experience specialists of SME TEC Design Institute apply various options for associated gas disposal, allowing to transport all associated gas to a gas refinery plant and obtain commercial products (propane-butane fraction, stable natural gas gasoline, commercial dry gas) on site. Techniques used for associated gas disposal are the following:

- **Oil absorption technique**, with use of hydrocarbon absorbent with molecular weight not less than 150. It also can be used as an absorbent for stable condensate. This technique is widely used in USA and some European countries. About 60% of associated and natural gas is treated by means of this technique.
- **Low temperature separation technique**, during which the gas is cooled down by an outside cooling station. Propane, ammonia and freon are used as a cooling agent in oil, gas and chemical industry.
- **Low temperature separation technique**, when Joule-Tompson effect is used for gas cooling, it is achieved through gas throttling expansion. This technique is the most popular in gas industry.
- **Low temperature separation technique**, during which the gas is cooled down by a turbine expander. Turbine expanders are widely used in gas and chemical industry.
- **Low temperature separation technique**, when Ranque-Hilsch effect is used for gas cooling down. Vortex tubes are used for gas cooling down when this technique is applied. This is a relatively new technique for gas cooling down. The main developer and supplier of vortex tubes is NPK Unikmash (Moscow). This technique is being successfully implemented at several Russian oilfields.
- **Low temperature condensation technique**, is further development of low temperature separation technique and it differs in lower temperature of separation. Separation temperature can go down to 120°C when this technique is applied. The main goal of low temperature separation is obtaining target product - ethane, i.e. a raw material for petrochemical industry.

- **Rectification technique** is used during field refinery aimed to obtain target products out of liquid hydrocarbons - propane and butane or their mixture, stable condensate or stable natural gas gasoline. As a rule it is used combined with low separation technique.

In 2008 Design Institute implemented the following projects:

- Main engineering solutions on associated gas disposal for Imperial Energy fields upon the assignment and contract with Imperial Energy Tomskgas (city of Tomsk).
- Technical and feasibility evaluation of options for associated gas disposal at Talinskoye Oilfield upon the assignment and contract with TNK-Nagyan (city of Nagyan)
- Development of design documents for the facility: Condensate gathering unit for Krasnoleninskoye oil and gas field and survey works upon the assignment and contract with TNK-Nagyan (city of Nagyan)
- Development of design documents for the facility: Upgrade of Yuzhny CTF at Krasnoleninskoye oil and gas field and survey works upon the assignment and contract with TNK-Nagyan (city of Nagyan)
- Development of design and estimate documents for construction of the following facility: Tie-in facilities for oil refinery at the village of Semiluzhki, Tomsk Region, to main pipeline Alexandrovskoye - Anzhero-Sudzhensk upon the assignment and contract with Tomskneftepererabotka (city of Tomsk).



SME Tomsk Electronic Company designs facilities related to oil and gas production, transportation and treatment, gas supply, power supply, oil refinery, machine building and metallurgy.

All the activities related to designing are supported by License №ГC-6-70-02-26-0-7020037139-003162-2 (Registry Number №887807 dated 04.06.07) for Structural Engineering of Criticality Rating I and II.



## Design Institute within SME TEC Ltd . provides services for the following fields:

- Oilfield Construction
- Pipeline Systems for Oil and Gas Transportation
- Associated Gas Disposal
- Integrated automation for oil, gas and petrochemical branches of industry
- Systems for traffic control and production records
- Integrated Systems for Metering and Recording
- Lines for materials batching and supply
- Robotic complexes and process lines
- Power units

## Structure of Design Institute of SME Tomsk Electronic Company is the following:

Departments:

- Process
- Architecture and Construction
- Installation Design
- Plumbing
- Electrotechnical
- Estimates and Arrangements of Construction Project

Groups:

- Environment
- Economic Analysis of Investment Efficiency
- Chief Project Engineers

Parts of design and estimate documents for automation, metrology (recording systems), traffic control and remote measurement are implemented jointly with specialists working for some other business lines of the Company, such as:

- Department for PCS Design
- Department for PCS information support
- Departments for Process Designing
- Departments for Integrated Metering Systems
- Department for Traffic Control and Remote Measurement







## Solution for Oil and Gas Field Construction

SME TEC Design Institute develops design projects for new fields as well as expansion, upgrade and revamping of operating facilities of oil and gas fields (central treatment plants, oil treatment plants, oil and gas gathering units, booster pump stations, water knock out units, oil and gas metering skids etc).

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Design solutions for field construction allow the following:

- Production of recoverable reserves of oil, gas and condensate as well as associated components
- Maximum recovery of reserves
- Compliance with the license holder duties and requirements of the RF law on natural reserves



Oil and gas construction projects implement the most advanced research and engineering developments and modern technical solutions:

- Rational use of natural reserves and material, fuel, power and human resources
- Pressure-sealed system for gathering, treatment, transportation and metering of oil and gas, as well as petroleum gas and formation water for the whole route from the well to the consumer
- Single pipe pressure-sealed gathering of oil and gas (including petroleum gas) up to the units for the first stage of oil and gas separation
- Transportation of saturated oil from booster pump stations or gathering systems to central treatment plant
- Water and salt removal from saturated oil with previously knocked out water with its consequent separation (if necessary heated separation) at the final stages
- Integrated automation and remote control of oil and gas gathering, treatment and transportation with oil metering avoiding tanks and commercial oil delivery
- Maximum use of petroleum gas transportation under natural pressure after the first stage of separation up to arrival to consumers: Gas treatment plants or main compressor stations etc
- Construction of pad wells when developing oilfields, equipping them with modular units, equipment and facilities to service and work over wells, meter flow rate, volume of injected water, power consumption and automated remote control etc.
- Application of highly efficient corrosion inhibitors for pipeline systems when transporting well fluids and emulsion breakers by oil treatment
- Laying field utilities in-line in one corridor (pipelines, power lines, communication lines and remote control, motor roads etc), providing a unified design solution and unified systems and units for electrochemical protection of pipelines, power and water supply etc.
- Using computer tools (SAPR system) for oilfield development options and choosing the best one, as well as optimization of pad oil gathering systems, oil treatment and transportation, general utilities, transportation lines and plan for routine maintenance and repair
- Maximum possible application of modular and packaged equipment and main process units, prefabricated buildings and block boxes for auxiliary facilities
- Application of super blocks, designing gathering and treatment systems for oil, gas and water as a unified process unit closed or open, with storied allocation of process equipment
- Using modular automated booster stations with the enhanced capacity, general surface facilities including a gas dehydration unit of modular design
- Using industrialized methods of construction assembling structures from prefabricated modules
- Using non-metallic pipes







## Design of Pipeline systems

Specialists from our design institute will perform designing of new facilities and revamping (major overhaul, upgrade) of existing pipeline transportation systems and their branches with nominal diameter up to 1400 mm with excessive fluid pressure above than 1.2 MPa (12 kgs/sq.sm) up to 10 MPa (100 kgs/sq.sm) by laying a single line or as a bundle of lines to transport the following:

- Oil, oil products (including stable condensate and stable benzene), natural, petroleum and associated hydrocarbon gases from their production area (fields) or storage facilities up to the places of consumption (tanks farms, terminals, off loading stations, gas distribution stations, industrial and agricultural companies and ports)
  - Liquefied hydrocarbon gaseous fractions C(3) and C(4) and their mixtures, wild gasoline and condensated petroleum gas and other liquid hydrocarbons with saturation pressure not higher than 1.6 MPa (16 kgs/sq.sm) by temperature plus 40 C from production fields or main transportation pump stations to the place of consumption
  - Commercial products within compressor stations and oil pumping stations, underground gas storage facilities, booster pump stations, gas distribution stations and gas metering skids
  - Impulse, fuel and start gas for booster stations, underground gas storage facilities, gas distribution stations, gas metering skids and gas reduction stations.
- The Following Units Can Be Designed as a Part of Pipeline Systems:
- Pipelines (tapping from main field line for stocktank oil long distance transportation) with branch lines and loopings, isolation valves, crossings over natural and man-made obstacles, junction points to booster stations, compressors and gas reduction stations, startup units and treatment facilities, condensate traps and methanol units.
  - Anti-corrosion electrochemical pipeline protection, communication lines and facilities, remote control
  - Power supply lines, aimed for pipeline maintenance, power supply and remote control for isolation valves and electrochemical protection units
  - Fire fighting systems and units, anti-erosion and protection devices for pipelines
  - Tanks for storage and gas knock out, emergency tanks for oil, oil products, condensate and liquid hydrocarbons
  - Auxiliary facilities for pipeline maintenance service
  - Regular motor roads and helicopter pads along the pipeline route, access ways to them, warning and other signs for pipeline location
  - Main and intermittent pumping and off loading pump stations, tank farms, compressor stations and gas distribution units
  - Heating units for oil and oil products

### SME Tomsk Electronic Company means:

- Individual approach to Customer's requirements Supporting the developed design and estimate documents when getting approvals and appraisal in the Russian Federation
- Ongoing communication with the Customer and assistance in decision making
- Adaptation of projects designed by foreign designers in order to achieve compliance with the Russian standards



Annually the Company implements dozens of projects, in the Urals, Siberia, Far East and CIS countries. The projects are implemented for such Customers as:

- Transneft
- NK Rosneft (Tomskneft, RN-Yuganskneft, RN-Sakhalinmorneftegas, Samaraneftegas, Angarsky Polymer Plant and others)
- TNK BP (Novosibirskneftegas, TNK-Nyagan)
- Gazprom (Tomskgazprom, Gazprom Transgaz Tomsk)
- Kamchatgazprom
- Nord Imperial
- Sibur
- Vostochnaya Transnationalnaya Company
- NK KazMunayGas and others
- OOO Imperial Energy TomskGas
- OOO Tomskneftepererabotka

Our partners for design and survey works include research and design organizations such as:

- SAPR-HEFTECHIM, Moscow - calculations of material and thermal balances for oil and gas production, treatment and refinery as well as their components and development of process procedures for designing of various process units and complexes
- CKNB Gazprom, Podolsk - development of technical and design documents for vessels and process units
- NF VNIPGazdobucha OAO Gazprom, Novosibirsk - development of individual parts for gas technologies
- TomskTISlz, Tomsk - full range of civil engineering surveys
- TF ICT-Service, Tomsk - development of process procedures for oil treatment facilities

