



Upgrades for Booster Pump Stations, Oil Treatment Units and Preliminary Water Removal Units

Modifications to accelerate the oil-water emulsion separation and stratal water treatment processes to remove dispersed oil and entrained solids.

Apparatuses installed in the early stages of field operation will eventually cease to fully meet the requirements of the changed operating environment, and their performance will also deteriorate owing to the changed parameters (temperature, water cut, gas-oil ratio, etc) of the well-products fed into booster pump stations, oil treatment units and preliminary water removal units.

Polyexpim FZE has gained considerable experience in modifying the existing process units in order to maximize the efficiency of the water-oil emulsion separation and stratal water treatment processes to remove dispersed oil and solids.

Sequence of steps of modification:

- inspection of the equipment operation and diagnose their condition;
- study of well stream properties, gathering conditions, physical parameters (pressure, temperature, gas-oil ratio, viscosity, density, emulsion water content) to select the most effective demulsification agent;
- selection of internals design based on the acquired well stream data;
- development of design documents and drawings;
- fabrication and installation of new internals;
- commission of the modified equipment and bring them to stable operation.

Modifications can be made to two- or three-phase Separators, Oil and Water settling drums, Gas Separators, and other equipment.

Two-phase separators are upgraded by replacing the liquid gas feed distributor to provide for more efficient gas separation, and by installing a foam-breaking pack and a demister at the gas outlet.

Three-phase separators will be retrofitted with a newly-designed inlet system modified depending on the well stream parameters to provide more even

distribution of the liquid gas mixture and quicker removal of free water, and a weir plate of a new design for oil to spill over to the oil section to prevent the formation of intermediate phases. Coalescing packs will also be installed in the equipment to improve its oil dewatering efficiency as well as the quality of the separated water (water-in-oil content – 0.5-5%, oils and solids content– below 30 mg/l).

Settling drums improved with new internals differ from conventional units by the following:

- an optimized inlet device of a special design aimed to improve the emulsion flow distribution,
- a quiescence plate made of expanded steel sheet, and
- coalescing plate packs to provide for deeper oil dewatering and better quality of the released water.

This arrangement fully prevents the formation of intermediate phases. The resulting water-in-oil (WIO) content drops below 0.3-0.5%, and the oil-in-water (OIW) level is 30-40 mg/l.

Improved water settling drums built by modifying the existing equipment are designed to provide deeper removal of oil and solids from the stratal water. Their distinctive feature is the use of internal settling devices designed to capture petroleum products traces and an oil gathering device (a cap at the top of the equipment) that allow the collected oil to be released without interrupting the water treatment process. The water quality at the outlet is 30-40 mg/l for oil, 20-30 mg/l for solids, where the original oil-in-water level in the water to be treated is up to 1000 mg/l.

