

Specifications for NES 801 - 2 module pre-treatment and oil recovery system

Module 1. 40 ft ISO containerised Pre-treatment unit.

In the first of the two modules the pre-treatment unit consists of three tanks. The first two tanks receive the input feed stock to be treated after first passing through an inlet horizontal vibratory screener for removal of major contaminants.

Whilst one of these tanks is being filled the second is being blended by low shear mixers with heating via steam heating coils via steam temperature control system. A fume ventilation system is fitted to each tank.

Chemicals can also be dosed into these tanks from the dosing tanks and mixers via their own dosing pumps. Once the contents of a tank have been conditioned to a suitable physical state for passing through the decanter centrifuge it is pumped to tank number three, which is the feed tank for the decanter.

An intricate pipework system with 3-x transfer (low shear pumps) manifolded to tanks with valve system enables different combinations of flow source, direction, and destination to be selected by the operator to cover any eventuality encountered. The twin polymer dosing and mixing tanks and pumps allow the dosing of polymers into the decanter inlet if required. All pumps and mixers are hydraulically powered and the supply for these comes directly from the electric hydraulic power pack located in the module that contains the decanter.

Temperature and visual level indicators ensure the operator is in possession of all the information he requires to operate the unit.

- 2 heated resuspension tanks of 10m³ each with paddle mixers
- 1 heated blending tank with paddle mixer
- 3 Rotary Lobe transfer pumps 84 m³/h (500Bbl/h) @ 6.2 Bar (91 psi) electrically powered with main pipework in 3" - Ball valves fitted allowing all possible variations of product flow direction including feed to decanter centrifuge
- High and Low level visual and audible alarms - 6" overflow pipe from all tanks terminating in flange for site connection
- Control Panel for operation Forward/Reverse/Stop of pumps, agitators and mixers
- Steam Heating and Control systems with steam traps on all three tanks
- 2 Chemical and 2 polymer plastic dosing/mixing tanks with paddle mixers and pumps for continuous dosing of chemicals and polymers - pumps and mixers electrically powered
- Linear electrically powered vibratory screen shaker
- Emission control chimneys on re-suspension and blending tanks
- Removable tank lids
- Removable access plates on tank sides for cleaning purposes
- Insulation 25mm polyurethane foam on tank outsides

Module 2. 40 ft ISO containerised treatment unit.

The second module houses a silenced diesel driven generator and electric power packs built to NES usual safety specifications. It also houses the Flotwegg Z42 Tri-canter centrifuge. The centrifuge is fed from the pre-treatment unit and the output of 1- water is piped to the water settling tank also housed in the same unit 2- the recovered oil piped into a separate recovered oil tank (not part of this supply) and 3-the sediments discharged onto a conveyor belt that discharges directly into a truck or skip for transport away from the site. A 2000kg-steam generator to supply heat to module 1 is also fitted into a separate compartment in the module.

Operation: - With the bowl spinning at up to 3,500 rpm the feed slurry is fed through a fixed central pipe into the distributor located in the scroll. The product is accelerated smoothly to bowl speed as it passes through the feed ports in the scroll into the bowl.

Separation takes place in the conical cylindrical bowl when the slurry forms a rotating liquid tube under the centrifugal force caused by the bowl rotational speed. The solids in the slurry are deposited against the bowl wall and the remaining liquids separate into a light and heavy phase giving three concentric layers held against the bowl by centrifugal force.

The scroll is rotating at a differential speed to that of the bowl and conveys the separated solids in the direction of the conical end of the bowl. The length of time the solids remain in the bowl is an important factor in determining the dryness of the final solids discharge. The residence time can be adjusted by changing the differential speed of the scroll in relation to the bowl.

The separated solids are discharged through openings at the conical end of the bowl into a fixed discharge housing and then down the discharge chute.

While the liquid phases are being clarified they progress to the cylindrical end of the bowl where they are decanted through separate discharge systems to prevent cross-contamination.

The lighter phase is normally discharged under gravity whilst the heavier phase is removed under pressure by the variable pitch impeller. By altering the impeller during operation the clarity of the two liquid phases can be optimised.

Description of NES Hydraulic Driven Centrifuge Unit

Hydraulic drive for Tricanter Z4D-4/441 VS2I-370A Hydraulic Control System
(with belt guard removed for clarity)

Tricanter Centrifuge for continuous separation of two liquids with different specific weight and one settleable solids phase.

The first liquid phase is ejected under pressure via an adjustable impeller disc (continuous optimisation of the liquid separation line during operation of the machine).

The second liquid phase flows without pressure by gravity over an adjustable weir.

All product contact parts are made of stainless steel. The other metal parts are protected against corrosion by multilayer finish.

Sealing: Material NBR

Scroll: Surface ground

Wear protection:

Feed compartment armoured with cast iron bushings

Scroll blade protected by tungsten carbide

Bowl: Wear protection:

Discharge area outside: hard metal

Flanged wheel: hard metal

Execution inside:

Wear protection by strips and cast iron bushings

Rotor housing: stainless steel

Solids housing: integrated in rotor housing

Machine base: carbon steel

with vibration insulators

Rotor: exchangeable for easy maintenance

Belt guard: according to EEC safety rules

Central lubrication system: manually operated

Drive bowl: Hydraulic motor with fluid coupling

Visual differential and bowl speed measuring device
for indication of the bowl and differential speed.

Initiators mounted on power packs

NESL fully hydraulic drive VS2I-370 A aggregate

for continuous adjustment of bowl- and scroll differential speed as well as for control of scroll diff. Speed (from 3 to 22 min⁻¹ during operation and under load.

Compensator (NBR with 2 angle flanges) for solids chute (439-02)

The Flottweg Z42 Tricanter with full hydraulic drive will process 6 to 10 cu mtr /hr

A Flottweg auto discharge disk stack polishing centrifuge is fitted in the module and is connected to the oil discharge of the Z4D.

A solids removal conveyor is fitted.

Model: Flottweg Z42-3/441 - 3 phase decanter with cylindrical bowl and inbuilt hard faced conveyor for the solid/liquid separation. Adjustable peeling disc. Bowl diameter in mm:420

All parts coming into contact with product made of stainless steel.

Mounted on heavy duty base plate with ant-vibration mountings.

Flow: With light liquid 94.5 US gallons/minute

With oily sludges etc +/- 63 US gallons/minute depending on quality of input product.

Maximum speed:4000 rpm

Bowl and scroll drives

- 1- Viscotherm Rotodiff type 1070S/V
- 2- Volvo F11-19 drive motor with block and console for 3200 rpm max bowl speed
- 3- Control block fitted with flow/speed meters for bowl and for scroll, scroll speed setting and bowl speed setting, boost pressure setting, machine cut off pressure, feed in cut off pressure.

Electric Hydraulic Power Packs

Pump No.1 + 2 (double pump) for the bowl -Pump1- Plunger type pilot operated with variable displacement 65 l/min 250 bar. Pump No.2 for the scroll – Gear pump fixed displacement 54.5 l/min 250 bar
 Pump No.3 for centrifuge feed pump – Gear pump fixed displacement 54.5 l/min
 Pump No.4 for the bypass oil cooler 12 Kw and filtration – Gear pump fixed displacement 54.5 l/m
 Pressure line filtration 10 micron abs
 Hydraulic Tanks- incorporated Full instrumentation and controls fitted
 Only Mineral oil with viscosity VG68 (68mm²/s, 68cst) to DIN 51524HLP to HL68 to ISO HM68 is permitted

Steam Generator

Heat output 1226kw
 Equivalent output saturated steam at 1 bar 2000 kg/hour
 Design pressure 32 bar
 Electric motor 7.5kw

Diesel Powered Electric Generator

Engine Iveco 8361 Sri -26 6 cylinder turbo charged and intercooled diesel 205kw max
 Full engine protection
 Generator 380/220v 50 hz 3 phase 200kva at 1500 rpm
 Full acoustic enclosure
 Control and instrumentation panel
 Exhaust Spark arrestor
 Chalwyn air inlet safety shut down valve

Treatment Results using Tricanter

INFLUENT:-

A typical sludge having the following characteristics:-

Oil Content -	min 20% by weight
Water content -	max 80% by weight
Solid content -	8-10% (by Vol) or 10-12% (by weight)
Paraffin content-	Content can be paraffin providing melt point less than 70deg C
Viscosity of oil content -	150 centistokes @ 50 deg C
Solids density -	min 1200 kg/cu/cm
Preferable decanter inlet temp-	60-80 deg C

With the above influent you would expect to get better than the following results, without the addition of chemicals. However you must assume that the water and oil in the influent are not bound together in a tight emulsion.

We have based the above on an expected throughput of 15 cu mtr/hr with the NES 802 unit with twin Z42 tri-canters or 7.5 cu mtr/hr with NES 801. It is also possible to polish the solids by re-circulating the water phase back into the inlet to reduce the oil content in the solids without a noticeable change in throughput. However steps such as this are the sort of thing that can be carried out during fine tuning to a particular oil.

Expected results will be:-

OIL PHASE- Less than 2% Water by weight
 Less than 0.5% Solids by weight
 Hence less than 2.5% BS & W

WATER PHASE- Less than 4% oil by weight ***
 Less than 2% solids by weight