GENERAL SPECIFICATION

INTENT

The equipment to be supplied by manufacturer includes the screw pumps, support for the drive unit, profile plates, motors, gearboxes, couplings, guards, upper and lower bearing assemblies, belts, pulleys and all fasteners necessary for the complete screw pump unit.

TECHNICAL SPECIFICATIONS

SPIRAL SCREW

The screw pump body consist of a centre tube constructed of mill-certified St 37 steel, sealed at each end with rigidly designed steel end plates of the same quality as the centre tube. The actual speed of rotation of the screw shall be within a range of +/- 10% from the nominal speed which is given by the equation $50=N \cdot D^{(2/3)}$ where N is the nominal speed in revolutions per minute and D is the outer diameter of the screw in meters.

The centre tube is designed such that the pump deflection between bearing centrelines in the horizontal position does not exceed 4 mm under all static and dynamic loads.

Tube end plates are machined with registers to precisely accept the upper and lower bearing assemblies. The layout of the bolt holes in the end plates for the lower bearing assemblies should provide a watertight pump body.

Each torque tube is mounted in a precision lathe and accurately faced to give perpendicular end plates to the pump's centreline access. Circularity of the torque tube is measured and checked that the circularity limits are not exceeded throughout the entire length of the pump.

The screw flights are constructed of cold-formed, mill-certified St 37. The screw flights are continuously welded to the centre tube on both sides with full penetration welds. All radial welds between adjacent flight segments are full penetration welds on both sides of the flight. Each flight segment is positioned and welded in place such that each flight is perpendicular to the centre tube.
After all and circumferential welds of the flights to the centre tube have been complete, the screws are mounted in a precision lathe and accurately finish-machined to a uniform outside pump diameter at the pump flights.

BEARINGS

The lower bearing assemble is constructed to allow continuous operation when fully submerged in wastewater.

The bearing is designed to:

1. Remain in true axial alignment of the screw pump centreline axis through the lower and upper bearings for all operating conditions.
2. Allow for free expansion of the screw pump.

The bearing is a totally enclosed bearing assembly, consisting of a roller bearing, a high-carbon partly not metal sprayed steel shaft stuffing box and gland plate, cast iron base and cast iron hub flange, attached to the screw pump body end plate. The lower bearing assembly is designed for radial loading only. The bearing is completely protected by a stationary, cast PU

(polyurethane) shroud to prevent material in the wastewater from becoming wrapped around its rotating parts. The shroud is manufactured in two halves to facilitate easy removal from the bearing assembly. Each halve shroud part may not exceed 25 kg in weight. The bearing shaft and roller bearings are bolted to the cast iron base anchorage casting and screw pump body end plate. The design of the lower bearing is such that it can be replaced without removal of the cast iron base anchorage or the screw pump body.
The manufacturer has to guarantee that the bearing can run without any additional grease pump and grease feed line. It is not allowed to bring any grease in the water.
References from the last 4 years for the above-mentioned lower bearing, which should be operational, have to be added to the quotation.
Rotating parts should be suitable for connection to a system that enables continuous remote monitoring of the bearing and gear condition. The bearing condition shall be monitored by *acoustic-emission-technology* (i.e. measurement of noises). Monitoring by vibration measurement is not accepted.

The upper bearing assembly incorporates a antifriction bearing train, consisting of a self-aligning, double- spherical roller bearing mounted in a cast iron housing designed to withstand all the thrust and radial loads by the operation of the screw pump. The bearing housing is designed with easily removable sections for ease of inspection service. To absorb the axial forces of the rotating screw pumps the bearing is secured on the shaft by double shaft nut with locking washer. Snap rings are not allowed. The upper bearing shall be arranged for plinth mounting with all loadings transmitted to the motor room floor. Upper bearings that need to be fixed in the inclined wall are not acceptable.

The upper bearing drive shaft is a solid steel stub shaft fitted with either a cast iron tube flange or a machine-faced and gusseted steel plate flange to match the register on the screw pump end plate. The upper bearing flange is connected to the screw pump centre tube end plate and incorporates against its back face, a steel splash plate for covering the opening to the screw pump.

GEAR BOX
A totally enclosed oil-lubricated, air-cooled, foot-mounted, helical/bevel right-angle-shaft gearbox drives each screw pump. The gears and bearings are splash or lubricated to suit the size and mounting orientation of the unit. The gearbox is designed for 24-hours continuous service, with a bearing life of 40,000 hours at rated power, in the angular mounting position corresponding to the inclination angle of the screw pump.
The housing of the gearbox is complete with removable inspection covers, oil filler and drain, and oil breather. The first oil fill is included. The bearing lifetime shall be guaranteed.

FLEXIBLE COUPLING
The output shaft of the gearbox is connected to the screw pump upper bearing shaft by means of a low-speed flexible coupling.

It is designed to compensate for shocks, vibration and shaft misalignment. The coupling consists of two cast iron housings separated by flexible, non-metallic rubber or elastomeric

bushes. Replacement of the flexible elements can be done without disassembly of the screw pump drive train.

ELECTRIC MOTOR

The electric motor is connected to the gearbox via a V-belt drive and is mounted on a adjustable base, with the following characteristics:

1. Horizontal with IP55 enclosure
2. Motor poles - 4
3. Suitable for full voltage starting at local power supply.
4. A rugged motor base to give a means of adjusting tension on the V-belts.

V-BELT DRIVE

The electric motor and speed reducer are connected by means of multiple V-belts and pulleys.

GUARDS

Guards are provided to protect plant personnel from the rotating elements of the screw pump (i.e. V-belts and low-speed coupling). The guards are fabricated in a neat and substantial manner, and are easily removable for inspection and maintenance purposes.

ANTI-ROTATION DEVICE

The screw pump is equipped with an anti-rotation device to prevent back rotation of the screw pump on power failure or stopping of the screw.

PROTECTION

Steel parts are grid blasted to SA 2.5 (DIN 55928) followed by a coating system:
manufacturer: Sigma, Ameron or equal.

. All parts in contact with the sewage are given two coats of 2 components epoxy to 300 microns.
- Proprietary items, motor/gearboxes/lubricators etc are supplied in manufacturers finish.

DESIGN CRITERIA AND TECHNICAL DATA

water medium		:	
capacity		:	(l/s)
sewer level		:	(m)
touch point	(TP)	:	(m)
chute point	(CP)	:	(m)
filling point	(FP)	:	(m)
max. pumping point	(MPP)	:	(m)
screw pump diameter		:	(mm)
tube diameter		:	(mm)
tube thickness		:	(mm)
steel liner thickness		:	(mm)
flight thickness		:	(mm)
number of flights		:	
inclination		:	(□)
length of flights		:	(mm)
length of tube (approx.)		:	(mm)
weight of screw pump (including bearings)		:	(kg)
horizontal deflection		:	(mm)
tensile stress		:	(N/mm^2)
manufacturer		:	
type		:	
lift (MPP-FP)		:	(m)
rotation speed		:	(1/min)
efficiency of screw pump		:	(%)
efficiency of drive unit		:	(%)
total efficiency		:	(%)
absorbed power at screw pump shaft P1		:	(kW)
absorbed power at motor shaft		:	(kW)

Bearings

upper bearing (type)	:	
axial load	:	(kN)
radial load	:	(kN)
diameter bearing shaft	:	(mm)
lifetime (B10) (>30.000 h)	:	(hours)

bottom bearing (type)	:	
axial load	:	(kN)
radial load	:	(kN)
diameter bearing shaft	:	(mm)
lifetime (B10) (>30.000 h)	:	(hours)

Drive unit

Complete incl. all guards and elements, that are needed for connection between tube and drive unit.

(Bevel) helical gear unit:

manufacturer	:		
chosen manufacturer	:		
type	:		
ratio	:	1:	
rotation speed	:		(1/min)
nominal torque	:		(Nm)
service factor (min. 1.5)	:		(-)
efficiency of gearbox	:		(%)
Oil capacity	:		(l)
Weight	:		(kg)

Electric motor

manufacturer	:	
type	:	
motor power	:	(kW)
rotation speed	:	(1/min)
efficiency of motor	:	(%)
voltage	:	(V/Hz)
starting	:	Direct / Star delta
construction type	:	
Weight	:	(kg)

Backstop

manufacturer	:		
type	:		
mounted		:	at motor shaft / at gearbox

V-belts

number	:	
type	:	
motor pulley	:	(mm)
gearbox pulley	:	(mm)
rotation speed of V-belts	:	(m/s)

Coupling

manufacturer	:	
type	:	
diameter of coupling	:	(mm)
service factor	:	

Monitoring system

manufacturer	:
type	:
number of sensors	: