

# TANKMAN OPERATION & MAINTENANCE INSTRUCTIONS



Read all instructions in this manual before operating machine.

#### GENERAL

The TANKMAN<sup>®</sup> is a hydraulically driven rotating head that provides effective control of rotational speed to assure optimum cleaning by the nozzle streams of internal tank surfaces to be cleaned, sanitized, treated, or rinsed. No reduction gears are used and therefore, minimal maintenance is required. The nozzles are driven by a set of bevel gears through a complete 360° path simultaneously in both the vertical and horizontal planes. This unit is complete with 2 or 3 nozzles which provide an indexing pattern of 4° or 3° per revolution, respectively. The "clean line" design of this unit ensures a minimum of outside crevices in the unit where processing material may accumulate to cause contamination. It may be installed on a permanent basis (C.I.P.). Many types of fluids, sanitizers, detergents, solvents and caustics may be used through this unit to assist in its cleaning effectiveness. (Please note caution below) The unit will only operate properly when mounted in the vertical position (suspended or inverted) and can clean almost any type of contained area within its range.



Caution: If chemicals, hazardous materials, operations, and equipment are used in conjunction with this cleaning equipment, it is the responsibility of the user to establish appropriate associated safety and health practices. Prior to application, the user must consult and determine the applicability of regulatory (federal, state, local and facility) safety and environmental agency limitations.

#### MODELS

80-100 = Base standard 2 nozzle model 80-300 = Base standard 3 nozzle model

#### MATERIALS

The TANK-MAN is made of 316 (UNS S31600) stainless steel with the exceptions of the bearings and bushings, which are Teflon and UHMW-PE. No lubricants are required.

#### CONSTRUCTION

Refer to drawings 80-100 or 80-300, the unit consists of two basic components; the drive assembly and the nozzle body assembly. This unit's construction does not require lubrication of any kind.

#### ROTATION

The liquid enters the inlet cap (1) and then flows through the oblique and bypass holes of the inlet disc (6) causing a swirling motion in the liquid. The swirling liquid goes down the outside of the vertical shaft (2) imparting rotation to the 4 tooth impeller (9) and thus the vertical shaft. The liquid then goes thru the holes in the vertical shaft and thru the elbow to the horizontal shaft (15). There is a hole in the elbow allowing

a constant stream of liquid to be directed at the gear mesh to help prevent build-up. The liquid flows into the nozzle body and out each nozzle. The rotation of the vertical shaft causes the nozzle head assembly to rotate in a horizontal plane. The water leakage from the bottom of the unit is necessary to lubricate the vertical radial bearings and to flush out particles which may cause the unit to jam. The nozzle bodies rotate in the vertical plane by the meshing of the bevel gears (12 & 16); bevel gear (12) has 45 teeth while bevel gear (16) has 44 teeth. This difference in the number of teeth in each gear indexes the nozzles with each rotation. It will take 45 revolutions for one complete cleaning cycle. Thus, if the unit is rotating 5 RPM, it will take 9 minutes for a complete cleaning cycle. To obtain cycle time, divide 45 by the RPM of the head. Normal rotation of the 2 nozzle TANK-MAN is 3-15 RPM at a 100 to 200 PSI (6.9 to 13.8 BAR) inlet pressure and the 3 nozzle TANK-MAN is 3-20 RPM at a 75 to 150 PSI (5.2 to 10.3 BAR) inlet pressure. The nozzle holes in head (19) are set off of true center in favor of rotation.

### THROUGHPUT

The amount of liquid going through a TANKMAN is proportional to the pressure applied and the nozzle orifice size. Increasing the pressure will increase the throughput. For specific information refer to the flow curve. Please note the operating pressure range.

#### **CLEANING/WETTING RADII**

The cleaning and wetting distances are a function of rotational speed and liquid pressure applied. The slower the unit rotates and the higher the pressure applied, the greater the distances. The maximum wetting radius is about 40 ft (12.2 m). The EFFECTIVE CLEANING RADIUS is 22 ft (6.7 m), but the actual results will also depend on the type and condition of soils to be removed. The nozzle extensions (25) concentrates the stream for greater reach. If striping occurs on tank walls then the extensions may be removed. This will provide a fatter stream, but will sacrifice about a 5 ft (1.5 m) radius of throw.

#### SUPPLY SOLUTION PRESSURE

The minimum amount of liquid that will satisfactorily run the TANK-MAN with 2 x 3/8" nozzles is about 70 GPM (16.5 m<sup>3</sup>/hr) at 100 PSI (7 BAR) and with 3 x 3/8" nozzles about 100 GPM (23 m<sup>3</sup>/hr) at 75 PSI (5.2 BAR). The Sellers BX4000 Jet will supply the capacity and pressure requirements for a single unit.

### INSTALLATION

The TANK-MAN is very easy to install as it has a single female pipe thread connection. It may be installed on a tripod, suspended from a pipe, manhole cover, etc, but the unit must be VERTICAL. In all installations a suitable strainer should be used (such as a 20 Mesh "Y" strainer) to prevent dirt or scale from clogging the waterways or openings.



Warning: In closed tanks, provisions should be made for adequate venting during operation to allow the escape of any gases or volatile vapors which may be produced during operation. This will also prevent the tank from collapsing due to vacuum formation, which can be caused by a cold rinse cycle in a warm tank.

#### **OPERATION**

To start the unit, turn on the fluid. An in-line valve is advised for a slow build-up of liquid pressure in the unit to prevent water hammer. To stop the unit, turn off the liquid. The unit should always be handled carefully. If the unit is dropped or maltreated it may cause internal damage to the drive assembly, which in turn can effect the performance of the unit. If handled properly the unit will perform well and provide dependable service.

# **OPERATION & SPECIFICATION SHEET**

Refer to drawing 80-100 or 80-300 & variations for assembly and parts list.

Pipe Connection Operating Pressure Range - 2 - 3	2 Nozzle 3 Nozzle	1 1/2" Female NPT 60-200 PSI (4.1-13.8 BAR) 75-200 PSI (5.2-13.8 BAR)
Maximum Operating Tempera Flow Capacity2 -3	iture Nozzle Nozzle	250° F (121° C) 60-110 GPM (14-25 m <sup>3</sup> /hr) 60-135 GPM (14-31 5 m <sup>3</sup> /hr)
Head Rotation Speed (Factor *Effective Cleaning Radius Effective Wetting Radius Nozzle quantity	y Set)	3-20 RPM To 22 ft maximum (6.7 m) To 40 ft maximum (12.2 m)
Standard Nozzle Orifice diam Indexing Pattern	eter	2 013 3/8" (9.5 mm):5/16" (7.8mm); 7/16" (11mm) - 2 Nozzle 4° - 3 Nozzle 3°
Overall Head Length x Body I Installation Hole diameter	Diameter -2 Nozzle -3 Nozzle	12.75" x 5.5" (324 mm x 140 mm) 6.5" (165 mm) 12.5" (318 mm)
Approximate Weight Materials of Construction		15 lbs (6.8 kgs) 316 Stainless Steel Teflon and UHMW-PE
**Recommended Solution Strainer (supplied by user - not included)		20 Mesh (1/32" openings)

\* Depends on type and conditions of soils to be removed

\*\*Required for most applications to prevent fouling or plugging of the unit from foreign material, i.e., scale, grit, and soils in solution. Additional strainers and/or finer mesh screens may be required depending upon the amount, nature, and size of foreign materials in solution.

**NOTE:** Consult Sellers where operating conditions are not covered in the above specifications.

# **TROUBLE SHOOTING**

Due to the simplicity of the unit, very few problems should occur. If any trouble should arise, the following steps may be taken: Refer to drawings 80-100 or 80-300.

- A. Check units for external damage, look for evidence of mishandling that may have damaged shafts, bearings, or alignment.
- B. If the unit fails to rotate and no liquid passes:
  - 1. Check for liquid pressure and volume at the unit.
  - 2. Check strainer for filter blockage.
  - 3. Remove unit and check for clogged jet holes.
  - 4. With the nozzle removed, recheck for flow through the unit.
  - 5. Remove the inlet cap and check the holes of the inlet disc. Check to see that no foreign material is preventing the unit from rotating.
- C. If the unit fails to rotate and sufficient liquid passes:
  - 1. Check for rotational freedom, by hand, in the vertical and rotational axis.
  - 2. If no visible abnormalities are discovered, the unit may have been dropped and internal damage is suspect.
  - 3. If the unit still does not rotate, check for:
    - a. Contamination and obstructions in the unit.
    - b. Wear of the bearing parts.
    - c. Galling and straightness of the shafts and gears.

#### Replace all defective parts. No lubrication!

# SERVICING-DISASSEMBLY

- A. Refer to drawings 80-100 or 80-300.
  - A spanner wrench for the gears is available, part 80-124.
  - 1. Removal of nozzle body, elbow and vertical shaft assembly.
    - a. Unscrew inlet cap (1).
    - b. Unscrew the hex nut (3) and shaft cap (4).
    - c. Remove the thrust washers (5 & 23) and radial bushing (8).
    - d. Lift out the inlet disc (6).
    - e. Unscrew the impeller (9) from the vertical shaft (2).
    - f. Lift the outer body (7) assembly from the vertical shaft.
  - 2. Disassembly of lower body assembly.
    - a. Secure the lower cap (11) assembly and remove the body (7).
    - b. Secure the lower cap assembly inverted in a vice. Remove the gear (12) with a spanner wrench.
    - c. Remove the thrust washers (18 & 24) from the lower body cap.
  - 3. Disassembly of vertical shaft and nozzle body assembly.
    - a. Loosen the 2 set screws (10) in the elbow (14).
    - b. Secure the elbow in a vice and remove the nozzles (20) and nozzle extensions (25) and check the condition of the stream straighteners.
    - c. Using a rod inserted thru the nozzle body holes, unscrew the shaft from the elbow. Secure the elbow and remove the vertical shaft (2).
    - d. Secure the nozzle body and remove the gear (16) with a spanner wrench. Remove the thrust washers (13 &18), the horizontal shaft (15), and the radial washer (24).

# SERVICING-ASSEMBLY

- A. Refer to drawings 80-100 & 80-300.
- B. Pay particular attention to the drawing notes, as they provide the torques for assembly, washer counts for the bearings, and a notification that food-grade never-seez should be applied to all threads.
  - 1. Nozzle body, shafts, and elbow assembly
    - a. Insert 1 radial washer (24) into the nozzle body (19) recess.
    - b. Insert the horizontal shaft (15), threaded end up, into the nozzle body. Locate the 3 washers onto the shaft, first washer (13), then washer (18), and finally washer (13), surfaces of the washers with the rounded corners should face away from each other, forming a doughnut shape.
    - c. Screw the threaded bevel gear (16) into the nozzle body.
    - d. The nozzle body should spin freely on the shaft.
    - e. Screw the horizontal shaft (15) assembly into the elbow (14) by inserting a rod thru the nozzle holes to catch the shaft holes.
    - f. Screw the vertical shaft (2) into the elbow.
    - g. Install the 2 set screws (10) into the elbow.
  - 2. Lower cap assembly
    - a. Insert a thrust washer (24), washer (18), and washer (24) into the gear (12), surfaces of the washers with the rounded corners should face away from each other, forming a "doughnut" shape.
    - b. Screw the gear into the lower body cap (11).
  - 3. Final assembly
    - a. Mount the elbow/shaft assembly into a vice with the vertical shaft being vertical. Install the impeller (9) onto the shaft.
    - b. Screw the outer body (7) onto the lower cap assembly.
    - c. Place the inlet disc (6) into the outer body locating the vertical shaft thru the center. Insert the bushing (8).
    - d. Insert the thrust washers into the inlet disc recess, first washer (23), then washer (5), and finally washer (23).
    - e. Screw the vertical shaft cap (4) onto the shaft and lock the cap with the lockwasher (27) and hex nut (3).
    - f. The nozzle body assembly should spin freely about the vertical shaft.
    - g. Remount the lower body cap flats into a vice and screw the inlet cap (1) to the outer body.
    - h. Install the nozzle extension (25) with the nozzles (20) into the nozzle body (19).
    - i. All threads to be wrench tightened to the recommended torques.

# PARTS FOR TANKMAN®

(80-100 & 80-300)

PART NO.	REFERENCE NO.	DESCRIPTION
1	80-101	Cap, Inlet
2	80-102	Shaft, Vertical
* 3	15-23-1	Nut, Hex 3/8"-16
4	80-104	Cap, Vertical Shaft
* 5	80-105	Washer, Thrust-TFE
6	80-106	Disc, Inlet - 2 Nozzle
	80-306	Disc, Inlet - 3 Nozzle
7	80-107	Body, Outer
* 8	80-108	Bushing, Vert Shaft-TFE
9	80-109-SS	Impeller - 2 Nozzle
	80-209-SS	Impeller - 3 Nozzle
10	74-324	Set Screw 10-32x1/4"
11	80-110	Cap, Lower Body
12	80-111-EP	Gear, 45T
* 13	J6-238	Washer, Thrust, UHMW-PE
14	80-112	Elbow
15	80-113	Shaft, Nozzle Body
16	80-114-EP	Gear, 44T
* 18	80-116	Washer, Thrust-TFE
19	80-117	Body, Nozzle - 2 Nozzle
	80-117-LF (80-100-FA ONLY)	Body, Nozzle - 2 Nozzle
	80-317	Body, Nozzle - 3 Nozzle
20	J6-115-GA	Nozzle, Assembly 3/8"
	J6-115-FA	Nozzle, Assembly 5/16"
	J6-115-HA	Nozzle, Assembly 7/16"
21	80-122	Straightener, Stream (part of #20)
* 23	J6-239	Washer, Thrust, UHMW-PE
* 24	80-119	Washer, Radial, UHMW-PE
25	80-123	Extension, Nozzle Assembly
26	80-122	Straightener, Stream (part of #25)
* 27	20-14-1	Washer, Split, Lock 3/8"

(\*) Recommended spare parts dependent on model, parts designated are the wear parts but the actual quantity and parts are unique to each model.

(\*\*) Specify nozzle size and quantity desired. Available size are 3/8", 7/16", and 5/16" nozzles. Other sizes are available but are considered special and costs will vary.







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	ITEM #20 J6-115-GA J6-115-FA J6-115-FA		18-8 SS 316 SS	315 SS 316 SS UHMW-PE 316 SS 316 SS 316 SS	TEFLDN 316 SS 316 SS 316 SS 316 SS 0HMW-PE 316 SS	316 SS 18–8 SS 316 SS 316 SS 316 SS 316 SS 316 SS 316 SS	316 SS 18-8 SS 316 SS 316 SS 316 SS	96046
1	ITEM #19 80-317 80-317 80-317	25-03561)	375 - DF #25	LIF #23) EMBLY ART DF #20)	JRIZ HDRIZ	E.		~
	ITEM #9 80-209-SS 80-209-SS 80-109-SS	LUBRICANT (6: NT GALLING. BLY: 5 FT/LBS 80 FT/LBS	H AN ® LIT, LOCK, 3 LITSEP (PADT	ILIZEK (PAR) NDZZLE ASS DIAL RUST R, STREAM (PA EMBLY EMBLY	LE BODY, HC RUST CLE BODY, HC RUST, DUTER	BDDY ERTICAL SHAI	CAL SHAFT 175-16 TICAL DRENGLATURE OR DRESCRIPTION TS LIST	MAN
	ITEM #6 80-306 80-306 80-106	S NEVER-SEIZE IBLY TO PREVE LES FOR ASSEM 00 FT/LBS ITEM #11 TO 71 5 ITEM #19 TO	BO-120-SPK DENTIFIED WITH WASHER, SPI VANF STAR	VANE, STABJ EXTENSION, WASHER, RAI WASHER, THF STRAIGHTENEF NDZZLE ASSI BDDY, NDZZL	MASHER, THI GEAR, 44 TC SHAFT, NOZZ ELBOW WASHER, THI GEAR, 45 TC	CAP, LOWER SCREW, SET IMPELLER BUSHING, VE BUDY, DUTER DISC, INLET WASHFR, THI	CAP, VERTIC NUT, HEX, .3 SHAFT, VER CAP, INLET NN	ZZLE TANK
2	PART No. 80-300 80-300-HA 80-300-FA	UNIT = 15 LB: EIGHT = 20 LB: ALL AMDUNT DF EADS AT ASSEM LLOWING TARCU 2 AND #16 TD 1 WHILE HOLDING TT 20 IN/LBS TT 20 IN/LBS	S KIT NUMBER THE KIT ARE II D-14-1	D-122 D-123 D-119 5-239 5-239 D-122 EE CHART		0-110 4-324 EE CHART 0-108 0-107 EE CHART D-105	D-104 5-23-1 0-102 0-101 D-101 DENTIFYING NO.	3 NC
		TTES, I. WEIGHT PEF SHIPPING W 2. APPLY A SW TO ALL THR I D ALL THR I SUE THE #11 ITEM #10 ITEM #10 ITEM #10 ITEM #20	4. SPARE PART PARTS FOR 27 1 20	255 3 8 24 23 2 4 20 3 8 21 2 4 20 3 8 20 3 8 21 2 4 20 3 8 21 2 4 20 3 8 20 3 8 20 4 20 3 8 20 4 20 4 20 4 20 5 20 5 20 8 20 8 20 8 20 8 20 8 20 8 20 8 20 8		11 10 1   10 2 7 7   9 1 1 8 9   7 1 1 8 1   6 1 1 8 1 1   6 1 1 8 1 1 1   7 1 1 8 1	4 1 8   3 1 1 8   2 1 1 1 1   1 1 1 1 1 1   1 1 1 1 1 1 1   1	VG NO CD80
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