# PREFACE

We Are Very Much Pleasure and Thankful to you for using **Ankar Centrifuges** in Your Esteemed Organization. Ankar Centrifuges have been developed and designed to satisfy customer's desire for rationalized production.

Since the establishment of our company in the year 1996, we have been manufacturing the finest, most reliable machines, always endeavoring to advance our technology. We have supplied to 261 Companies, more than 1890 centrifuges in India. The highlight of our company is by manufacturing and supplying centrifuges and other process requirements and on time delivery with effective after sales service by continually in improving the effectiveness of quality management system.

Our clients have been procuring their centrifuge requirements time and again form us since several years, which would testify to our standing as a quality manufacturer and extremely customer friendly company.

Every care has been taken at all stages of manufacture and assembly of the machine for ensuring to meet the stringent standards of quality and Performance as per GMP standards.

## Technical specification:

| | |
|---|---|
| **Design Codes And Standards** | Vessel-Gmp / Pipes –ASME B31.3 / Flanges –ANSI B16.5-Class150# |
| **Type** | Four Point centrifuge cGMP |
| **Size** | 36" |
| **Model** | Manual Top Discharge |
| **Material of construction** | Contact part are SS316/Non-Contact SS 304 |
| **Motors and controls** | Flame Proof |
| **Suspension** | Inertia plate with 4 nos. with ant vibration mounts |
| **Solid Discharge** | Manually From Top |
| **Lid** | Partially Opening –Manually Operated |

**Process Details:**

1. Operation — Batch wise
2. Temperature During Feed in Deg c — Room Temperature
3. Liquid Specific Gravity — 1( DM water with slight acidity PH5 to 6 due to acetic acid )
4. Chemical Properties — Hazardous

| **General details:** | | **36"** |
|---|---|---|
| 1. Diameter of basket | * | 915mm |
| 2. Height of Basket | * | 460mm |
| 3. Diameter Of Lip of Basket | * | 600mm |
| 4. Volume Under Lip of Basket | * | 180 Lts |
| 5. Filter Area | * | 1.32$m^2$ |
| 6. Max RPM of Basket | * | 900rpm |
| 7. Max Permissible Load | * | 195kg |
| 8. centrifugal force along basket Wall at Max RPM, G Units | * | 510 G units |
| 9. Motor HP | * | 5.5 kW (7.5 Hp) |
| 10. Inertia plate | * | 60mm |
| 11. Viscous dampers | * | 400mm height |

| **Material of construction:** | | **36"** |
|---|---|---|
| 1. Basket Shell & Top | * | SS316, 6mm thk |
| 2. Outer Body | * | SS316, 5mm thk |
| 3. Chamber cladding | * | SS316, 1.6mm thk |
| 4. Basket Bottom cone | * | CI |
| 5. Bearing Housing | * | CI |
| 6. Shaft, Dia | * | EN-8, 80mm |
| 7. Driven Pulley, Main Pulley | * | CI |
| 8. Inertia plate | * | MS |
| 9. Inertia plate cladding | * | SS304, 1.6mm thk |
| 10. Viscous dampers | * | SS304, 1.6mm thk |
| 11. Motor Guard | * | SS304, 1.6mm thk |
| 12. Belt Guard | * | SS304, 1.6mm thk |

**Nozzles:**

Side glass, view glass, Feed Pipe & Wash Pipe Nozzles on Lid vents Nozzle, nitrogen purging Nozzle.

**Drives, controls and braking:**

1. Motor : 7.5 hp /415 V, 50 Hz, 3 Phases, CROMOPTON Make.
2. Transmission : Through V-belt & CI pulley.
3. Limit switch : Non Contact Type, Flame Proof, with SS304 Cover.
4. Brake : Dynamic Brake through variable frequency drive.
5. V. F. D. : Customer Scope.

**Safety interlocks:**

Power to motor will be cut off when the door is open.

**Testing:** Basket will be dynamically balanced at Maximum Speed.

| SL.NO | DESCRIPTION | MATERIAL | | SIZE THICKNESS | |
|---|---|---|---|---|---|
| | | SPECIFIED | USED | SPECIFIED | USED |
| **1.** | **INERTIA PLATE** | M.S | M.S | 60 MM | 60 MM |
| a. | S.S.INVOLUTE LINING | SS 316 | SS 316 | 1.6 MM | 1.6 MM |
| b. | S.S.LINING TOP | SS 316 | SS 316 | 1.6 MM | 1.6 MM |
| c. | S.S. LINING BOTTOM | SS 316 | SS 316 | 1.6 MM | 1.6 MM |
| **2.** | **BEARING HOUSING GUARD** | SS316 | SS316 | 1.6mm | 1.6MM |
| a. | VERTICAL SHELL | SS 316 | SS 316 | 5 MM | 5 MM |
| b. | BOTTOM FLANGE | SS 316 | SS 316 | 10 MM | 10 MM |
| c. | COVER | SS 316 | SS 316 | 1.6 MM | 1.6 MM |
| **3.** | **MONITOR CASING** | SS316 | SS316 | 500*5 | 500*5 |
| a. | SHELL | SS 316 | SS 316 | 5 MM | 5 MM |
| b. | LID | SS 316 | SS 316 | *5 MM* | 5 MM |
| c. | PAD PLATE | SS 316 | SS 316 | *5 MM* | 5 MM |
| d. | BOTTOM FLANGE | SS 316 | SS 316 | | |
| **4** | **BASKET** | | | | |
| a. | SHELL | SS 316 | SS 316 | 6 MM | 6 MM |
| b. | CONE LINING | SS 316 | SS 316 | 1.6 MM | 1.6 MM |
| c. | BASKET TOP | SS 316 | SS 316 | 6 MM | 6 MM |

| SL.NO | DESCRIPTION | MATERIAL | | SIZE THICKNESS | |
|---|---|---|---|---|---|
| | | SPECIFIED | USED | SPECIFIED | USED |
| **5.** | **NOZZLE** | | | | |
| a. | FLANGE | SS 316 | SS 316 | 16 MM | 16 MM |
| | FEED PIPE | SS 316 | SS 316 | 50NB | 50NB |
| b. | FLANGE | SS 316 | SS 316 | 12 MM | 12 MM |
| | WASH PIPE | SS 316 | SS 316 | 25NB | 25NB |
| c. | FLANGE | SS 316 | SS 316 | 12 MM | 12 MM |
| | VENT PIPE | SS 316 | SS 316 | 80 NB | 80 NB |
| d. | FLANGE | SS 316 | SS 316 | 15 MM | 15 MM |
| | DRAIN PIPE | SS 316 | SS 316 | 80NB | 80NB |
| **6.** | **LOWER SHELL** | SS 316 | SS 316 | 5 MM | 5 MM |
| **7.** | **LOWER SHELL FLANGE** | SS 316 | SS 316 | 12 MM | 12 MM |
| **8.** | **GUARDS** | | | | |
| a. | MOTOR GUARD | SS 304 | SS 304 | 1.6 MM | 1.6 MM |
| b. | BELT GUARD | SS 304 | SS 304 | 1.6 MM | 1.6 MM |
| c. | PROXMITY SENSOR GUARD | SS 304 | SS 304 | 1.6 MM | 1.6 MM |
| **9.** | **HEX.HEAD BOLTS** | SS 316 | SS 316 | M1*6 | M 1*6 |
| **10.** | **MAIN SHAFT** | EN-8 | EN-8 | Ø 80 | Ø 80 |

| S.NO | DESCRIPTION | MAKE | RATING / MODEL |
|---|---|---|---|
| 1. | FLAME PROOF MAIN MOTOR | CROMPTON | 7.5 HP |
| 2. | PROXIMITY SENSOR | STANDARD | |
| 3. | PNEUMATIC CYLINDER | ROTEX | |
| 4. | SOLENOID VALVE | ROTEX | |
| 3. | ANTISTATIC BELTS | FENNAR | B-105 |
| 4. | RUBBER GASKETS | SILICON | |
| 5. | START-STOP PUSH BUTTON STATION & JUNCTION BOX | STANDARD | |

## DESCRIPTION OF PARTS

BASKET:

The basket is made up of adequate thickness so as to withstand the loads caused by the centrifugal force developed by material in the basket. The dynamically balanced basket ensures vibration less and silent working. The basket bottom is made up of suitable material and duly balanced independently without the basket for higher accuracy.

**BEARING HOUSING:**

The heart of the centrifuge is the bearing housing which has to take care of the load and vibrations. It is made out of good quality solid steel rod or cast iron as per the design size of centrifuge. Special care is taken to avoid entry of corrosive gases which damage the bearings and housing. The entire housing is protected from contact with corrosive materials being handled.

**BEARINGS**:

Selection of bearing is done carefully, for running the machine at different speed such as loading, washing, de watering and rinsing.

Main Bearings No:

- NJ314 –Cylindrical Roller Bearing
- N313 - Cylindrical Roller Bearing
- 51312 - Thrust Bearing

End covers are provided to keep the bearing in position on the shaft and seals provided to prevent grease coming of the bearings during running and during greasing.

**BRAKE:**

The centrifuges are fitted with external shoe brakes with brake liners. The brakes are heavy duty type designed to bring loaded basket to stop quickly.

**DRIVE:**

The drive consist of motor mounted at the basket casing driven through v-belt with provision of the tensioning the belts. The centrifuges are fitted with Driven pulley at the motor shaft.

**FEED PIPE:**

As explained in the centrifuge operation about feeding loading of the slurry into the machine plays a significant role in the operation of centrifugation. Feed pipe is designed for three types of slurries like thick, thin and medium.

**WASH PIPE:**

After Uniform Distribution of Feeding Is Completed usually the impurities in the solid (cake) in the basket has to be removed by spraying suitable wash media. The nozzles used in the wash pipe are specially designed to minimize quantity of washing media used for washing the cake and uniform distribution of wash media is spread all over the cake and the impurities are carried away by the centrifugal force in the cake in the form of MLS( mother liquor solution).

**N2 NOZZLE:**

**As** a safety measure N2 (nitrogen) basket can be provide by giving the n2 supply both at the centrifuge and at the bearing housing which prevents fire accidents occurring because of friction.

**VENT NOZZLE:**

A vent nozzle is provided on centrifuge to prevent solvent losses during loading, washing, & spinning. In case solvents are used during centrifugation Solvent recovery can be done by providing a SC Rubber on the vent which is also useful for odd harmful vapors emitting out from centrifuge during centrifugation.

**BASKET BALANCING:**

All baskets are statically and dynamically balanced with regular usage and passage of time there are changes that balancing of basket may slightly disturbed when the machine is fully overhauled it is advisable to check the balancing at least once in two years. With the passage of time, depending on the material centrifuged, and the use that the machine is put to. It is absolute necessary that the basket must be thoroughly subjected to regular checks for such corrosion. The basket rotates at high speed, and if not properly maintained, it may lead to very serious accident.

**'V' BELTS:**

Tension of 'v' belts should be regularly checked, slack side approximately half inch loose should be there when compared to tight side these could be adjusted by suitable adjusting the position of the motor base plate in case of damage in one belt all 'v' belt should be changed at a time.

**BELT TENSION:**

During running 'v' belt are get loose which make slap noise on slack side. By increasing the tension of the belt the problem can be rectified. Motor is placed on the baser plate and fixed with 4 bolts and nuts. By adjusting the hinge bolts and increase the distance between driven pulleys to drive pulley.

**SIGHT GLASS:**

For operators clear view in the centrifuge during centrifugation a sight glass opposite to light glass is provided.

## System of centrifuge operation

1. The centrifuge accelerates to a predetermined loading speed and the flow of feed is initiated.

2. As centrifugal force drives the mother liquor through the deposited cake, filter media and perforated basket wall, a cake builds up on the filter media.

3. The liquid effluent is discharged through a tangential outlet.

4. After the suspended solids have filled the basket to a preset volume or cake thickness, the cake detector provides the signal to shut off the feed.

5. The retained solids are purged of mother liquor, washed and accelerated to spin drying speed.

6.After spin drying, the centrifuge decelerates to discharge speed and the discharger removes the product from the basket. An alternative discharge method, not illustrated, allows top removal of product in a filter bag.

## MAINTENANCE AND PERFORMANCE CHECKS

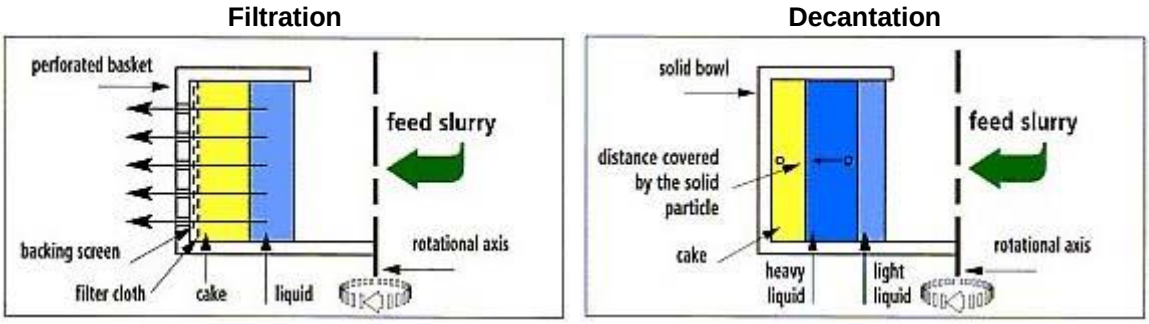
1) Lubrications must be rigidly followed.

2) To avoid Rust and Corrosion machine must be washed and cleaned daily. This will ensure trouble free operation of lid and other moving parts that would otherwise become jammed with the materials handled by the machine.

3) A touch –up with good paint at regular intervals will avoid corrosion.

4) Depending on the use that the machine is put to, must be completely overhauled at least once a year if materials used are very corrosive, then it may be necessary to over haul the machine even twice or thrice in a year before assembly after overhauling all parts must be subjected to through scrutiny and if necessary must be replaced. Overhauling of the machine used in textile industry may be done at little longer intervals.

## Solid-Liquid Separation:




**SEPARATION PRINCIPLES**

**CENTRIFUGAL FILTRATION**

Centrifugal solid-liquid separation using a perforated basket equipped with a filter cloth or removable filter bag.

During centrifugal filtration, centrifugal force produces pressure that forces the liquid through cake, filter cloth, backing screen, and out the basket perforations. The filter cloth retains the solid particles within the basket.

**CENTRIFUGAL DECANTATION:**

Centrifugal solid-liquid, liquid-liquid, or solid-liquid-liquid separation using a solid bowl. Liquid removal is accomplished using a skimmer or by overflowing the bowl rim.

During centrifugal decantation, centrifugal force is used to accelerate the gravity sedimentation process in which a mixture of phases with different densities is forced to settle. In a solid-liquid decantation application, the solid particles move radially through the liquid and accumulate on the walls of the solid bowl. If two liquids with different densities are present, the less dense liquid migrates toward the bowl's axis of rotation.

# TROUBLE SHOOTING:

**1.** Heavy Vibration in the Machine during Feeding:

- Material being fed unbalanced
- Uneven distribution of cake
- Filter cloth chocked
- Basket locknut loose
- Bearing damaged
- Bearing housing bolt loose
- Slow down the rpm of the basket
- Feed more material
- Stop feeding
- Drain nozzle chocked
- Specific gravity of feed material is too high
- Tighten the lock nut
- Replace the bearings
- Tighten the bolts/ replace the entire bolts and nuts.

**2.** UNEVEN DISTRIBUTION OF CAKE:

- Feeding the material, solid to liquid ratio is high.
- filter cloth to be set properly

- Slow down the feeding rpm.
- Change nozzle orientation
- Feeding angle to be changed towards the direction of basket Rotation
- Set cloth properly

**3.** When the machine motor rotating but basket is not running at full speed Physically

- Belt damaged
- Belts loose

- Replace the belts
- Tighten the belts

**4.** Motor not rotating even after start signal

- check incoming power supply
- check drive power supply
- check drive output
- check chooper kit for good condition.

- Switch on the mains
- Switch on the MCB'S inside the panel
- Observe run LED on PLC
- Call drive expert

# BILL OF MATERIAL FOR 36'' CENTRIFUGE

NOTE: ALL DIMENSION ARE IN MM ONLY
DESIGN AND FABRICATION CODE IS-2825-1969
ALL MS PARTS ONE COAT OF REDOXIDE ONLY.
ALL NOZZLES ARE TABLE -150-BS-16.5
MATERIAL OF GAS KET-CAP

## BILL OF MATERIAL

| SNO | DESCRIPTION | SIZE | MATL | QTY | REMARKS |
|---|---|---|---|---|---|
| 1 | MOTOR FLP/1440 RPM | 7.5HP/FLP | CROMOPTON | 1 | |
| 2 | BEARING | NJ-314 | ZKL | 1 | |
| 3 | BEARING | NJ-313 | ZKL | 1 | |
| 4 | BEARING | 51312 | ZKL | 1 | |
| 5 | OIL SEAL | 70X100X10 T | SUNNY | 1 | |
| 6 | OIL SEAL | 58x80x10 T | SUNNY | 1 | |
| 7 | V-BELTS,B-SEC | B – 105 | CLASSIC | 3 | |
| 8 | DRIVEN PULLEY | 260 DIA | C.I | 1 | |
| 9 | PROXMITY SENSOR | STD | - | 2 | |
| 10 | PUSH BUTTON STATION | STD | - | 1 | |
| 11 | JUNCTION BOX (4 WAY) | STD | - | 1 | |
| 12 | VOLUME | 180Ltrs | - | 1 | |
| 13 | CIRCLIP | EXTERNAL 65 | - | 1 | |
| 14 | MAIN PULLEY | Ø400 | C.I | 1 | |
| 15 | RPM OF THE MACHINE | 900 RPM | - | - | |

## NOZZLE SCHEDULE

| | | | | | |
|---|---|---|---|---|---|
| N6 | NITROGEN PURGING | ½"BSP COUPLING | - | 1 | |
| N5 | DISCHARGE PIPE | 80NB | - | 1 | |
| N4 | VENT | 80NB | - | 1 | |
| N3 | SIGHT AND LIGHT GLASS | Ø100MM | - | 2 | |
| N2 | WASH PIPE | 25NB | - | 1 | |
| N1 | FEED NOZZLE | 50NB | - | 1 | |
| MARK | SERVICE | SIZE NB | MTL | QTY | REMARKS |

## GENERAL INFORMATION

Ankar Machines are constructed with the Best prime materials to withstand severe stress and strain of working conditions. To ensure smooth and trouble free running of the machine and safe guard against any manufacturing defects. Inspection at every stage of the manufacture is carried out all machines before dispatch is tested and empty trail runs are taken. The machine is fully assembled and could be commissioned immediately by placing it on the platform as per the foundation required.

Ankar top discharge centrifuges in original design, backed by detailed attention to operational convenience, various metallurgy and safety. These centrifuges address all the problems that normally prevail in top discharge centrifuges. The machine is smooth and trouble free in operation. The machine is constructed to withstand vigorous working conditions. The machines are ideally suited for chemical, pharmaceutical and food industries requiring filtration of various types of slurries.

# SAFETY PRECAUTIONS

Do not attempt to operate a centrifuge until you have received instruction in its specific operation.

- Read the operation manual. If not available contact the manufacturer for a copy. Ask an experienced colleague to demonstrate the procedures.

- Individual users are responsible for the condition of the centrifuge machine and rotors during and at the end of procedures. This responsibility includes proper loading, controlling speed to safe levels, safe stopping, removal of materials, and cleanup

- Ultra centrifuge rotors require special cleaning procedures to prevent scratching of surfaces, which can lead to stress points and possible rotor failure during operation.

- Make sure table top centrifuges are firmly anchored in a location where its vibration will not cause bottles or equipment to fall.

- always close the centrifuge lid during operation and do not leave until full operating speed is attained and the unit is running smoothly.

- Stop the centrifuge immediately and check the load balance if vibration occurs. Check swing-out buckets for clearance and support.

- Maintain a "run log" to keep track of the number of runs on the rotor. Be sure to replace centrifuge parts on the manufacturer's maintenance schedule.

- Clean rotors and buckets with non-corrosive cleaner regularly and allow to fully air dry

- Inspect the shell and mechanical parts for corrosion, pitting or metal fatigue.

- Check the rotor for rough spots, pitting, and discoloration. If noticed, check with the manufacturer before using.

- Check the bearings for proper lubrication

- Check the O-ring for proper attachment and condition.

- Assure vacuum grease is fresh.

- Use only screw capped cups/containers in the centrifuge. Parafilm does not prevent splatter.

**Does your unit have?**

 Balance capability each time the centrifuge is used

 adequate shielding against accidental "flyaway"

 Suction cups or heel brakes to prevent "walking"

 Accessibility of parts, particularly for rotor removal

 Lid equipped with disconnect switch which shuts off rotor if the lid is opened

 Safeguard for handling flammables and pathogens. (This may include negative exhaust ventilation, a safe location or sealed cups.)

 Positive locking of head

 Electrical grounding

 Locations where vibration will not cause bottles or equipment to fall off shelves

Watch for Unbalanced loads

 Keep lid closed during operation and shut down

 Stop the rotor if you observe anything abnormal, such as noise or vibration

Corrosion

 Corrosion on the rotor or bucket can lead to failure.

 Follow the maintenance schedule and if in doubt, the rotor manufacturer will inspect the rotor using a Ultrasound technique. This is normally a free service.

Broken tubes

 when loading the rotor examine tubes for signs of stress and discard tubes that look suspicious.

 be aware of any spillage in the bucket. Clean it immediately.