

PUMP INSTALLATION

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The background of the slide is a light gray gradient. In the top-left and bottom-right corners, there are several realistic water droplets of various sizes, rendered with soft shadows and highlights to give them a three-dimensional appearance. The word "INTRODUCTION" is centered in the middle of the slide in a large, bold, black, sans-serif font.

INTRODUCTION

INTRODUCTION

- FOR CENTRIFUGAL PUMPS, "INSTALLATION" ENCOMPASSES THE ARRANGEMENT OF THE PUMP SET ON SITE, TOGETHER WITH ALL PIPING CONNECTIONS.
- THE TYPE OF INSTALLATION DEPENDS ON THE PUMP TYPE AND FREQUENTLY ON THE APPLICATION:
 - ✓ INSTALLATION ON A FOUNDATION OR WITHOUT FOUNDATION.
 - ✓ WET WELL OR DRY INSTALLATION.
 - ✓ INDOOR OR OUTDOOR INSTALLATION.

INSTALLATION WITH FOUNDATION

- THE FOUNDATION OF A STATIONARY CENTRIFUGAL PUMP MUST BE CAPABLE OF ABSORBING THE FORCES AND TORQUES TRANSMITTED TO IT BY THE PUMP WITHOUT SHIFTING ITS POSITION.
- THE INSTALLATION OF VERTICAL PUMPS AND DRIVES ROUGHLY CORRESPONDS TO THAT OF HORIZONTAL PUMPS. HOWEVER, THERE IS NO NEED TO ALIGN THE COUPLINGS IF THE PUMP AND DRIVE ARE CONNECTED TO EACH OTHER VIA A MOTOR STOOL. IN THESE CASES, THE PUMP SET IS MOUNTED ONTO THE FOUNDATION VIA A FOOT FLANGE. THE MOTOR STOOL DETERMINES THE DRIVE'S EXACT POSITION.

INSTALLATION WITHOUT FOUNDATION

- INSTALLATION WITHOUT A FOUNDATION IS CHOSEN IF THE WEIGHTS OF THE PUMP SETS TO BE INSTALLED AND THE ANTICIPATED LOADS BY THE PIPING ARE LIMITED, IF THE PUMP MUST REMAIN TRANSPORTABLE, OR IF VIBRATION DAMPENING IS TO BE PROVIDED TO ENSURE THAT SOLID-BORNE NOISE IS NOT TRANSMITTED TO THE FLOOR.

WET WELL AND DRY INSTALLATION

- AN INSTALLATION IS TERMED WET WELL IF THE OUTSIDE OF THE PUMP CASING IS IN CONTACT WITH THE FLUID HANDLED.
- IF THE PUMP CASING REMAINS DRY ON THE OUTSIDE, THE PUMP IS SAID TO BE DRY-INSTALLED.

HOW TO INSTALL CENTRIFUGAL PUMPS: GENERAL GUIDELINES

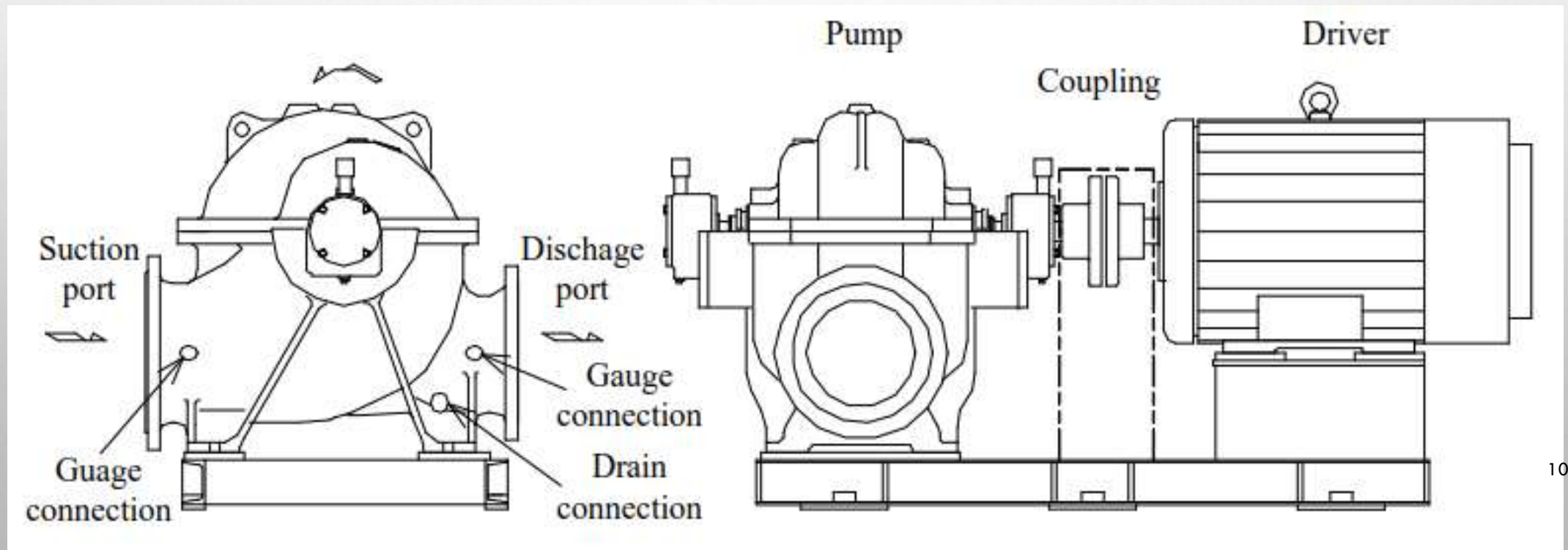
- CHOOSE A PUMP BASED ON THE SPECIFIC INDUSTRIAL APPLICATION REQUIREMENTS.
- TO ENSURE CORRECT OPERATION, ALL THE NECESSARY COMPONENTS MUST BE INSTALLED IN THE PUMP, SUCH AS THE PIPES, USING TEFLON TAPE.
- AN ELBOW WITH A PLUG IS THEN FITTED TO PRIME THE PUMP.
- A CHECK VALVE IS SUBSEQUENTLY INSTALLED IN THE PUMP'S DRIVING SYSTEM TO PREVENT WATER HAMMER.
- A GATE VALVE SHOULD THEN BE INSTALLED AFTER THE CHECK VALVE SO THAT THE GATE CAN BE CLOSED DURING MAINTENANCE.

The page features a light gray gradient background with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

INSTRUCTION MANUAL EXAMPLE (DOUBLE SUCTION VOLUTE PUMP)

CHARACTERISTIC OF THE PUMP

- THIS PUMP IS THE HORIZONTAL DOUBLE SUCTION CENTRIFUGAL VOLUTE PUMP THAT HAS A HORIZONTAL SUCTION PORT AND A HORIZONTAL DISCHARGE PORT, AND IS DRIVEN BY THE DRIVER THROUGH THE COUPLING.



STRUCTURE OF THE PUMP

STRUCTURE OF THE PUMP

- **THE STRUCTURE OF THE PUMP IS DIVIDED INTO THE FOLLOWING SIX PARTS**

:-

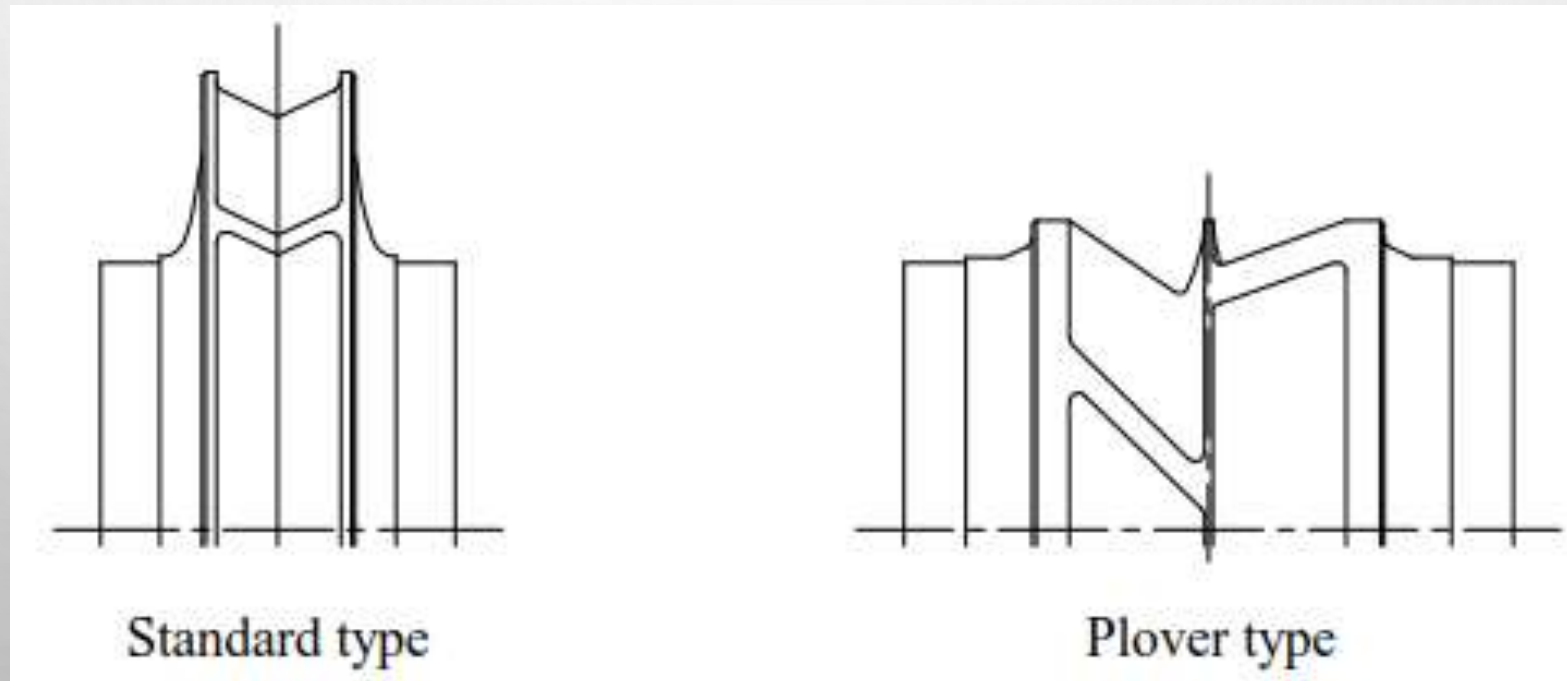
1. CASING
2. IMPELLER
3. SHAFT
4. BEARING PART
5. STUFFING BOX
6. COUPLING

1. PUMP CASING

- PUMP CASING HAS A SUCTION PORT AND A DISCHARGE PORT IN THE HORIZONTAL DIRECTIONS.
- THE LIFTING LIQUID THAT FLOWED INTO A SUCTION PORT IS SPLIT EQUALLY RIGHT AND LEFT, AND PUMP CASING ON THE SUCTION SIDE IS THE FORM THAT THE LIFTING LIQUID IS LED TO IMPELLER DOUBLE ENTRY.
- PUMP CASING ON THE DISCHARGE SIDE IS A VOLUTE TYPE.

2. IMPELLER

- IMPELLER IS A DOUBLE ENTRY TYPE, THE AXIAL THRUST BALANCES THEORETICALLY. THERE IS A PLOVER TYPE IMPELLER WHICH ONLY HALF PITCH MOVED THE BLADE AS A SPECIAL TYPE.



3. SHAFT

- SHAFT TRANSMITS THE OUTPUT OF THE DRIVER THROUGH THE COUPLING TO THE IMPELLER.
- THE STRUCTURE OF THE ROTOR HAS HIGH RIGIDITY, BECAUSE BOTH ENDS OF THE SHAFT ARE SUPPORTED BY THE BALL BEARINGS.

4. BEARINGS

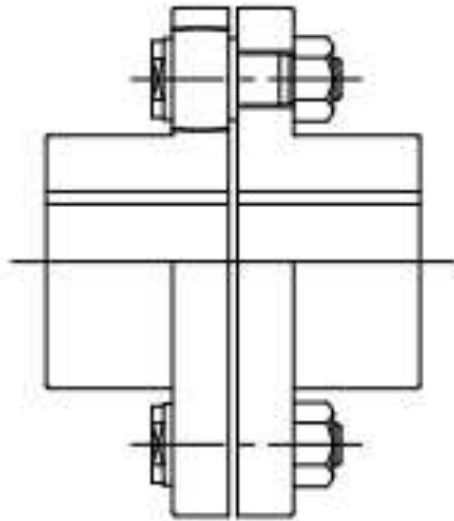
- BALL BEARINGS SUPPORT THE SHAFT ON BOTH ENDS.
- BALL BEARING DEEP GROOVE TYPE IS USED IN THE COUPLING SIDE, THE NON-DRIVE END AS WELL.
- BALL BEARING IS LUBRICATED BY THE OIL.

5. STUFFING BOX

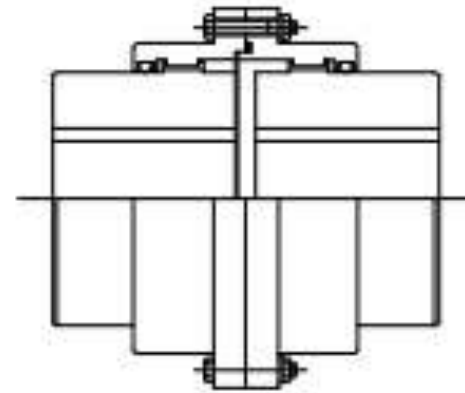
- STUFFING BOX IS SET UP ON THE PART WHERE THE SHAFT GOES THROUGH THE PUMP CASING TO KEEP THE LIFTING LIQUID TIGHT INSIDE THE PUMP.

6. COUPLING

- THE FLEXIBLE COUPLING OR THE GEAR COUPLING ARE USED MAINLY FOR THE COUPLING THAT TRANSMIT THE OUTPUT OF THE DRIVER TO THE PUMP SHAFT.



Flexible coupling



Gear coupling

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INSTALLATION OF THE PUMP IN THE SYSTEM

POSITION OF THE PUMP

- BE CAREFUL OF THE FOLLOWING ITEMS TO SELECT THE INSTALLATION POSITION OF THE PUMP :-
- INSTALL THE PUMP AS MUCH AS POSSIBLE NEAR THE SUCTION SOURCE, AND SHORTEN THE SUCTION PIPE AS MUCH AS POSSIBLE.
- DON'T INSTALL IT IN THE HIGHER POSITION THAN THE SURFACE OF WATER OF THE SUCTION SOURCE BEYOND THE NECESSITY.
- SECURE THE HEIGHT AND THE BREADTH THAT THE DISASSEMBLY AND THE ASSEMBLY OF THE PUMP CAN BE DONE ENOUGH.
- THE PLACE WHERE IT DRIED AS MUCH AS POSSIBLE IS SUITABLE IN THE INSTALLATION POSITION OF THE PUMP.

PIPE ARRANGEMENT

- BE CAREFUL OF THE FOLLOWING ITEMS WHEN PUTTING THE PIPE ARRANGEMENT :-
- INSTALL THE SUCTION PIPE INLET IN THE DEPTH OF MORE THAN 1.5 TIMES OF THE PIPE DIAMETER D FROM THE WATER SURFACE.
- WHEN INSTALLING TWO AND MORE PUMP IN THE SAME SUCTION SUMP, TAKE THE PITCH BETWEEN THE SUCTION PIPE MORE THAN THREE TIMES OF D

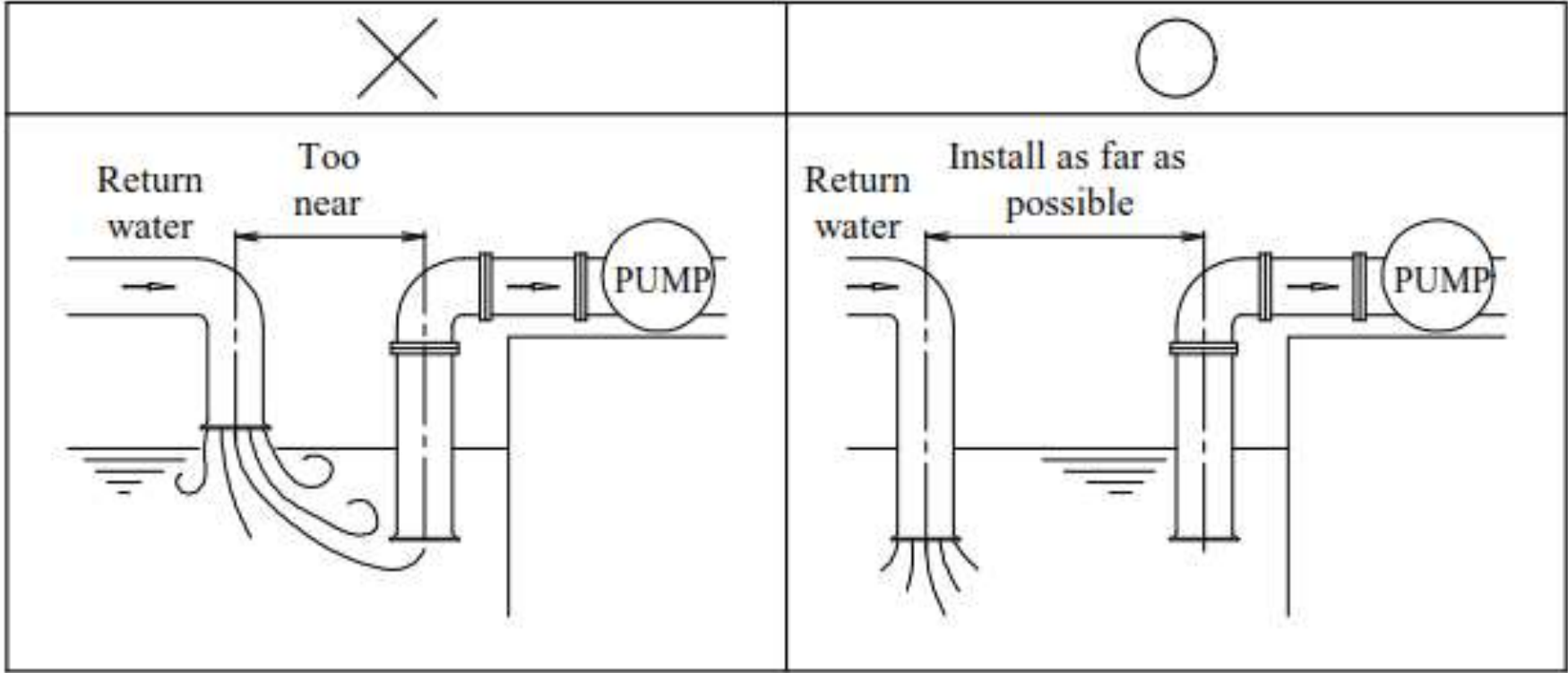
PIPE ARRANGEMENT

- WHEN THE WATER FROM THE PLANT IS RETURNED TO THE SUCTION SUMP, IF THE WATER IS DROPPED FROM THE TOP OF THE WATER SURFACE, THE AIR INVOLVED IN THE WATER SOMETIMES CAUSES INSTABILITY OPERATION AND THE VIBRATION OF THE PUMP, AND BREAK OF THE SHAFT.
- THEREFORE, BE SURE TO LET THE HEAD OF THE PIPE FOR THE RETURN WATER SET UNDER THE WATER. AND, INSTALL THE HEAD OF THE PIPE FOR THE RETURN WATER IN AS FAR A POSITION AS POSSIBLE FROM THE PUMP SUCTION PIPE.

PIPE ARRANGEMENT

- SET UP THE STRAINER FOR AVOIDING A DUST AND SO ON IN THE SUCTION PIPE SIDE
- THE SUCTION PIPE IS TO BE AS SHORT AS POSSIBLE, AND REDUCE THE BEND SECTION.
- CONNECT THE VALVE AS MUCH AS POSSIBLE NEAR THE PUMP DISCHARGE PORT WHEN SETTING UP THE VALVE IN THE DISCHARGE SIDE. AND WHEN SETTING UP THE CHECK VALVE, CONNECT IT BETWEEN THE PUMP DISCHARGE PORT AND THE VALVE OF DISCHARGE SIDE.

PIPE ARRANGEMENT



THE TOOLS FOR THE INSTALLATION

- HAMMER
- LEAD HAMMER
- BAR
- STRAIGHT EDGE
- DIAL GAUGE
- CLEARANCE GAUGE
- SCREW DRIVER
- TAPE MEASURE

INSTALLATION OF THE PUMP UNIT

- ALIGNING AND FIXATION OF THE PUMP UNIT
- TEMPORARY INSTALLATION OF THE PUMP UNIT AND TEMPORARY ALIGNING
- TEMPORARY ALIGNING OF THE COUPLING
- THE FIXATION OF THE FOUNDATION BOLTS
- REGULAR INSTALLATION OF THE PUMP AND REGULAR ALIGNING

CONNECTION OF THE PIPE

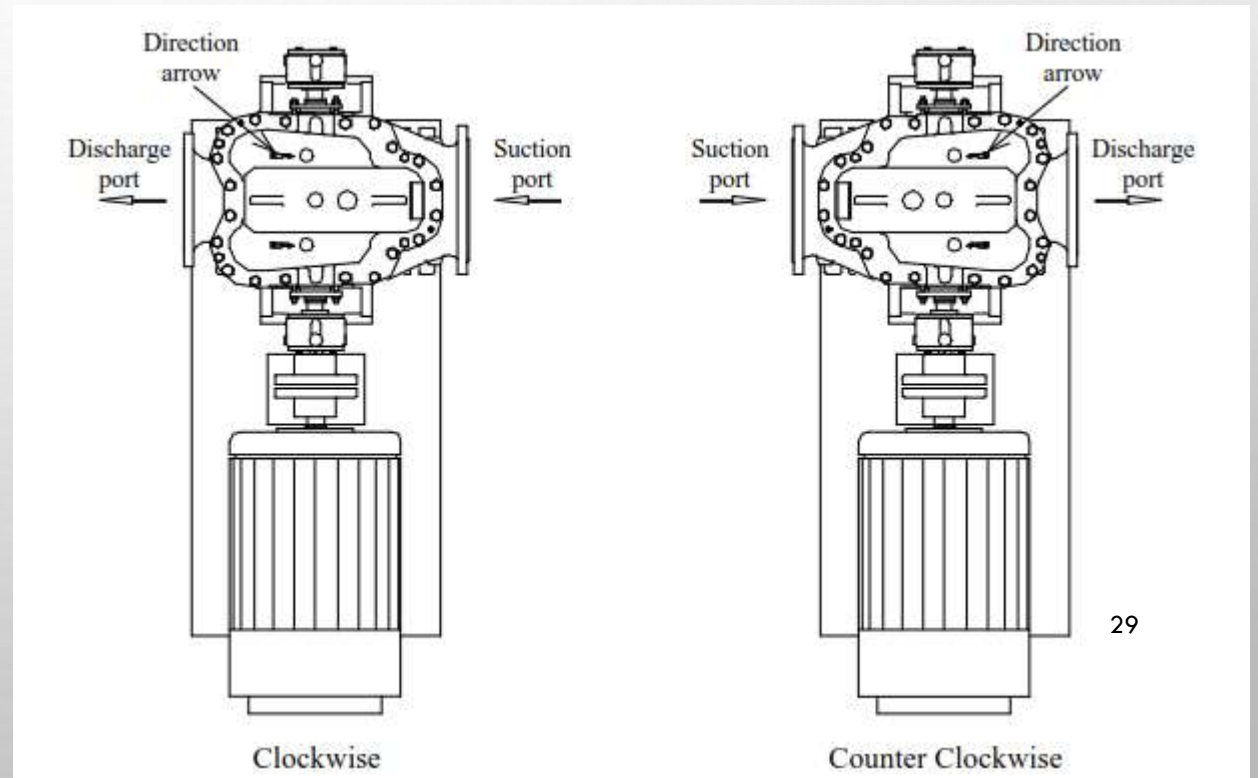
- AFTER THE PUMP UNIT FIXED THE POSITION, CONNECT THE SUCTION PIPE AND THE DISCHARGE PIPE (AND VALVE) WITH BEING CAREFUL OF THE FOLLOWING ITEMS :-
 1. BE CAREFUL OF THE WAY OF THE SUPPORT OF THE PIPE AND THE VALVE SO THAT THE LOAD OF THEM MAY NOT ACT ON THE PUMP AT THE TIME OF THE CONNECTION.
 2. CONFIRM THAT THE PUMP ISN'T CAUSING THE DISTORTION BY THE LOAD OF THE PIPE.
 3. CONFIRM THAT THE SHAFT OF THE PUMP TURNS AROUND SMOOTHLY BY HAND

PARALLELISM OF THE COUPLING

- PUT THE TAPER GAUGE OR THE CLEARANCE GAUGE ON FOUR POINTS OF THE CIRCUMFERENCE OF THE COUPLING, AND MEASURE THE END-TO-END OF THE COUPLING SURFACE DIMENSION “A” AT EACH POINT.
- THE PARALLELISM IS FOUND WITH $A_{MAX}-A_{MIN}$. THE ALLOWABLE VALUE OF THE PARALLELISM IS 0.10MM (WITH DIAL GAUGE) IN THE CASE THAT THE FLEXIBLE COUPLING ARE USED.

PRECAUTION BEFORE OPERATING THE PUMP

- CONFIRM THE DIRECTION OF THE ROTATION BY STARTING THE DRIVER AFTER REMOVING THE COUPLING BOLTS. THE PUMP IS RIGHT ROTATION FROM THE DRIVER (CW) IF THERE IS A SUCTION PORT IN THE RIGHT FROM THE DRIVER, BUT IF THERE IS OPPOSITE SIDE, THE PUMP IS LEFT ROTATION FROM THE DRIVER (CCW)



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START UP AND SHUT DOWN OF THE PUMP SYSTEM

START UP THE PUMP IN ACCORDANCE WITH THE FOLLOWING ORDER

1. OPEN THE VALVE OF SUCTION SIDE FULLY, AND CLOSE THE VALVE OF DISCHARGE SIDE FULLY.
2. PRIME THE LIFTING LIQUID IN THE SUCTION PIPE AND THE INSIDE OF THE PUMP FULLY. IF THE PUMP AIR VENT VALVE IS INSTALLED, OPEN THE VALVE GRADUALLY AND CLOSE THE VALVE AFTER THE PUMP IS FILLED WITH LIQUID.
3. CONFIRM THAT NO PERSON IS NEAR THE PUMP.
4. CONFIRM THAT THE ROTOR OF THE PUMP TURNS SMOOTHLY BY MAKING IT TO START AND STOP MOMENTARILY.
5. CONFIRM THERE IS NO ABNORMALITY, STARTS UP THE PUMP AGAIN AND OPENS THE VALVE OF DISCHARGE SIDE GRADUALLY UNTIL THE DISCHARGE OF THE PUMP BECOME ³¹ THE RATED DISCHARGE.

SHUT DOWN THE PUMP IN ACCORDANCE WITH THE FOLLOWING ORDER

1. CLOSE THE VALVE OF DISCHARGE SIDE FULLY.
2. TURN OFF THE SWITCH OF THE DRIVER. AT THIS TIME, CONFIRM THAT THE ROTATION SPEED IS TO GO DOWN SMOOTHLY AND THE PUMP STOPS QUIETLY.
3. DISCHARGE ALL THE LIFTING LIQUID INSIDE THE PUMP WHEN THERE IS A FEAR OF FREEZING.

REFERENCES

- INOXMIM.COM
- KSB.COM
- TORISHIMA PUMP MFG
- A. T. SAYERS - HYDRAULIC AND COMPRESSIBLE FLOW TURBOMACHINES-
MCGRAW-HILL BOOK CO LTD (1990)

THANK YOU

ANY
Questions?