

CASE STUDY REF: 014

MODULATING DUTY SLUICE GATE WITH HYDRAULIC ACTUATION AND FAIL-SAFE ARRANGEMENT AT 232 MLD VALLABHNAGAR PS, MCGM, MUMBAI



Location:

Vallabh Nagar Pumping Station, 120 Foot Link Road, I.C. Colony, Borivali (W), Mumbai - 400 103, MH, India.

About the project:

Municipal Corporation of Greater Mumbai has been implementing integrated Water Supply and Sewerage Projects since 1974 with the assistance of the World Bank. MCGM has successfully completed the project 'MSDP-I' which included works such as laying of new sewers lines, improvement of pumping stations, new pumping stations, treatment plants & three marine outfalls. The need of Stage-II Master Plan for Sewerage was anticipated to further improve environment in and around Mumbai and to cater to the needs of ever-growing population.

The waste water collection and treatment facilities for the city are grouped in 7 service zones. Upgradation of all these treatment plants, Priority Sewer Tunnel and Conveyance system of treated sewage has been taken under MSDP Stage II Priority Work. The Malad service zone i.e. zone 5 is one of the major service zones in the Western suburb of Mumbai covering 5 administrative wards. The zone covers an area of 5483 Hectare and serves a population of 3.5 Million (2011). The population is projected to increase upto 5.6 Million by 2031. Vallabhnagar Pumping Station is one of the very important pump station to feed the comprehensive Waste Water Treatment Facility (WwTF) at Malad zone.

Role of Hydraulically actuated Sluice Gate in Vallabhnagar Pumping Station:

Rains during monsoon in Mumbai can be as high as 400 mm (15") in a day. This results into severe flooding and sometimes may require shutdown of entire pumping station immediately. In this situation main inlet gate becomes extremely important and if this main inlet gate fails to close then this may cause failure of entire pumping station. To avoid such situation, a Hydraulic cylinder operated Sluice Gate is installed at entry of main inlet chamber to isolate the complete pumping station.

Hydraulic actuator (Cylinder) is used to control the inlet Sluice Gate so that it can modulate the inflows to the maximum safe capacity of the Pumps. This modulating control is accomplished by level controls located between the pump start level and high-level alarm.

Project Details	
Project	232 MLD Vallabhnagar Pumping Station, Mumbai Sewage Disposal Project – Stage II
Customer	Municipal Corporation of Greater Mumbai
EPC Contractor	K. Rajesh & Company, Mumbai
Consultant	FP Project Management, Mumbai

Facts sheet	
Nos. of Gates	1
Gate Size	1800 mm dia.
Design Standard	IS 13349-1992
Design head	10 meters (Class-2 type)
Material of construction	Cast Iron
Cylinder Size	Dia. 160 mm x 1800 mm Stroke
Hoist Capacity / Load	17.5 tons in Push & Pull
Cylinder Working Pressure	150 Bar
Cylinder Test Pressure	250 Bar
Cylinder Speed Open / close	250 mm per minute ~
Manual override facility	Yes, provided
Continuous monitoring system (Pressure / Position)	Yes, provided
Modulating Duty	Yes, provided
Fail Safe	Yes, provided



Under testing at plant



Actual Site photograph

Salient features of Hydraulic Sluice Gate:

To satisfy challenge of modulating control of inflows for the Pump sets, Jash Engineering Ltd has designed, manufactured and supplied Hydraulically actuated Cast Iron Sluice Gate having following special features:

- Modulating / regulating duty at 13-meter depth.
- Skid mounted Hydraulic power pack with manual override facility. The Skid is comprised of an integral bund sufficient to contain oil leakage of up to 110% of the maximum reservoir volume.
- Fail safe closure operation in case of pipe line rupture / damage or loss of electricity.
- Opening / closing during power failure with the help of Accumulators.
- Continuous position monitoring system from 0% to 100% by using inbuilt positioning sensor.
- End of travel via proximity switches in cylinder cap.
- Continuous pressure drop monitoring system by using Pressure Transmitters and electric control panel (ST 30 PLC CPU model in circuit).
- Anti-creep feedback system to regain desired position.
- Accumulator pressure monitoring system to give signal to power pack to re-energize the Accumulator.
- Manual locking by the use of hydraulically actuated Valves to allow the hydraulic system pressure to be reduced whilst the gate is not required to be operated and to prevent inadvertent gate closure in the event of the hydraulic system failing to maintain pressure due power failure or hydraulic line rupture.
- Provision for transferring all the operating data like position of piston rod, pressure in accumulator etc to main (Master) PLC for data / fault analysis.
- Hydraulic cylinder having paint system with 25 years life.

This sluice gate is over-weighted to close on its own against the applicable unseating water head of 10 meters. This gate was installed in 2018 and is working smoothly since then.

Besides this gate 07 nos. electrically actuated 1500 x 1800 mm Sluice Gates, 04 nos. 700 mm dia & 04 nos. 800 mm dia electrically actuated Knife Gate Valves and 02 nos. 17 meters long "MM2MM" multi rake screens of JASH make are also operational at this project.

JASH ENGINEERING LTD,

31, Sector-C, Industrial Area, Sanwer Road, Indore-452015 (MP), India
 Phone : +91 (731) 2720143, 2721143,
 Email : info@jashindia.com,
 Website : www.jashindia.com

SUBSIDIARIES:

Rodney Hunt INC, USA.
 Mahr Maschinenbau Ges.m.b.H, AUSTRIA
 Engineering & Manufacturing Jash Ltd, HONG KONG
 Shivpad Engineers Pvt Ltd, INDIA