

OBSERVATION OF WATER FLOW IN THE BALL VALVE BEFORE AND AFTER REPAIRS USING LAPPING MACHINES

David Tua Armando, Kusdi Prijono

Universitas Pamulang

Email: Davidtuaarmado25@gmail.com, dosen00656@unpam.ac.id

Abstract

In industrial piping systems, particularly in the oil and gas, petrochemical, and power generation sectors, ball valves are one of the most important components in controlling fluid flow. Defects on the contact surfaces pose risks of leakage, pressure drop, and flow disruption. These issues not only reduce system efficiency but also increase the potential for further damage. One of the commonly used repair methods is lapping, which is the process of smoothing the surfaces of the ball and seat to improve contact compatibility. The effectiveness of lapping is typically tested through a hydro test, where pressure stability over time serves as the primary indicator of post-repair flow performance. The primary objective of this study is to identify changes in pressure patterns and analyze trends in pressure stability in ball valves before and after repair using a lapping machine, evaluated through a hydro test. The research method is a quantitative experiment. Data collection is based on pressure-versus-time graphs from the hydro test on each ball valve in two conditions: before and after lapping. The results of the study show that before lapping, all ball valves experienced significant pressure fluctuations and were unable to maintain test pressure, indicating leakage. However, after the lapping process, the ball valves consistently showed a drastic improvement in performance, with stable pressure graphs and the ability to maintain maximum pressure ($\pm 900 - 920$ psi) during the holding phase. These findings significantly contribute to the understanding that lapping is a highly effective repair method for restoring the sealing integrity of ball valves. The lapping process successfully restores the ball valve's ability to withstand pressure optimally, thereby improving water flow stability. Implicitly, this method can serve as an efficient practical solution for ball valve maintenance in industry.

Keywords: Ball Valve, Lapping, Hydro Test, Pressure Stability.

Introduction

In industrial piping systems, especially in high-pressure sectors such as oil and gas and energy, ball valves are essential components for flow control¹. The performance of these valves is highly dependent on the quality of the sealing between the ball and the seat². However, micro-damage or surface wear over time often leads to a decrease in seal quality, leading to leakage and pressure drop when hydrostatic tests are performed³. This problem not only reduces operational efficiency but also increases the risk of system failure. Standard repair methods, such as lapping, aim to smooth the contact surface and

¹ Schmitz, F. J. F. K., & Persson, A. T. B. N. J. (2020). Fluid Leakage in Metallic Seals. *Tribology Letters*, 68(4), 1–11. <https://doi.org/10.1007/s11249-020-01358-x>

² Peng, D., Dong, S., Wang, Z., Wang, D., Chen, Y., & Zhang, L. (2021). Characterization of the solid particle erosion of the sealing surface materials of a ball valve. *Metals*, 11(2), 1–19. <https://doi.org/10.3390/met11020263>

³ Rahmi, M., & Canra, D. (2018). Analysis of Fluid Pressure Differences in Full Closed and Full Open Condition Ball Valves with Abstract Computational Fluid Dynamics. *Sec. 4*, 7–11.