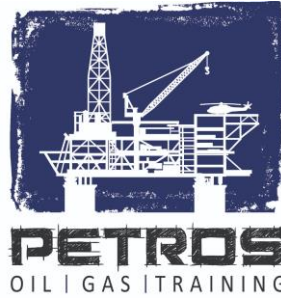


Certificate No : 2023-PTR-PUMP-009-02

Date : July 7th , 2023



CERTIFICATE OF ACCOMPLISHMENT

This is to certify that

WELDI VERDIANSYAH
ID NUMBER : PTR-PUMP-009-02

has completed

***PUMP SELECTION, APPLICATION, OPERATION,
MAINTENANCE & TROUBLE SHOOTING
TRAINING***

Trainer : Ir. Emil Mahfuzi, IPM, Asean Engineer – Senior Mechanical Engineer

Held by **Petros Oil Gas Training** – Jakarta

July 1st & 2nd , 2023 , covering the subjects as listed on the back page



Validation Check

A handwritten signature in black ink, appearing to read "Heru Prasadja", written in a cursive style.

Heru Prasadja, ST
Director

PUMP SELECTION, APPLICATION, OPERATION & TROUBLE SHOOTING TRAINING

SUBJECTS :

PUMPS BASIC/ FUNDAMENTAL

- Types of pump and how it works system curves
- Centrifugal pumps performance characteristic
- Implications of running off the Best Efficiency Point
- Affinity laws
- Specific speed and suction specific speed.
- NPSH and cavitation

CENTRIFUGAL PUMP CONSTRUCTION

- Impellers, casings, shafts, etc.
- Mechanical seals
- Couplings
- Bearings
- Baseplates

PUMPS SELECTION AND APPLICATION

- Pumps standards (API, ANSI/ ASME, ISO, HI, NFPA)
- The different between API 610 vs ANSI/ ASME pump
- Pump Classification & designation according to API 610 11th Ed. and Hydraulic Institute
- Material selection
- Typical application of centrifugal pumps
- Pump selection

PUMPS OPERATION

- Pump operation
- Parallel operation
- Series operation
- Controlling pump capacity

PUMP MAINTENANCE

- Preventive maintenance
- Bearing lubrication
- Pump inspections to improve mechanical seal life
- Overhaul

PUMP TROUBLESHOOTING

- Faults, causes, remedies

PUMP SAFETY TIPS