FEB-MAR 2019

Final Report
Project code: 2018PMWH

Compressed Instrumental Air Leak Survey Report Of Leading Refinery

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Acknowledgements

We are thankful to the management for giving us the opportunity to be involved in this very interesting and challenging project. We would be happy to provide any further clarifications, if required, to facilitate implementation of the recommendations.

We received full co-operation and support from the concerned personnel from all the departments. We would like to particularly thank:

Mr.
Mr.
Mr.

and all other supporting staff who have given full co-operation and support. They took keen interest and gave valuable inputs during study.

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AIR LEAK LOCATION
FREE AIR DELIVERY TEST METHOD
TLV-MOISTURE DRAIN TRAP SPEC.SHEET

1. Executive Summary

1.0 This section presents a brief summary of results of the compressed air leak audit in instrument air network and air compressor performance carried out at Refinery in Feb-Mar 2019.

2.0 A team of two specialist consultants were involved in the compressed (instrument air) air system audit and leak survey. The audit was mainly targeted at identifying all the Big, Medium and Small leaks in the instrument air system network. The audit involved using a wide range of sophisticated, portable, diagnostic and measuring instruments to generate refined data and facilitate in complex analysis to give a more reliable basis for identification of leaks, evaluation of performance, energy saving measures and economic viability.

3.0 The identified annual electrical energy saving potential is **15.35 lakh kWh.** The total annual energy cost saving potential is **Rs.84.44 lakhs.**

The salient points of compressed air leak survey are given below;

- Total no of Air leaks detected during sample survey -**435 no's.**
- Total air loss due to leaks i.e. **1411.15 Nm³/Hr.** The classification of leaks is given below;

Type of Leak	Air Leaks Identified During Feb-2019 - Survey		Annual Energy Lost	Annual Monetary Lost
	No. of Leaks	Loss in Nm³/Hr.	kwh in Lakh	INR in Lakh
Big Leaks	43	887.95	9.66	53.13
Medium Leaks	40	206.40	2.24	12.35
Small Leaks	352	316.80	3.44	18.95
Total	435	1411.15	15.35	84.44
Quantification and Monetary loss calculation's				Refer.10.2

4.0 The leak audit survey was carried out only for instrument airline network. The total identified instrumentation air leakage is **1411.5 Nm3/hr,** which is **15.5** % of the total instrument air consumption of **9061.29 Nm3/Hr**

5.0 Maximum quantity of leaks observed in - **RODM, DHDT, FCCU, CPP, PP & DCU.** The maximum numbers of leaks were found from valve joints, hose connectors joints, thread joint, air regulators body, & diaphragm rapture drain hole leakages.

❖ **The details of location wise identified compressed air leakage points with tag numbers, colour codes are given in Annexure**

6.0 Production and consumption of Compressed Air for different network is given in below table;

Description	Production (Nm3/Hr)	Consumption (Nm3/Hr)	Working Pressure (kg/cm2)
Total Compressed air	**32,539.51**	**-**	7.4
Instrumental Air		**9061.29**	**6.6**
Plant Air		7,360	6.7
Nitrogen	7,500	7,374	6.4

- Hence the total compressed air generation is observed to be 32539.51 Nm3/hr during normal operation of the refinery. Out of the total compressed air generated, 16118.22 Nm3/Hr is used for Nitrogen Generation, **9061.29 Nm3/Hr** is used for instrumentation air & 7360 Nm3/Hr is used for Plant air.

7.0 The performance characteristics of running compressors for generating the compressed air for different application is given in the following table

AREA			**NITROGEN PLANT**			
Compressor Tag. No.			**585-K-001A**	**585-K-001B**	**585-K-001D**	**585-K-001F**
Operation Status			**Running**	**Running**	**Running**	**Running**
Power Readings *(kW)*	***Rated***		1250	1250	1250	1250
	Actual		1051.21	1171.93	1005.59	1212.16
	% Load		84	93	80	96
FAD Readings (Nm3/Hr)	***Rated***		8963	8963	8963	8963
	Actual		8131.76	8809.41	8031.18	7567.06
	% delivery		90	98	89	84
Operating Pressure (kg/cm^2)	***Rated***		8.3	8.3	8.3	8.3
	Actual	***Min***	5.80	5.91	5.94	5.90
		Working	7.25	7.42	7.41	7.45
		Max.	8.70	8.87	8.90	8.84
Specific Energy Consumption (kW/Nm3/Hr)	***Design***		0.139	0.139	0.139	0.139
	Actual		0.129	0.133	0.125	**0.160**
Recommendation	**-**		-	-	-	**Refer 8.3**

- Hence above the performance characteristics table, the plant operates four air compressors for catering the requirement of plant during the survey. The actual specific energy consumption of air compressor-**585-K-001 A, B & D** are found to be lower than the design specific energy consumption, but the air compressor **585-K-001F** actual specific energy consumption is found to be 0.160 kw/Nm3/hr. which is 0.02kw/Nm3/hr. higher than the design specific energy consumption, check the inlet air filter for any dust accumulation maintaining clean filter area may reduce the specific energy consumption thus improving free air delivery(FAD).
- Clean air-inlet filters regularly. Compressor efficiency will be reduced by 2 percent for every 250 mm WC pressure drop across the filter.
- Install TLV free float moisture separator traps at air receiver tanks, intercoolers and aftercoolers for efficient removal of moisture explained in **Annexure.**

2. Introduction

2.1 Refinery Introduction

2.2 Permaweld

Permaweld Pvt Ltd has over its past 28 years of its existence has conceptualized ease in maintainability by periodic Health Monitoring of Plant Machinery and predictive maintenance requirements, pre-empting unscheduled shut-downs and thus loss of productivity besides, avoiding un-necessary repairs.

Permaweld Pvt Ltd is Authorized Distributors for products and services of CTRL SYS INC – U.S.A in India.

Customized Services Offers from PERMAWELD

- **Leak Audits:** using CTRL UL-101 Tool -Compressed Air, Vacuum, Nitrogen, LPG and all Gaseous Leaks.
- **Condition Monitoring Services:** Using Vibration Analyser for all Rotary Equipment's.
- **Thermography Services:** Using Thermal Imager –Insulation Survey &Electrical Applications – Hot Spots Survey
- **Steam Trap & Steam Leak Audit:** Using Trap Man of TLV Japan.

Permaweld Pvt Ltd is an ideal 'Single Point Vendor" for all your maintenance solutions. Based on our 28 years of Vertical Focus on Maintenance, we are well qualified to take up Any Specific or Customized Contracts as required by your Plant.

2.3 Survey Details

In recognition of its green initiatives, Refinery has implemented compressed air leak survey from **M/s PERMAWELD PVT LTD** through wide work order **No-123456789 dated 28.01.2019.**

Thanking this opportunity to **Refinery**, we deputed the well qualified two engineer's team for the assignment includes Compressed air leak survey starting from **18.02.2019 to 05.03.2019** completed the detailed survey with help of CTRL UL-101 Ultrasound diagnostic device.

The compressed air system energy audit and leakage survey was taken up during Feb-Mar 2019 to evaluate the actual performance of the existing air compressors and to detect the leaks in the compressed air network. During the audit, every attempt was made to understand the operational features and the actual working in the right perspective. All analysis has been based on actual data collected and based on the on-site measurements / observations made using portable diagnostic instruments.

Based on the measurement, analysis, observations and leak detection, the energy saving opportunities has been identified for the plant. The recommendations have been discussed with the plant team during the study to ensure that the suggestions made are realistic, practical and implementable.