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PERFORMANCE TEST RESULTS FOR NEW FANS INSTALLED ON MARLEY AND EVAPCO COOLING TOWERS AT SILTRONIC SILICON WAFER PTE LTD

By

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1.0 INTRODUCTION

The conventional MARLEY and EVAPCO cooling tower fans in Siltronic Silicon Wafer Pte Ltd were replaced with energy efficient H'FLO fans with optimized blade profiles as part of an energy efficiency improvement project.

Measurements were carried out before and after the fans were replaced to verify the performance of the new fans and this report summarises the measured data and findings.

2.0 MARLEY, EVAPCO AND H'FLO FAN PERFORMANCE TESTS

2.1 Specification of fans

The specification of the original MARLEY and new H'FLO fans are given below.

Parameter / Manufacturer	MARLEY	H'FLO
Material	Aluminium	Fibre-reinforced plastic (FRP)
Fan diameter (mm)	3050	3050
Hub diameter (mm)	500	750
Traverse area (m^2)	7.75	7.11
Ring / Stack diameter (m)	3100	3100
Blade angle (^{o})	NA	12
Rated motor power (kW)	30	30

Similarly, the specification of the original EVAPCO and new H'FLO fans are given below.

Parameter / Manufacturer	**EVAPCO**	**H'FLO**
Material	Aluminium	Fibre-reinforced plastic (FRP)
Fan diameter (mm)	4000	4000
Hub diameter (mm)	900	1050
Traverse area (m^2)	12.25	12.02
Ring / Stack diameter (m)	4050	4050
Blade angle (^{o})	NA	8
Rated motor power (kW)	22	22

2.2 Pre and post-performance data

The performance, in terms of airflow and vibration, of the conventional MARLEY and EVAPCO cooling tower fans prior to removal and the new H'FLO fans after installation were measured for each cooling tower and the results are tabulated below.

2.2.1 Airflow

Cooling tower	Airflow (m^3/sec) using MARLEY fan blades (pre-measurement)	Airflow (m^3/sec) using H'FLO fan blades (post-measurement)	Increase in airflow (%)
AV 109	63.03	81.86	29
AV 110	65.67	80.40	22
AV111	62.51	80.97	29
AV112	62.07	80.12	29
AV113	63.06	81.51	29
AV114	63.84	81.59	27
AV115	65.53	82.61	26
AV116	63.65	80.69	26

On average, an increase in airflow of 27% is observed for the cooling towers after the original Marley fan blades were replaced with H'Flo fan blades.

Cooling tower	Airflow (m^3/sec) using EVAPCO fan blades (pre-measurement)	Airflow (m^3/sec) using H'FLO fan blades (post-measurement)	Increase in airflow (%)
AV 117	69.02	79.43	15
AV 118	67.89	77.63	14
AV119	65.76	75.77	15
AV120	61.02	76.92	26

On average, an increase in airflow of 17.5% is observed for the cooling towers after the original Evapco fan blades were replaced with H'Flo fan blades.

2.2.2 Vibration

Cooling tower	Vibration (mm/s) using MARLEY fan blades (pre-measurement) X|Y axis	Vibration (mm/s) using H'FLO fan blades (post-measurement) X|Y axis	Reduction in vibration (%)
AV 109	2|4	1.3|2.6	35
AV 110	2.5|6.6	1.9|3.7	43
AV111	2.5|6.6	1.9|3.7	43
AV112	1.4|4.2	1.2|2.6	38
AV113	2.2|4.3	1.9|2.6	39
AV114	2.2|4.3	1.9|2.6	39
AV115	1.6|4.1	1.3|2.6	37
AV116	1.6|4.1	1.3|2.7	34

On average, a reduction in vibration of approximately 38% is observed for the cooling towers after the Marley fan blades were replaced with H'Flo fan blades.

Cooling tower	Vibration (mm/s) using EVAPCO fan blades (pre-measurement) X|Y axis	Vibration (mm/s) using H'FLO fan blades (post-measurement) X|Y axis	Reduction in vibration (%)
AV 117	5.5|9.5	2.5|4.9	45
AV 118	5.6|9.8	2.4|5.5	42
AV119	6.1|9.9	3.1|5.1	50
AV120	6.3|9.4	3.6|5.5	57

On average, a reduction in vibration of approximately 48.5% is observed for the cooling towers after the Evapco fan blades were replaced with H'Flo fan blades.

3.0 CONCLUSION

Based on the data presented above, it is clear that there is both an increase in airflow and decrease in vibration after the original MARLEY and EVAPCO cooling tower fan blades were replaced with H'FLO fan blades. Therefore, it can be concluded that the H'FLO fan blades have met the project objectives.