MAYEKAWA

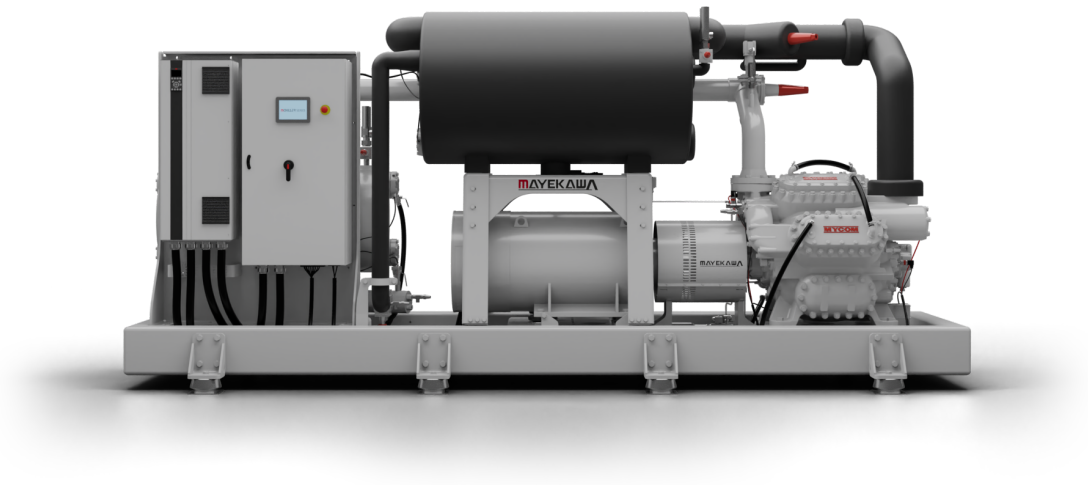
mCHILLER FUGU

FAT REPORT

Date of documentation: January 18, 2024

Serial Number :	MR FU RS 0000163	Project Name :	STOCK
FUGU Model :	960R	Motor :	250 kW
Customer Name :	-	Date of Test :	2024-01-18
Refrigerant :	R717 - Ammonia	Refrigerant charge :	80 kg

This report is in compliance with ISO 916:2020. The FAT protocol document defines the parameters used in this report and the exact guidelines followed by the testing facility.



Test Supervisor Signature

Date

河豚

The Test Conditions :

The Unit is tested under the temperatures shown in figure 1. The data-logging occurs twice every second and the values shown here are averaged over a period of 20 seconds. The FAT is conducted at Mayekawa Serbia. The data shown is with reference to UTC time and the running conditions are shown in the table below.

Running Capacity	100 %
Running Speed	1500
Test Condition	NTC1
Test Duration	2024-01-18 11:00:00 to 2024-01-18 12:00:00
Oil Type	Kluber Summit RHT68
Secondary Media	Ethylene Glycol 30%
Flow rate - Hot side	210.97 m^3/h
Flow rate - Cold side	184.06 m^3/h
No. of connections	2 connections on each HX

The expected and achieved values are shown in the table below .

	Target Value	Test value
Condenser Inlet Temperature - T_{ci} [°C]	30.0	30.06
Condenser Outlet Temperature - T_{co} [°C]	35.0	35.1
Evaporator Inlet Temperature - T_{ei} [°C]	12.0	12.06
Evaporator Outlet Temperature - T_{eo} [°C]	7.0	6.66
Cooling Capacity - Qc [kW]	992.6	1063.02

Figure 1 shows the temperature values measured from the unit during the test.

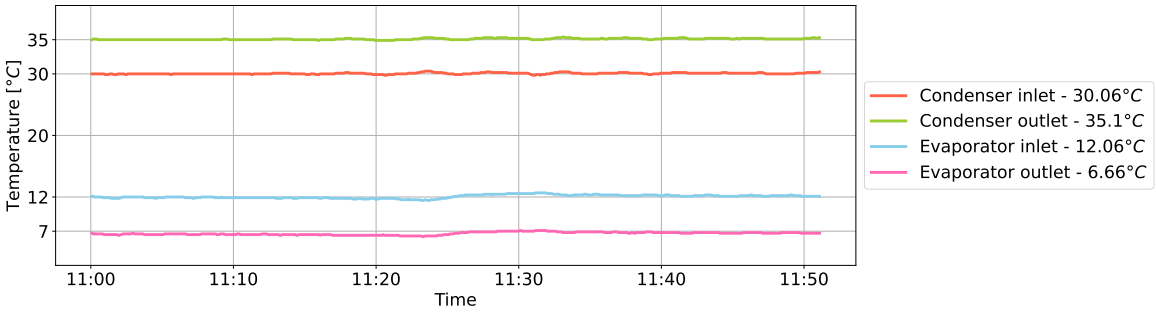


Figure 1: Plot of Condenser and Evaporator Temperatures

The accepted tolerance (%) is based on ISO 916:2020 and EN 12900:2013. The fine values are values within 50% of the standard acceptance tolerance. The color coding of the present tolerance is given by :

- green - fine
- yellow - acceptable
- red - unacceptable

Under the test conditions, the following results are obtained while running the unit with 30% Ethylene Glycol on the secondary side. :

	Target Value	Test value	Accepted tolerance (%)	Present tolerance (%)
Cooling Capacity - Q_c [kW]	992.6	1063.02	-7.0 & above	7.09
Heating Capacity - Q_h [kW]	1146.4	1178.91	-7.0 & above	2.84
Total Electricity Consumption - P_E [kW]	187.9	188.0	+5.0 & below	0.05
Energy Efficiency Ratio (Shaft) - EER_{shaft}	5.6	6.04	-12.0 & above	7.91
Energy Efficiency Ratio (Line) - EER_{line}	5.28	5.65	-12.0 & above	7.09
Coefficient of Performance (Shaft) - COP_{shaft}	6.47	6.7	-12.0 & above	3.58
Coefficient of Performance (Line) - COP_{line}	6.1	6.27	-12.0 & above	2.8
Pressure drop - Evaporator side - Δp_e [bar]	0.49	0.38	+15.0 & below	-22.77
Pressure drop - Condenser side - Δp_c [bar]	0.64	0.68	+15.0 & below	6.25

P_E is the total electrical consumption of the whole unit. All calculated values are in accordance to EN 14511-2018.[1]

[1]Variations from target parameters and tolerance determination have been further defined in the FAT protocol document.

The EER and COP values are shown in Figure 2.

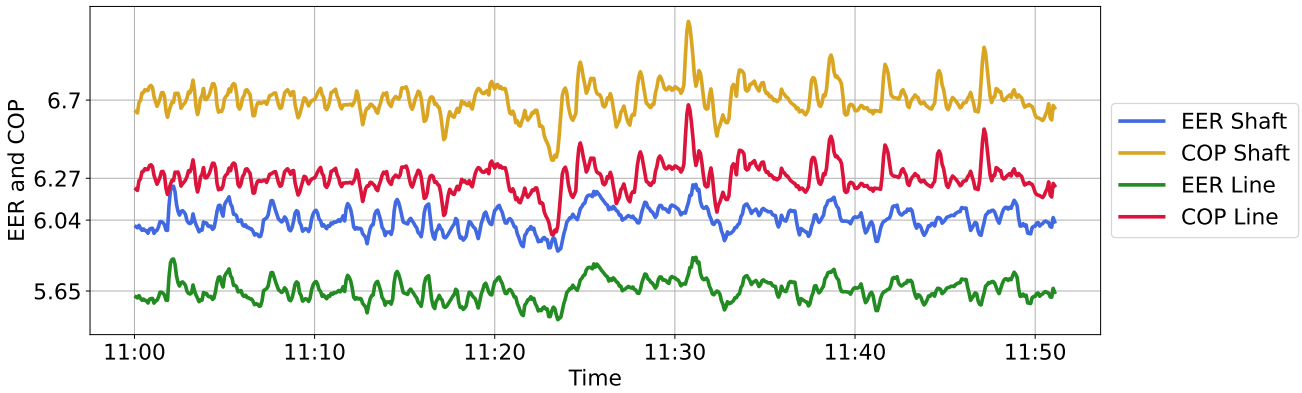


Figure 2: Plot of EER and COP Values throughout the test duration

Notes :