

Table 1 Design Flow Rates Cooling Water Streams

Cooling Water Stream	P&ID Reference	Flow Meter [Y/N]	Design Flow Rate [m ³ /h]	Data Source
Desilication	6033-30-J-1001	N	32.3	30HEX501 data sheet
AMV Precipitation	6033-35-J-1001	N	50	35HEX501 data sheet
Seal and Gland Water	6033-35-J-1003	N	?	
V2O3 Production Kiln 1 Discharge Screw	6033-41-J-1001	Y	15	Control Philosophy 6033- G-00-F-014
V2O3 Production Kiln 1 Cooling Jacket	6033-41-J-1001	N	?	
V2O3 Production Kiln 2 Discharge Screw	6033-41-J-1002	Y	15	Control Philosophy 6033- G-00-F-014
V2O3 Production Kiln 2 Cooling Jacket	6033-41-J-1002	N	?	
V2O5 Production (Future)	6033-40-J-1003	N	N/A	
FeV Production Furnace Shell Cooling	6033-45-J-1003	Y	65	Control Philosophy 6033- G-00-F-016
FeV Production Furnace Rectifier Cooling	6033-45-J-1004	Y	45	45HEX501 data sheet
FeV Production Furnace Cathode, Anode and Transformer Cooling	6033-45-J-1003	Y	14	Control Philosophy 6033- G-00-F-016
Total Cooling Water Flow			236.3	Excl. Seal and Gland, and Cooling Jackets Kiln 1 and 2

Cooling Water Demands

Table 2 shows the cooling water demands for each cooling water demand item in the cooling water system (e.g. heat exchanger, kiln discharge screw). This provides more detail on the required flow rates to each of the cooling water demand items, in particular the FeV production furnace cathode, anode and transformer.

Table 2 Cooling Water Demands

Cooling Water Stream	P&ID Reference	Cooling Water Demand Item	Design Flow Rate [m ³ /h]	Data Source
Desilication	6033-30-J-1001	30HEX501	32.3	30HEX501 data sheet
AMV Precipitation	6033-35-J-1001	35HEX501	50	35HEX501 data sheet
Seal and Gland Water	6033-35-J-1003	35HEX502	?	Data sheet missing
V2O3 Production Kiln 1 Discharge Screw	6033-41-J-1001	41FDS502	15	Control Philosophy 6033-G-00-F-014
V2O3 Production Kiln 1 Cooling Jacket	6033-41-J-1001	41KLN501	?	
V2O3 Production Kiln 2 Discharge Screw	6033-41-J-1002	41FDS504	15	Control Philosophy 6033-G-00-F-014
V2O3 Production Kiln 2 Cooling Jacket	6033-41-J-1002	41KLN502	?	
V2O5 Production (Future)	6033-40-J-1003	40FRN501	N/A	
FeV Production - Furnace Shell Cooling	6033-45-J-1003	45FRN501	65	Control Philosophy 6033-G-00-F-016
FeV Production - Furnace Rectifier Cooling	6033-45-J-1004	45HEX501	45	45HEX501 data sheet
FeV Production - Furnace Cathode Cooling	6033-45-J-1003	45CA501	11.5	Control Philosophy 6033-G-00-F-016
FeV Production - Furnace Anode Cooling	6033-45-J-1003	45AN501	0.5	Based on balance FE455364 and FE455306
FeV Production - Furnace Transformer Cooling	6033-45-J-1003	45HEX502	2	Control Philosophy 6033-G-00-F-016

Cooling Water System Capacity – All Cooling Water Streams Online

Table 5 shows the cooling water system flow rates with all cooling water systems online.

The table shows:

- The design flow rate of each cooling water stream
- The calculated flow rates for the existing system with all cooling streams operating at design flow (FCVs and TCVs fully open when design flow cannot be achieved); note that the flow rates were calculated without the short-term solution in place
- The calculated flow rates for the recommended long-term solution described in Table 6, with all cooling streams at design flow (FCVs and TCVs furnace cooling fully open)
- The calculated flow rates for the recommended long-term solution with all flow control valves and temperature control valves fully open

Table 5 Cooling Water Flow Rates – All Cooling Water Streams Online

Cooling Water Stream	Cooling Water Demand Item	Design	Existing System	Long-Term Solution	Long-Term Solution with FCVs and TCVs Fully Open
		[m3/h]	[m3/h]	[m3/h]	[m3/h]
Desilication	30HEX501	32.3	32.3	32.3	31.3
AMV Precipitation	35HEX501	50.0	50.0	50.0	101.9
Seal and Gland Water	35HEX502	?	20.6	20.0	18.8
V2O3 Production Kiln 1 Discharge Screw	41FDS502	15.0	15.6	15.1	14.1
V2O3 Production Kiln 1 Cooling Jacket	41KLN501	?	6.5	6.3	5.9
V2O3 Production Kiln 2 Discharge Screw	41FDS504	15.0	15.6	15.1	14.2
V2O3 Production Kiln 2 Cooling Jacket	41KLN502	?	6.5	6.3	5.9
FeV Production - Furnace Shell Cooling	45FRN501	65.0	47.9	65.2	60.5
FeV Production - Furnace Rectifier Cooling	45HEX501	45.0	34.4	47.8	44.9
FeV Production - Furnace Cathode Cooling	45CA501	11.5	8.3	11.9	11.0
FeV Production - Furnace Anode Cooling	45AN501	0.5	4.2	3.5	3.2
FeV Production - Furnace Transformer Cooling	45HEX502	2.0	2.0	2.0	5.8
Total		234.3 + ?	244.2	275.8	317.6

		COOLING TOWER EQUIPMENT DATA SHEET		Document No: 6033-D-50-M-066	
PROJECT: WINDIMURRA VANADIUM PROJECT			EQUIP NO: 50-CTR-501		
CLIENT: WINDIMURRA VANADIUM					
SERVICE: COOLING WATER					
AREA: PLANT SERVICES (AREA 50)					
Vendor to complete the following items					
Process Design		Units			
Rated Water Flow		m ³ /h		254	
Hot water in		°C		45	
Cold water out		°C		28	
Maximum wet bulb temp (design)		°C		20.9	
Cold water sump volume		m ³		16	
Cold water sump temp (Average)		°C		28	
Evaporation water loss		kg/h		6640	
Drift water loss		kg/h		1.2	
Blow down water loss		kg/h		Depending on water quality	
Minimum approach to wet bulb		°C		8	
Total make-up water required		m ³ /h		6.9 approx	
Equipment Description					
Manufacturer				Superchill Australia	
Model number				EWK 3100/12 C19	
Type					
Capacity at specified conditions		m ³ /h		254	
Maximum flow		m ³ /h		620	
Minimum flow		m ³ /h		254	
Feed pump head required		m		6.025	
Water Volume		m ³		16	
Packing					
- Wetted surface area		m ²		30.4	
- Height of fill		mm		1200	
- Projected area of fill		m ²		31.7	
- Maximum temperature				80	
Materials of construction					
- Casing				FRP	
- Drift eliminators				P/P	
- Louvres				P/P with insect screens	
- Fasteners				304 S/Steel	
- Tie rods				N/A	
- Bolts/Nuts/Washers				304 S/Steel	
- Access Stairs / Structure				HDG Steel	
Number of access doors				Two	
Perimeter handrail included		Y/N		Y	
Water Distribution (Gravity/Sprays)				Pressure sprays	
Finish details					
Cold water discharge diameter		mm		300	
Hot water Inlet diameter		mm		200	
Make-up water inlet diameter		mm		25	
Float valve details				Brass float valve with Plastic Ball	
Motor					
Manufacturer				Teco	
Power		kW		22	

