LAHORE CONVERTER STATION LIST OF KEY PARAMTERS

System	Project	Equipment	The Main Parameters
AC System	AC System Frequency		50±0.5 Hz
	35kV AC Bus Voltage		34-37.5kV
	132kV AC Bus Voltage		125-139kV
	500kV AC Bus Voltage		475-540kV
	500Kv ACF 3-Phase Unbalanced Current		Section I Alarm (Delay 10s): Primary Value of Ground Current x Balance Coefficient (HP12/24: 0.000388(65mA), SC:0.000472(81mA)) Section II Trip (Delay 120min): Primary Value of Ground Current x Balance Coefficient (HP12/24: 0.000879(148mA), SC:0.001021(185mA)) Section III Trip(Delay 0.02s): Primary Value of Ground Current x Balance Coefficient (HP12/24: 0.001114(187mA), SC:0.001292(234mA))
	500kV Station Transformer	Oil Temperature	85^0C I Section Alarm, 95^0C II Section Alarm
		Winding Temperature	105^0C I Section Alarm, 115^0C II Section Alarm
		Oil Level	5% - 95%
		Cooler Switching Strategy	Upper oil temperature reach 65^0C start two set of cooler fan. When the load exceed 70% of rated capacity (103A) Start two set of cooler fan. When the upper oil temperature drops to 45^0C two set of cooler fans all stop.
	500kV AC Field	Circuit Breaker	0.8MPa highest, 0.7MPa rated, 0.62MPa alarm, 0.6MPa blocking (B1Q1, B1Q3, B2Q1, B2Q3, B3Q1, B3Q3, B3Q2, B4Q1, B4Q3, B4Q21, B5Q1, B5Q3, B6Q1, B6Q3) 0.9MPa maximum,0.8MPa rated, 0.72MPa alarm, 0.7MPa blocking (B1Q2, B2Q2, B5Q2, B6Q2, B7Q1, B7Q2)
	500kV ACF Field	Circuit Breaker	0.9MPa maximum,0.85MPa rated, 0.77MPa alarm, 0.75MPa lockout
	35kV AC Field	Circuit Breaker	0.8MPa maximum, 0.7MPa rated, 0.62MPa alarm, 0.6MPa lockout
	35kV Transformer	Oil Temperature	85℃ I section alarm, 95℃ II section alarm
	11kV Dry Type Transformer	Winding Temperature	Fan start temperature 90℃, 130℃ section I alarm, 150℃ section II alarm
	10kV, 400V/220V Bus Voltage		10.45-11.55kV, 380-420V
	230V DC Voltage		218.5-241.5V
DC System	Extinction Angle	$17±2.5^0$	Extinction Angle
	DC Filter	Unbalanced Current	HP12/24: 0.006/10S, HP6/42: 0.006/10S, alarm
	Converter Transformer	Top Oil Temperature	85℃ I section alarm, 100℃ II section alarm
		Winding Temperature	100℃ I section alarm, 115℃ II section alarm
		Oil Level	Low oil level≦80mm, high oil level≧1850mm
	Converter transformer Valve side Bushing	SF6 Pressure	0.24MPa alarm, 0.10MPa trip
	DC Field	660kV DC Wall Bushing	0.57MPa rated, 0.53MPa alarm, 0.50MPa trip
		DC Voltage Divider	0.35MPa rated, 0.30MPa section I alarm, 0.27MPa section II alarm, 0.22MPa trip
		DC Field Circuit Breaker	0.70MPa rated, 0.62MPa alarm, 0.60MPa lockout

LAHORE CONVERTER STATION LIST OF KEY PARAMTERS

System	Project	Equipment	The Main Parameters
	Electrode Line	|IDEL1－IDEL2|	0.02pu (60.6A) delay 1s alarm, 0.134pu (406.02A) unipolar 2S action, bipolar 1.5S action
		Mono Pole mode Electrode Line Current	More than 0.6pu (1818A) delay 500ms alarm, delay 120s action
	Inverter	Trip Condition 1	The number of damaged thyristor stages in a single valve>5 (redundant number)
		Trip Condition 2	The number of thyristor stages triggered by over-voltage protection (FOP) in a single valve>9
	DC Voltage	Reduced Voltage Operation	100%, 85%, 70% Adjustable
Fire Fighting System	Valve Hall Trip Logic		At least one very early air sampling detector and at least one ultraviolet detector report a fire alarm; Very early air-collecting detectors at the fresh air outlet of the valve hall air conditioning and at least two UV detectors report fire
	Starting Condition of Converter Transformer Spray Valve		Temperature sensing cable 1 action (or abnormal), Temperature sensing cable 2 action (or abnormal), Three flame detectors have 1 action take two out of three, and the commutation transformer outlet circuit breaker is opened
	Station Transformer Spray Valve Starting Condition		When the two sets of temperature sensing cables of the station transformer are both operating (105℃) and the circuit breaker on the high voltage side of the station transformer is opened
DGA	Dissolved Gas Analysis Limit Values		acetylene <1μL/L, total hydrocarbon <150μL/L, hydrogen <150μL/L
Valve Cooling System	Valve Inlet Temperature		10℃ Low Inlet Temperature
			46℃ High Inlet Temperature
			49℃ Inlet Valve Temperature is Extremely High
	Valve Outlet Temperature		61℃ high outlet temperature
	Temperature Difference Limit between Inlet and Outlet of Valve		15℃ high temperature difference between inlet and outlet of valves
	Cooling Water Flow		89L/s is Ultra Low (Trip)
			94L/s is Low (Trip)
	Deionized Water Flow		2.50L/s is Low
	Inlet Valve Pressure		0.60Mpa is Ultra Low (Trip)
			0.65MPa is Low (Trip)
			0.88MPa is High (Trip)
			0.92MPa is Very High (Trip)
	Outlet Pressure		0.28MPa is Ultra Low
			0.30MPa is Low
	Cooling Water Conductivity		0.5μS/cm High
			0.7μS/cm Very High
	Deionized Water Conductivity		0.1μS/cm High
	Expansion Tank Liquid Level		5% Ultra Low (Trip)
			15% Low Level
			90% High Level
	Expansion Tank Pressure		0.28MPa Very Low
			0.30MPa Low
			0.40MPa High
			0.42MPa Very High
	Valve Cooling System Leakage		0.3%/30s (The temperature change of inlet valve is less than 0.2℃)