List of key parameters of Lahore converter station

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| **system** | | **project** | | | | **The main parameters** | | |
| **Communication system** | | AC system frequency | | | | 50±0.5Hz | | |
| 35kV AC bus voltage | | | | 34—37.5kV | | |
| 132kV AC bus voltage | | | | 125—139kV | | |
| 500kV AC bus voltage | | | | 475—540kV | | |
| 500kV AC filter capacitor three-phase unbalanced current | | | | Section I alarm (delay 10S): primary value of ground current \* balance coefficient  (HP12/24: 0.000388 (65mA), SC: 0.000472 (81mA))  Section II trip (delay 120min): primary value of ground current \* balance coefficient  (HP12/24: 0.000879 (148mA), SC: 0.001021 (185mA))  Section III trip (delay 0.02S): primary value of ground current \* balance coefficient  (HP12/24: 0.001114 (187mA), SC: 0.001292 (234mA)) | | |
| 500kV station transformer | | | Oil temperature | 85℃ Ⅰ section alarm, 95℃ Ⅱ section alarm | | |
| Winding temp | 105℃ Ⅰ section alarm, 115℃ Ⅱ section alarm | | |
| Oil level | 5%～95% | | |
| Cooler switching strategy | When the upper oil temperature reaches 65℃, start two sets of cooling fans;  When the load exceeds 70% of the rated capacity (103A), start two sets of coolers;  When the upper oil temperature drops to 45°C, the two sets of cooling fans all stop. | | |
| 500kV AC field | | | 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 AC filter | | | breaker | 0.9MPa maximum,0.85MPa rated, 0.77MPa alarm, 0.75MPa lockout | | |
| 35kV equipment | | | breaker | 0.8MPa maximum, 0.7MPa rated, 0.62MPa alarm, 0.6MPa lockout | | |
| **Station power system** | | 35kV transformer | | | Oil temperature | 85℃ Ⅰ section alarm, 95℃ Ⅱ section alarm | | |
| 11kV dry type transformer | | | Winding temp | Fan start temperature 90℃, 130℃ section I alarm, 150℃ section II alarm | | |
| 10kV, 400V/110V bus voltage | | | | 10.45—11.55kV, 380—420V | | |
| 230V DC voltage | | | | 218.5-241.5V | | |
| **system** | | | **project** | **The main parameters** | | **system** |
| **DC system** | | | Extinction Angle | 17±2.5° | | 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 | Converter | | 0.24MPa alarm, 0.10MPa trip |
| DC field | 600kV 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 |
| Electrode Grounding | ∣IDEL1－IDEL2∣ | | 0.02pu (60.6A) delay 1s alarm, 0.134pu (406.02A) unipolar 2S action, bipolar 1.5S action |
| Single ground electrode line current | | More than 0.6pu (1818A) delay 500ms alarm, delay 120s action |
| Inverter valve | 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 pressure operation | | 100%, 80%, 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 conditions of converter transformer deluge 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 |
| Main transformer deluge valve starting conditions | | | 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 |
| **Oil chromatography** | | | Characteristic gas standard | | | Dissolved gas standard: acetylene <1μL/L, total hydrocarbon <150μL/L, hydrogen <150μL/L |
| **Serial number** | | | **project** | | | | **The main parameters** |
| **Bipolar 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 |
| High temperature difference between inlet and outlet valves | | | | 15℃ high temperature difference between inlet and outlet valves |
| Cooling water flow | | | | 89L/S cooling water flow is ultra-low (trip) |
| 94L/S cooling water flow is low (trip) |
| Deionized water flow | | | | 2.50L/S deionized water flow is low |
| Inlet valve pressure | | | | 0.60MPa inlet valve pressure is ultra low (trip) |
| 0.65MPa low inlet pressure (trip) |
| 0.88MPa high inlet valve pressure (trip) |
| 0.92MPa inlet valve pressure is super high |
| Outlet pressure | | | | 0.28MPa outlet pressure is ultra-low |
| 0.30MPa low outlet pressure |
| Cooling water conductivity | | | | 0.5μS/cm high conductivity |
| 0.7μS/cm ultra high conductivity |
| Deionized water conductivity | | | | 0.1μS/cm high conductivity |
| Expansion tank liquid level | | | | 5% liquid level ultra low (trip) |
| 15% low liquid level |
| 90% high liquid level |
| Expansion tank pressure | | | | 0.28MPa ultra-low pressure |
| 0.30MPa low pressure |
| 0.40MPa high pressure |
| 0.42MPa super high pressure |
| 120% high liquid level |
| 30% low liquid level |
| 15% liquid level ultra low |
| **Valve cold trip setting** | | | High inlet valve temperature | | | | 49°C |
| Low cooling water flow and ultra-low inlet valve pressure | | | | 94L/S cooling water flow is low  0.60MPa inlet valve pressure is ultra low |
| Ultra-low cooling water flow and low inlet valve pressure | | | | 89L/S cooling water flow is ultra-low  0.65MPa low inlet pressure |
| Ultra-low cooling water flow and high inlet valve pressure | | | | 89L/S cooling water flow is ultra-low  0.88MPa high inlet valve pressure |
| Ultra low liquid level in expansion tank | | | | 5% |
| Valve cooling system leakage | | | | 0.3%/30s (The temperature change of inlet valve is less than 0.2℃) |