

Technical Specification for 230 kV Switchyard

Project VIAN

VAI Fuchs GmbH

Content

1	GENERAL REMARKS.....	3
2	STANDARDS.....	3
3	AMBIENT CONDITIONS AT SITE.....	3
4	PLANING DOCUMENTS	4
5	DEGREE OF PROTECTION.....	5
6	GENERAL TECHNICAL DATA	5
7	TECHNICAL SPECIFICATION	6
7.1	230 kV-Switchgear	6
7.1.1	Incoming Feeder (1 set).....	6
7.1.2	Transformer feeders (2 set)	7
7.1.3	Busbar connection (1 set).....	8
7.1.4	Gantries and supporting steel structures.....	8
7.1.5	Switchyard accessories.....	9
7.1.6	Earthing System for the Substation	9
7.1.7	Special Tools	9
7.1.8	Factory Acceptance Tests and On-Site Testing	10
7.1.8.1	Factory acceptance tests	10
7.1.8.2	On-site Testing / Test Equipment.....	10
7.1.8.3	Testing/High-voltage test	10
7.1.9	Limits of scope of supply	11
7.2	Substation Control, Monitoring, Protection and Auxiliaries.....	12
7.2.1	Local Control and Monitoring of 220 kV-Substation	12
7.2.1.1	General Requirements	12
7.2.1.2	Control and monitoring functions	12
7.2.2	Substation Protection System.....	13
7.2.2.1	General Requirements	13
7.2.2.2	Protection functions.....	13
7.2.3	Auxiliary Systems	14
7.2.3.1	General Requirements	14
7.2.3.2	Lighthing equipment for 230 kV-Substation	14
7.2.3.3	230 V AC-Distribution for power sockets and device heating circuits.....	14
7.2.3.4	110 V DC-Distribution including Battery Charger and Battery	15

1 General Remarks

This system specification applies to the following high-voltage equipment for the 230 kV-Switchyard of the Vian Steel Plant as described and depicted in the Single line diagram No.1GAA050420, Rev. A.

2 Standards

All following relevant standards shall apply for design and execution of the switchgear:

- IEC regulations : [X]
- ISO standards : [X]

3 Ambient Conditions at Site

Level above sea	1640	m
Maximum atmospheric pressure	---	Pa
Minimum atmospheric pressure	---	Pa
Maximum air temperature outside of buildings (abs.)	+ 45	°C
Minimum air temperature outside of buildings (abs.)	- 30	°C
Maximum air temperature inside of buildings (abs.)	+ 30	°C
Minimum air temperature inside of buildings (abs.)	+ 10	°C
Maximum relative humidity in the melt shop	85	%
Maximum relative humidity in Control-,PLC- and PC-Rooms	75	%
Maximum outdoor wind velocity	90	km/h
Prevailing wind direction	NW - SE	
Maximum daily precipitation	40	mm/day
Maximum height of accumulated snow	600	mm
Freeze depth	100	mm
Basic earthquake intensity (MAX)	7.5	

4 Planing Documents

The following planning documents shall be prepared:

- Arrangement drawings including civil requirements	:	[X]
- Load plans for civil works	:	[X]
- Construction plans for foundations (if applicable)	:	[]
- Earthing plans	:	[X]
- Short circuit calculations for main and bay busbars	:	[X]
- Substation single line diagram	:	[X]
- Standard circuit diagrams	:	[]
- Individual circuit diagrams	:	[X]
- Terminal diagrams	:	[X]
- Cable list	:	[X]
- Equipment lists	:	[X]
- Front views	:	[X]
- Type test reports	:	[X]
- Acceptance test reports	:	[X]
- Erection instructions	:	[X]
- Documents for operation and maintenance	:	[X]
- Spare parts lists	:	[X]
- Training documents	:	[X]
- Manufacturing time schedule	:	[X]

5 Degree of Protection

For equipment (circuit breakers, disconnector switches, ...) : according
manufacturers
standard

For indoor and air conditioned areas:

- cubicles in general : IP 4X

For all other areas:

- cubicles in general : IP 5X

6 General Technical Data

Operating voltage	230 kV
Maximum design voltage	245 kV
Voltage variation	200 - 246 kV
System frequency	50 Hz
Rated busbar current	1600 A
Rated short circuit current	25 kA
Rated peak withstand current	62,5 kA
Power frequency withstand voltage (phase to earth and between phases / across isolation distance)	360 kV
Lighting impulse withstand voltage	850 kV (peak)
Degree of pollution	31 mm/kV