

ABB		PRECOMMISSIONING CHECK LIST		Doc. No.	
Equipment Transformer		Sr. No. 140220015. (R PHASE)		Date: 30/03/17	Rev. A
Location & Designation:		Drawing No.			Sheet
Customer: VEDANTA ALUMINIUM LIMITED.		Project: 1.2MPTa ALUMINIUM SMELTER at Jharsuguda Orissa.		Job order No.	

A. General checks :

1. Check the erection of equipment is carried out as per the approved drawings ☒
2. The equipment is cleaned and insulators are free from dust/dirt etc. ☒
3. Check that earthing has been properly done and connected to the earthing grid for the following:
 - a) Main Tank (Double Earthing) ☒
 - b) Marshalling box ☒
 - c) Cable Boxes (if applicable) ☒
 - d) Radiators & Fan motor ☒
4. Check the HV/LV Neutral is grounded properly, connected to two earth pits ☒
5. Check oil level in :
 - a) Main tank ☒
 - b) Conservator
 - MOG ☒
 - Plain oil level gauge ☒
 - c) HV Cable box (if provided) ☒
 - d) LV Cable box (if provided) ☒
 - e) HV Bushings ☒
 - f) IV Bushings ☒
 - g) LV Bushings ☒
6. No oil leakage from tank, conservator, radiator, joints etc. ☒
7. OTI & WTI pockets are filled with oil ☒
8. Check the Explosion vent diaphragm is intact; there is no oil in explosion vent (if provided) ☒
9. Check for fire protection system & emulsifier operation (if provided) ☒
10. Check the oil soak pit and oil sump are cleaned properly ☒
11. Check for proper locking of rollers onto rails (for roller mounted transformer) ☒
12. Any Paint removed / scratched in transit has been touched up ☒
13. Bushings are clean and free from physical damages ☒
14. Check Test tap caps of Bushing are fully tightened ☒

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15. Check tightness of Terminal Connectors ☒
Check following valves are open:
a) Valves connected between Main tank & conservator ☒
b) Valves connected from OLTC to conservator ☒
c) All radiator valves ☒
d) Main tank to cable box ☒
16. Check Air is released from following: ☒
a) All radiators ☒
b) Main tank and OLTC Tank cover ☒
c) Buchholz relay, Oil surge relay ☒
d) All Bushings and bushing pockets ☒
17. All sampling valves & filtration valves are closed ☒
18. Air release valve & sampling valve of Buchholz relay is closed ☒
19. Check leveling of Transformer and its accessories ☒
20. Any Paint removed / scratched in transit has been touched up ☒
21. Check Silica gel in the Main & OLTC breather is active/blue in color ☒
22. Oil is filled in the oil cup of breather up to the level marked ☒
23. Lock of Buchholz relay, oil surge relay and MOG released, kept in Service position ☒
24. Buchholz relay, Oil Surge relay arrow head is towards Conservator ☒
25. Unused secondary cores of Bushing CT have been shorted, if provided ☒
26. Check CT star point is formed correctly and earthed at one end only as per scheme ☒
27. Termination of control cables in Marshalling Box completed as per drawings, ☒
28. Terminals are tightened properly and unused holes of gland plate are sealed properly ☒
29. Cable tags, ferrules are provided, for all cores. ☒
30. Cables are properly dressed and clamped ☒

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31. Check OLTC operation in Local/ Remote Manual & Auto mode through RTCC
Check cooling fan operation in Manual/Auto mode & direction of rotation ☒
32. For off load tap changer, the tap switch is locked properly in desired tap position ☒
33. Check the operation of space heaters in marshalling box in auto/ manual mode ☒
34. Check the operation of space heater in RTCC in auto/ manual mode ☒
35. Check aircell for conservator has been commissioned ☒
36. Check that permanent and adequate lighting arrangements are ready ☐
37. Check that labeling and identification is permanent and satisfactory ☒
38. Check that Buchholz Relay is correctly mounted with arrow pointing towards conservator ☒
39. Check that CC-CL & G are shorted ☒
40. Change over operation of ac supply from source- I to source-II checked ☒
41. Calibration of OTI & WTI performed as per procedure ☒
42. Ensure RTCC is commissioned and kept in service ☒
43. Ensure On-Line DGA is commissioned and kept "ON" ☒
44. After dry out process final dew point checking

Dew Point Temp (-37.54°C)

Temp (33.76°C)

RH 0.44%

Remarks:

*Intertrip 400kV to 220kV checked



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B. Clearances:

Check the electrical clearances for live parts:

1. HV phase to phase - mm
2. HV phase to earth - mm
3. LV phase to phase - mm
4. LV phase to earth - mm

C. Settings:

1. Setting of OTI alarm - 85 ☒
2. Setting of OTI trip - 95 ☒
3. Setting of WTI alarm - 90 ☒
4. Setting of WTI trip - 100 ☒
5. Setting of start & stop of cooling fan - ON: ⁵⁵~~60~~ OFF: ⁴⁵~~55~~ ☒
6. Setting of start & stop of cooling pump - ON:70 OFF: ⁶⁰~~65~~ ☒

D. Protection Alarms & Tripping:

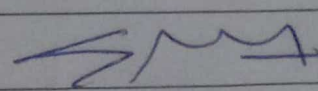
1. Check alarm/tripping of HV & LV CB through following:

- a) Over current relay
- b) Earth fault relay
- c) Differential relay
- d) Restricted Earth fault relay
- e) Over fluxing relay
- f) Over voltage relay
- g) Buchholz relay
- h) Oil Temp. Indicator
- i) Winding Temp. Indicator
- j) Oil Surge Relay
- k) Pressure Relief Device

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2. Check the alarm through magnetic oil level gauge

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Name Plate Details:

- a) Make:ABB
- b) MVA Rating:250 MVA
- c) HV Volts:400 KV
- d) MV Volts: 220 KV
- e) LV volts: 33 KV
- f) HV Current :1083.82 A
- g) MV Current:1970.57
- h) LV Current:4414.08
- i) % Impedance: At Tap 9 (HV-MV:12.13, HV-LV:71.71, MV-LV:18.60)
- j) Vector Group:YNao11
- k) Type of cooling: OFAF
- l) Type of OLTC:ABB Make (UCGRE 1050/1500/1 17 POSITION
- m) Variation of voltage:+10 % TO -10% of HV , of Steps:16

1. Insulation resistance test :(Value in GΩ DC)

Oil Temp=42°C

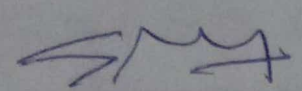
REF	Measured ValuesGΩ			P.I
	15sec	60sec	600sec	
HV to Tank Earth +LV	62.7	79.7	135	1.74
LV to HV+ Tank Earthed	51.6	71.9	128	1.78
HV to LV	68.1	101	172	1.77

2. INSULATION RESISTANCE OF CORE:-

Oil Temp= 42°C

Reference	Measured Values GΩ
CC-G	12.7
CL-G	19.3
CC-CL	19.0

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3. Voltage Ratio Test & Magnetic current test :

Test carried out by CPC100

TAP No.	No Load Voltage Ratio	Applied Voltage (1.1-N)	Measured Voltage (2.1-N)	Measured Ratio	% Error	Measured current (mA)
01	2.0	239.94	119.84	2.0021	-0.105	5.2
02	1.9773	239.92	121.30	1.9779	-0.030	5.3
03	1.9545	239.93	122.65	1.9562	-0.087	5.3
04	1.9318	239.95	124.17	1.9324	-0.031	5.4
05	1.9091	239.96	125.59	1.9106	-0.079	5.5
06	1.8864	239.93	127.18	1.8865	-0.005	5.6
07	1.8636	239.97	128.66	1.8651	-0.080	5.7
08	1.8409	239.94	130.34	1.8408	0.005	5.8
09	1.8182	239.97	131.90	1.8193	-0.060	6.0
10	1.7955	239.93	133.67	1.7949	0.033	6.2
11	1.7727	239.95	134.90	1.7787	-0.338	6.2
12	1.7500	239.96	137.16	1.7494	0.034	6.3
13	1.7273	239.94	138.90	1.7274	-0.006	6.4
14	1.7045	239.98	140.85	1.7037	0.047	6.5
15	1.6818	239.96	142.67	1.6819	-0.006	6.7
16	1.6591	239.94	144.69	1.6583	0.048	6.9
17	1.6364	239.92	146.66	1.6358	0.037	7.0

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5. Magnetizing Current Test (LV Side):

Tap No	Applied Voltage (V) 3.1-3.2	Magnetizing current (mA)
9	231.4	137.4
9	415.6	193.6

6. Magnetizing Current Test IV-N Side:

Tap No	Applied Voltage in Terminals 2.1-N	Magnetizing current in (mA) I.V
1	240.3	14.0
9	241.2	14.72
17	241.1	14.05

7. Magnetizing Current Test HV -IV Side:

Tap No	Applied Voltage in Terminals 1.1-2.1	Magnetizing current in (mA) I.V
1	241.3	14.19
9	241.0	20.51
17	241.3	27.28

8. Polarity Test

V app	1.1-3.2	232.8
V mean	3.1-3.2	26.56
	1.1-N	204.7
Short	3.1 and N	

V app	2.1-3.2	231.2
V mean	3.1-3.2	47.74
	2.1-N	183.6
Short	3.1 and N	

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9. WINDING RESISTANCE TEST:-

Resistance @ 75°C

Oil Temperature :34°C

 $R_{at\ 75^{\circ}C} = ((235+75) \times R_{avg}) / (235 + T_{avg})$

Ravg = Resistance at Temp avg

Tavg = Temp at R measured

TAP No.	HV(1.1)-IV(2.1)(mΩ)			
	(Ascending)		(Descending)	
	34°C	75°C	34°C	75°C
1	127.62	149.29	127.78	149.48
2	125.23	146.50	125.32	146.60
3	122.95	143.83	123.03	143.92
4	120.52	140.99	120.61	141.09
5	118.30	138.39	118.35	138.45
6	116.00	135.70	116.09	135.80
7	113.76	133.08	113.85	133.18
8	111.34	130.25	111.43	130.35
9	109.03	127.54	109.07	127.59
10	111.50	130.43	111.59	130.35
11	113.82	133.15	113.87	133.21
12	116.23	135.97	116.28	136.03
13	118.40	138.51	118.41	138.52
14	120.63	141.11	120.72	141.22
15	123.06	143.96	123.09	143.99
16	125.35	146.64	125.43	146.73
17	127.72	149.41	127.72	149.41

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TAP
No.

1.1-N(mΩ)

3.1-3.2(mΩ)

1.2-N(mΩ)

34°C

75°C

34°C

75°C

(Ascending)

(Descending)

34°C

75°C

34°C

75°C

1

251.2

289.49

251.6

289.95

2

249.0

286.95

249.7

287.76

3

246.7

284.30

246.9

284.53

4

244.4

281.65

244.7

282.00

5

242.1

279.00

242.4

279.35

6

239.7

276.23

239.9

276.46

7

237.5

273.70

237.7

273.93

8

235.1

270.93

235.2

271.05

9

232.8

268.28

232.9

268.40

10

235.3

271.16

235.5

271.39

11

237.6

273.81

237.7

273.93

12

239.9

276.46

239.9

276.46

13

242.3

279.23

242.5

279.46

14

244.8

282.11

244.9

282.23

15

247.0

284.65

247.2

284.88

16

249.3

287.30

249.5

287.53

17

251.7

290.06

251.7

290.06

10.345

12.102

123.37

144.32

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10. Short Circuit Test:

TAP No.	Applied voltage (V)	HV SIDE (A)	IV SIDE (A)
1	239.0	9.4	18.8
2	239.0	9.4	18.6
3	240.4	9.4	18.3
4	240.5	9.4	18.1
5	240.7	9.4	18.0
6	240.3	9.4	17.5
7	240.3	9.4	17.5
8	240.5	9.3	17.2
9	240.8	9.3	16.9
10	240.7	9.2	16.6
11	240.9	9.1	16.4
12	240.9	9.0	16.0
13	240.3	9.0	15.7
14	240.8	8.9	15.3
15	240.9	8.8	15.0
16	240.3	8.8	14.6
17	240.7	8.8	14.1

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Short Circuit Test:

HV - LV

Tap No	Applied Voltage	Short	Measured current in A	
	1.1-N		HV	LV
1	241.1	3.1 to 3.2	1.3	11.6
2	241.0	3.1 to 3.2	1.4	11.6
3	240.8	3.1 to 3.2	1.4	11.5
4	240.6	3.1 to 3.2	1.4	11.5
5	242.3	3.1 to 3.2	1.4	11.5
6	242.3	3.1 to 3.2	1.5	11.5
7	242.0	3.1 to 3.2	1.5	11.5
8	242.5	3.1 to 3.2	1.5	11.4
9	242.0	3.1 to 3.2	1.5	11.2
10	241.0	3.1 to 3.2	1.5	11.1
11	241.0	3.1 to 3.2	1.6	11.1
12	241.0	3.1 to 3.2	1.6	11.0
13	241.0	3.1 to 3.2	1.6	10.9
14	240.9	3.1 to 3.2	1.6	10.9
15	240.9	3.1 to 3.2	1.6	10.9
16	241.1	3.1 to 3.2	1.6	10.8
17	241.1	3.1 to 3.2	1.7	10.7

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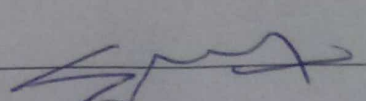
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11. Capacitance and Tan delta of Windings and Bushing:-

Oil Temp=31°C

Reference	Mode	Applied Voltage (KV)	Measured Current (mA)	Fz (Hz)	Capacitance (nF)	Dissipation Factor %(Δ)
(HV+LV)-LV	UST	2 KV	1.7080	50	2.69856	0.1790
		5 KV	4.2391	50	2.69860	0.1820
		10 KV	8.4896	50	2.69812	0.1809
(HV+IV)-TANK	GST	2 KV	4.3698	50	6.95752	0.2097
		5 KV	10.931	50	6.95661	0.2446
		10 KV	21.858	50	6.95593	0.2036
(HV+IV)-TANK	GSTg	2 KV	2.6847	50	4.26053	0.1629
		5 KV	6.7148	50	4.25883	0.1674
		10 KV	13.384	50	4.25960	0.2468
LV-(HV+IV)	UST	2 KV	1.6904	50	2.7000	0.1789
		5 KV	4.2374	50	2.6981	0.1703
		10 KV	8.4711	50	2.6979	0.1778
HV+IV-TANK	GST	2 KV	6.5347	50	10.4048	0.2045
		5 KV	16.348	50	10.4029	0.2059
		10 KV	32.698	50	10.4027	0.2040
LV-TANK	GSTg	2 KV	4.8784	50	7.70762	0.2021
		5 KV	12.123	50	7.70489	0.2011
		10 KV	24.232	50	7.70512	0.2018

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Bushing :-400KV: 1ZSC350047
220KV: 1ZSC350524
33KV 3.1: Not visible
3.2 : Not visible

Reference	Mode	Applied Voltage (KV)	Measured Current (μA)	Fz (Hz)	Capacitance (pF)	Dissipation Factor % (Δ)
HV Bushings	UST	2 KV	345.23	50	546.105	0.3593
		5 KV	859.42	50	546.109	0.3592
		10 KV	1.7219mA	50	546.117	0.3565
IV Bushings	UST	2 KV	301.05	50	476.117	0.3366
		5 KV	751.18	50	476.169	0.3366
		10 KV	1.5018 mA	50	476.175	0.3319
LV Bushings (3.1)	UST	2 KV	197.86	50	313.030	0.2856
		5 KV	492.87	50	313.031	0.2856
		10 KV	0.9874 mA	50	313.042	0.2807
LV Bushings (3.2)	UST	2 KV	196.97	50	311.827	0.2672
		5 KV	491.13	50	311.832	0.2673
		10 KV	0.9836 mA	50	311.838	0.2619

12. Oil Characteristics

(Sample to be taken prior to charging to Transformer and it should fulfill the recommendations as per IS 1865 /IEC 60422)

SAMPLING POINT	B.D.V.	MOISTURE	TAN DELTA	RESISTIVITY	INTERFACIAL TENSION
Permissible Limit →	70KV(min)	5 PPM(Max)	0.01 at 90° C (Max)	6x 10 ¹² Ω -CM at 90° C (Min)	0.0 35 N/m at 27°C (Min)
TOP	85.5	03			
Bottom	89.1	02			
OLTC	76.7	04			

DISSOLVED GAS ANALYSI

DISSOLVE GASES	H2	CH4	C2H4	C2H6	C2H2	CO	CO2	O2	N2	TCG
Before Charging										

Signature