Base Load Power Hub (BLPH)

DATA SHEET INCLUDING EQUIPMENT LAYOUT FOOTPRINT

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ROSETTI MARINO

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Sign	Date
Luca Maculan	11/06/2024

Rev.	Date	Description	Prepared	Reviewed	Approved
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Revision / Change Log

Rev.	Description
00	ISSUE FOR INFORMATION (IFI)
01	ISSUE FOR INFORMATION (IFI)
02	ISSUE FOR INFORMATION (IFI)
03	ISSUE FOR INFORMATION (IFI)
04	ISSUE FOR INFORMATION (IFI)

HOLDS LIST

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Row		S-720D Data Sheet for Transformers				Issue
2	Tag No. :	*Insert Tag Number*				
3	Service :	*Insert Service Description*				
4	Ref. Clause	Description			Additional notes	
5		**1. General**				
6		Manufacturer :	MF Trasformatori srl			
7		Vendor :	MF Trasformatori srl			
8		Equipment identifier :	TR-100AD1			
9		Quantity :	1			
10	9,3	Type of liquid preservation system :	conservator with bladder or diaphragm type			
11	4.1, 5.7.1, A.1.1 a) to x)	Service :	Distribution transformer			
12		Conformity assessment system :	D			
13		**2. Environmental conditions**				
14	5.5, A.1.1a) to x)	Altitude (if more than 1000m or 3280ft) :	not more than 1000 m	m		
15	4.2 a) to e), 4.2 f, A.1.1 a) to x)	Minimum ambient temperature :	-8,4	°C		
16	4.2 a) to e), 4.2 f , A.1.1 a) to x)	Maximum ambient temperature :	25	°C		
17	4.2 a) to e), A.1.1 a) to x)	Yearly average ambient temperature :	10,5	°C		
18	5.5, A.1.1 a) to x)	Design ambient temperature (if more than 40 °C or 104 °F) :	not more than 40°C	°C	Offshore (Netherlands)	
19	4.2 a) to e), 4.2 f, A.1.1 a) to x)	Relative humidity at maximum operating temperature (if more than 90 %) :	95	%		
20	4.2 f	Climatic conditions (K) for liquid immersed transformer :	4K26			
21	4.2 f	Special climatic conditions (Z) for liquid immersed transformer :	4Z1,4Z5,4Z14, 4Z15, 4Z17, 4Z10			
22	4.2 f	Biological conditions (B) for liquid immersed transformer :	4B2			
23	4.2 f	Chemically active substances (C) for liquid immersed transformer :	4CX			
24	4.2 f	Mechanically active substances (S) for liquid immersed transformer :	4S11			
25	4.2 f	Mechanical conditions (M) for liquid immersed transformer :	4M11			
26	9.6.18.1, 9.6.18.3	Corrosion class :	CX			
27	A.1.1 a) to x)	Seismic zone as per IEC 60721-2-6, figure 5 :	zone 2			
28	4.2 f , 4.2 i, 5.7.4.2, A.1.1 a) to x)	Location :	offshore fixed			
29	A.1.1 a) to x)	Unusual service conditions :	No			
30	5.7.3, 5.7.3	Sound power level :	68	dB(A)		
31		**3. Hazardous area classification**				
32	4.2 g, A.1.1 a) to x)	Hazardous area classification zone :	non hazardous			
33	4.2 g, A.1.1 a) to x)	Hazardous area classification gas group :	N/A			
34	4.2 g, A.1.1 a) to x)	Hazardous area classification temperature class :	N/A			
35		**4. Technical data**				
36		**4.1 Electrical system data**				
37	5.4.1, A.1.1 a) to x)	Rated voltage (HV) :	66	kV		
38	5.4.1	Rated voltage (LV) :	6,9	kV		
39	5.4.1	Rated voltage (tertiary) :	N/A	kV		
40	5.4.2, A.1.1 a) to x)	Rated frequency :	50	Hz		
41	A.1.1 a) to x), A.1.2 a) to t)	System short circuit apparent power :	87,5	MVA		
42	6.4.3.e	Minimum full load power factor :	0,8			
43	A.1.1 a) to x), A.1.2 a) to t)	Supply voltage harmonic content :	5	%		
44		**4.2 Transformer/reactor data**				
45		**4.2.1 General**				
46		**Power frequency withstand voltage**				
47	A.1.1 a) to x)	Power frequency withstand voltage - HV winding :	140	kV		
48	A.1.1 a) to x)	Power frequency withstand voltage - LV winding :	20	kV		
49	A.1.1 a) to x)	Power frequency withstand voltage - tertiary winding :	N/A	kV		
50	A.1.1 a) to x)	Power frequency withstand voltage - neutral terminal :	20	kV		
51		**Lightning impulse withstand voltage**				
52	A.1.1 a) to x)	Lightning impulse withstand voltage - HV winding :	325	kV		
53	A.1.1 a) to x)	Lightning impulse withstand voltage - LV winding :	60	kV		
54	A.1.1 a) to x)	Lightning impulse withstand voltage - tertiary winding :	N/A	kV		
55	A.1.1 a) to x)	Lightning impulse withstand voltage - neutral terminal :	60	kV		
56	5.7.2, 7.1.1 , A.1.1 a) to x)	Number of phases :	3			
57	6.4.3.a, A.1.1 a) to x)	Direction of power flow :	bi-directional			
58	7.1.5, 5.7.2, 7.1.1, A.1.1 a) to x)	Connection and phase displacement symbol (vector group) :	Dyn11			
59	A.1.1 a) to x), A.1.2 a) to t), B.4	Percentage impedance on air natural rating at principal tap :	8	%		
60	5.7.2	High limit for zero sequence impedance :	N/A	ohms/ph		
61	5.7.2	Low limit for zero sequence impedance :	N/A	Ohms/ph		
62	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (HV) :	7000	kVA		
63	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (LV) :	7000	kVA		
64	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (tertiary) :	N/A	kVA		
65	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (HV) :	N/A	kVA		
66	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (LV) :	N/A	kVA		
67	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (tertiary) :	N/A	kVA		
68	5.4.3	Variation in V/Hz ratio from no load to rated load when exceeding 105 % :	Not more than 105	%		
69	A.1.1 a) to x), A.1.2 a) to t), A.2 a) to f)	Parallel operation :	No			
70	5.1.1	Requirement of 1.8 times overloading for transformer feeding a group of motors :	No			
71	5.8, A.1.1 a) to x)	Insulating liquid :	synthetic organic liquid		MIDEL 7131	
72	A.1.1 a) to x), A.1.2 a) to t), Table 1	Tolerance on total losses when not in accordance with IEC 60076-1 :	N/A	%		
73	6.5, A.1.1 a) to x), A.1.2 a) to t), Table 1	Tolerance on impedance value when not in accordance with IEC 60076-1 :	N/A	%		

74		**4.2.2 Neutral terminal**				
75	9,4	Level of DC current in neutral :	<5	%		
76	A.1.1 a) to x)	Transformer neutral earthing for HV winding :	N/A			
77	A.1.1 a) to x)	Transformer neutral earthing for LV winding :	resistance grounded			
78	A.1.1 a) to x)	Transformer neutral earthing for tertiary winding :	N/A			
79	9,2	Sizing of the low voltage neutral terminal :	N/A	%		
80		**4.2.3 Winding**				
81	A.1.1 a) to x)	Winding conductor material :	copper			
82	5.7.2	Requirement of delta connected stabilizing winding :	No			
83	5.7.2	Method of earthing of delta connected stabilizing winding :	N/A			
84	A.1.1 a) to x)	Winding class of insulation :	A			
85	A.1.1 a) to x)	Non-uniform (graded) insulation :	No			
86	A.1.1 a) to x)	High temperature insulation :	No			
87	A.1.2 a) to t)	Thermally upgraded paper :	No			
88		**4.2.4 Termination**				
89	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (HV) :	plug-in connection			
90	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (LV) :	cable box			
91	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (tertiary) :	N/A			
92	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (neutral) :	N/A			
93	A.1.1 a) to x), A.1.2 a) to t)	Cable box type :	air insulated			
94	A.1.1 a) to x)	Main cable box design :	supplier standard			
95	A.1.1 a) to x)	Cable type :	insulated			
96	A.1.1 a) to x)	Number of cables (HV) :	TBC			
97	A.1.1 a) to x)	Number of cables (LV) :	TBC			
98	A.1.1 a) to x)	Number of cables (tertiary) :	N/A			
99	9.6.11.1.4, A.1.1 a) to x)	Cable conductor size (HV) :	TBC	mm²		
100	9.6.11.1.4	Cable conductor size (LV) :	TBC	mm²		
101	9.6.11.1.4	Cable conductor size (tertiary) :	N/A	Select		
102	9.6.11.1.4, A.1.1 a) to x)	Number of cores per cable (HV) :	TBC			
103	9.6.11.1.4	Number of cores per cable (LV) :	TBC			
104	9.6.11.1.4	Number of cores per cable (tertiary) :	N/A			
105	9.6.11.1.4, A.1.1 a) to x)	Number of cables per phase (HV) :	TBC			
106	9.6.11.1.4	Number of cables per phase (LV) :	TBC			
107	9.6.11.1.4	Number of cables per phase (tertiary) :	N/A			
108	5.6, A.1.1 a) to x)	Separate neutral terminal box :	No			
109	9.6.9.5, A.1.1 a) to x)	Canopy required for cable box :	No			
110	9.6.9.9.7	Breather with dessicant or drain for main cable boxes :	No			
111	A.1.1 a) to x)	Busduct type :	N/A			
112	A.1.1(a to x)	**Bushings**				
113	A.1.1 a) to x)	Type of bushings (HV) :	Epoxy resin			
114	A.1.1 a) to x)	Type of bushings (LV) :	Porcelain			
115	A.1.1 a) to x)	Type of bushings (tertiary) :	N/A			
116	A.1.1 a) to x)	Type of bushings (neutral) :	Porcelain			
117		**4.2.5 Tap changer**				
118	6.1, A.1.1 a) to x)	Tap changer required and type :	OLTC			
119	6.4.2.a, 6.4.3.c	Voltage variation required on: :	HV			
120	A.1.1 a) to x)	Type of de-energized tap changer (DETC) :	N/A			
121	9.6.17.2.2	Tap changer switching medium :	liquid			
122	6.2.a, 6.2.b, 6.2.c	Category of voltage variation :	CFVV			
123	6.4.1, 6.4.2.b, 6.4.3.b, 6.4.3.c, A.1.1 a) to x), B.4	Tapping range :	±8x1,25	%		
124	6.4.1, 6.4.2.b, 6.4.3.b, 6.4.3.c, A.1.1 a) to x)	Number of tapping positions :	17 steps			
125	6.4.3.b	Principal tapping position :	symmetrical			
126	6,3	Maximum current tapping position :	68A			
127	9.6.17.3.4	Remote tap-changer cabinet for OLTC :	Yes			
128		**4.2.6 Cooling**				
129	5.2, 5.1.3, A.1.1 a) to x)	Type of cooling :	KNAN			
130	5.1.3, 9.3, A.1.2 a) to t)	Temperature rise of insulating liquid when not in accordance with IEC 60076-2 :	N/A			
131	5.1.3, A.1.2 a) to t)	Temperature rise of winding when not in accordance with IEC 60076-2 or IEC 60076-11 :	N/A			
132	4.2 a) to e)	Cooling water inlet temperature when not in accordance with IEC 60076-2 and IEC 60076-11 :	N/A			
133	5,2	Provision for mounting of cooling fans :	N/A			
134	A.1.1 a) to x)	AF fan motor cabinet :	N/A			
135		**4.2.7 Miscellaneous requirements**				
136		**a. Construction**				
137	A.1.1 a) to x)	Type of cover for liquid immersed transformer and reactor :	bolted			
138	A.1.1 a) to x)	Surface finish of tank and radiators :	zinc coated			
139	9.6.18.1	Painting class required :	VH			
140	A.1.1 a) to x)	Paint shade :	Supplier Standard			
141		**b. Interface**				
142	A.1.1 a) to x)	Auxiliary supply voltage details for cooling fans :	N/A	V		
143	A.1.1 a) to x)	Auxiliary supply voltage details for RTCC :	400	V		
144	8.3 d) to k)	Requirement of current transformer in neutral terminal box :	Yes			
145	A.1.1 a) to x)	Current transformer ratio :	250/1	A		
146	A.1.1 a) to x)	Current transformer accuracy class :	5P20			
147	A.1.1 a) to x)	Current transformer burden :	5	VA		
148		**c. Transport**				
149	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (height) :	5075 ±20	mm		
150	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (width) :	3000 ±20	mm		
151	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (depth) :	3490 ±20	mm		
152	5.7.4.1, A.1.2 a) to t)	Limiting transportation weight :	22750	kg		
153	A.1.1(a to x)	Impact recorder requirement during transportation :	Yes			
154	5.7.4.2	Acceleration in excess of 1 g during transportation :	Yes			
155		**4.3 Reactor specific requirements**				
156	A.1.1 a) to x)	Application :	N/A			
157	A.1.1 a) to x)	Rated current :	N/A	A		
158	A.1.1 a) to x)	Rated short circuit current :	N/A	A		
159	A.1.1 a) to x)	Time to withstand rated short circuit current :	N/A	s		
160	6.5, A.1.1 a) to x)	Impedance at rated voltage and current :	N/A	Ohms		

161		**5. Accessories**				
162	9.1.2, A.1.1 a) to x)	Lifting lugs :	Yes			
163	9.3, A.1.1 a) to x)	Silica gel breather for main tank :	Yes			
164	A.1.1 a) to x)	Type of silica gel breather :	self regenerating			
165	A.1.1 a) to x), Annex F, Table F.1	Liquid level indicator :	Yes			
166	A.1.1 a) to x), Annex F, Table F.1	Magnetic liquid level gauge with alarm and trip contacts :	Yes			
167	9.6.3.4, 9.6.3.5, A.1.1 a) to x), Annex F, Table F.1	Buchholz relay with alarm and trip contacts :	Yes			
168	9.6.1.1, A.1.1 a) to x), Annex F	Pressure Relief Device (PRD) for transformer/reactor tank :	No			
169	9.6.1.1	Pressure relief device for OLTC :	No			
170	9.6.10.3.2	Pressure relief device for liquid filled cable box :	N/A			
171	9.6.1.3	Facility for directing emissions of liquid from the relief device in the direction specified :	No			
172	A.1.1 a) to x)	Sudden pressure relay :	Yes			
173	A.1.1 a) to x), Annex F, Table F.1	Liquid temperature Indicator with alarm and trip contacts :	Yes			
174	A.1.1 a) to x), Annex F, Table F.2	Winding temperature indicator with alarm and trip contacts :	Yes			
175	A.1.1 a) to x), Annex F, Table F.3	Winding temperature measurement type :	PT100 RTD			
176	A.1.1 a) to x)	Cooling fans :	N/A			
177	A.1.1 a) to x)	Redundancy of cooling fans :	N/A			
178	A.1.1 a) to x), Annex F, Table F.1	Control panel for fan starters (for AF type transformer) :	N/A			
179	A.1.1 a) to x), Annex F, Table F.2	Marshalling box :	Yes			
180	A.1.1 a) to x)	HV cable box :	Yes			
181	A.1.1 a) to x)	LV cable box :	Yes			
182	A.1.1 a) to x)	Tertiary cable box :	N/A			
184	9.6.13, A.1.1 a) to x)	Surge arrester requirement :	Yes			
185	9.6.13	Surge arrester class :	Distribuition class			
186	Annex F	Requirement of online dissolved gas analysis (DGA) :	No			
187	Annex F	Requirement of fiber optic temperature sensing :	No			
188	Annex F	Number of channels of fiber optic temperature sensor :	No			
189	9.6.6.2	Core earthing terminals at accessible location. :	Yes			
190	9.6.6.3, A.1.1 a) to x)	Earthing cable lug size :	TBC	mm		
193	9,3	Alarm contact for diaphragm failure for transformer with diaphragm in conservator :	Yes			
194	A.1.1 a) to x)	Bi-directional rollers :	Yes			
195	4.2 f	Anti-condensation heater for cable box :	Yes			
196	9.6.17.3.5	Anti-condensation heater for remote tap-changer cabinet :	Yes			
197	9.1.2. Note	Requirement of ladder :	Yes			
198		**6. Design data from vendor**				
199		**6.1 Electrical parameters**				
200	A.1.1 a) to x), A.1.2 a) to t)	No-load loss at rated voltage and principal tap :	6,2	kW		
201	A.1.1 a) to x), A.1.2 a) to t)	Load loss at rated voltage and principal tap :	34,8	kW		
202	A.1.1 a) to x)	Percentage regulation at unity power factor :	0,82	%		
203	A.1.1 a) to x)	Percentage regulation at 0.8 lagging power factor :	5,374	%		
204	5.1.1, A.1.1 a) to x)	Efficiency at unity power factor, 50 % load :	99,58	%		
205	5.1.1, A.1.1 a) to x)	Efficiency at unity power factor, 100 % load :	99,42	%		
206	5.1.1, 6.4.3.e, A.1.1 a) to x)	Efficiency at 0.8 lagging power factor, 50 % load :	99,47	%		
207	5.1.1, 6.4.3.e, A.1.1 a) to x)	Efficiency at 0.8 lagging power factor, 100 % load :	99,27	%		
208	6.5, 6.5, 6.5 , A.1.1 a) to x), B.4	Percentage impedance on AN rating at principal tap :	8	%		
209	5.7.2 , A.1.1 a) to x)	Zero sequence impedance :	0,53	Ohms/ph		
210		**6.2 Construction**				
211	A.1.1 a) to x)	Winding conductor material :	copper			
212		**Winding type**				
213	A.1.1 a) to x)	HV :	Non-foil			
214	A.1.1 a) to x)	LV :	Non-foil			
215	A.1.1 a) to x)	Tertiary :	Select			
216	A.1.1 a) to x)	Weight of core and windings :	9300	kg		
217	A.1.1 a) to x), A.1.2 a) to t)	Total weight with insulating liquid :	22750	kg		
218	A.1.1 a) to x)	Weight of insulating liquid :	7000	kg		
219	5.8, A.1.1 a) to x)	Insulating liquid :	synthetic organic liquid			
220	A.1.1 a) to x)	On-load tap changer make :	MR			
221	A.1.1 a) to x)	On-load tap changer power required :	1	kW		
222	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled length :	5075 ±20	mm		
223	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled width :	3000 ±20	mm		
224	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled height :	3490 ±20	mm		
225	A.1.1 a) to x)	Dimension details for remote tap changer cabinet length :	NA	mm		
226	A.1.1 a) to x)	Dimension details for remote tap changer cabinet width :	NA	mm		
227	A.1.1 a) to x)	Dimension details for remote tap changer cabinet height :	NA	mm		
228	A.1.1 a) to x), A.1.2 a) to t)	Transportation weight :	22750	kg		
229	5.7.3, A.1.1 a) to x), A.1.2 a) to t)	Sound power level :	68	dB(A)		
230	5.8, A.1.1 a) to x), A.1.2 a) to t)	Use of environmentally harmful materials :	No			
231	4.2.f	Seismic zone certification :	No			

232		**7. Testing requirements**				
233	11.1.3.a	Temperature rise test :	Yes			
234	6.6.b	Temperature rise test at tapping other than the maximum current tapping :	No			
235	11.1.3.d	Power consumption of fans and liquid pump motors :	N/A			
236	11.1.3.b, A.1.2 a) to t)	Dielectric type tests :	Yes			
237	11.1.3.c	Sound level test :	Yes			
238	11.1.3.e	Measurement of no-load loss and current at 90 % and 110 % of rated voltage :	Yes			
239	11.1.4.a, A.1.2 a) to t)	Dielectric special tests :	No			
240	11.1.4.b, A.1.2 a) to t)	Winding hot-spot temperature-rise measurements :	No			
241	11.1.4.c, A.1.2 a) to t)	Determination of capacitances windings-to-earth and between windings :	Yes			
242	11.1.4.e, A.1.2 a) to t)	Determination of transient voltage transfer characteristics :	No			
243	11.1.4.f, A.1.2 a) to t)	Measurement of zero-sequence impedance :	Yes			
244	11.1.4.g, A.1.2 a) to t)	Short-circuit withstand test :	Yes		ONLY CALCULATION	
245	11.1.4.i, A.1.2 a) to t)	Vacuum deflection test :	No			
246	11.1.4.j, A.1.2 a) to t)	Pressure deflection test :	No			
247	11.1.4	Pressure deflection test for OLTC tank :	No			
248	11.1.4.k, A.1.2 a) to t)	Vacuum tightness test :	No			
249	11.1.4	Vacuum tightness test for OLTC tank :	No			
250	11.1.4.l, A.1.2 a) to t)	Measurement of frequency response :	No			
251	11.1.4.m, A.1.2 a) to t)	Check of external coating :	Yes			
252	A.1.2 a) to t)	Measurement of dissolved gasses before and after dielectric tests :	Yes			
253	11.1.4.o, A.1.2 a) to t)	Mechanical test :	No			
254	11.1.4	Simulated transformer/motor on load start test for unit transformer :	N/A			
255	11.1.4	Routine test for Ex 'P' type transformer in accordance with IEC 60079-13 :	N/A			
256	11.1.4	Routine tests for Ex 'O' type transformer in accordance with IEC 60079-6 :	N/A			

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2	Tag No. :	*Insert Tag Number*				
3	Service :	*Insert Service Description*				
4	Ref. Clause	Description			Additional notes	
5		**1. General**				
6		Manufacturer :	MF Trasformatori srl			
7		Vendor :	MF Trasformatori srl			
8		Equipment identifier :	TR-200DE1			
9		Quantity :	1			
10	9,3	Type of liquid preservation system :	conservator with bladder or diaphragm type			
11	4.1, 5.7.1, A.1.1 a) to x)	Service :	Distribution transformer			
12		Conformity assessment system :	D			
13		**2. Environmental conditions**				
14	5.5, A.1.1a) to x)	Altitude (if more than 1000m or 3280ft) :	not more than 1000 m	m		
15	4.2 a) to e), 4.2 f, A.1.1 a) to x)	Minimum ambient temperature :	-8,4	°C		
16	4.2 a) to e), 4.2 f , A.1.1 a) to x)	Maximum ambient temperature :	25	°C		
17	4.2 a) to e), A.1.1 a) to x)	Yearly average ambient temperature :	10,5	°C		
18	5.5, A.1.1 a) to x)	Design ambient temperature (if more than 40 °C or 104 °F) :	not more than 40°C	°C	Offshore (Netherlands)	
19	4.2 a) to e), 4.2 f, A.1.1 a) to x)	Relative humidity at maximum operating temperature (if more than 90 %) :	95	%		
20	4.2 f	Climatic conditions (K) for liquid immersed transformer :	4K26			
21	4.2 f	Special climatic conditions (Z) for liquid immersed transformer :	4Z1,4Z5,4Z14, 4Z15, 4Z17, 4Z10			
22	4.2 f	Biological conditions (B) for liquid immersed transformer :	4B2			
23	4.2 f	Chemically active substances (C) for liquid immersed transformer :	4CX			
24	4.2 f	Mechanically active substances (S) for liquid immersed transformer :	4S11			
25	4.2 f	Mechanical conditions (M) for liquid immersed transformer :	4M11			
26	9.6.18.1, 9.6.18.3	Corrosion class :	CX			
27	A.1.1 a) to x)	Seismic zone as per IEC 60721-2-6, figure 5 :	zone 2			
28	4.2 f , 4.2 i, 5.7.4.2, A.1.1 a) to x)	Location :	offshore fixed			
29	A.1.1 a) to x)	Unusual service conditions :	No			
30	5.7.3, 5.7.3	Sound power level :	60	dB(A)		
31		**3. Hazardous area classification**				
32	4.2 g, A.1.1 a) to x)	Hazardous area classification zone :	non hazardous			
33	4.2 g, A.1.1 a) to x)	Hazardous area classification gas group :	N/A			
34	4.2 g, A.1.1 a) to x)	Hazardous area classification temperature class :	N/A			
35		**4. Technical data**				
36		**4.1 Electrical system data**				
37	5.4.1, A.1.1 a) to x)	Rated voltage (HV) :	6,6	kV		
38	5.4.1	Rated voltage (LV) :	0,42	kV		
39	5.4.1	Rated voltage (tertiary) :	N/A	kV		
40	5.4.2, A.1.1 a) to x)	Rated frequency :	50	Hz		
41	A.1.1 a) to x), A.1.2 a) to t)	System short circuit apparent power :	26,67	MVA		
42	6.4.3.e	Minimum full load power factor :	0,8			
43	A.1.1 a) to x), A.1.2 a) to t)	Supply voltage harmonic content :	5	%		
44		**4.2 Transformer/reactor data**				
45		**4.2.1 General**				
46		**Power frequency withstand voltage**				
47	A.1.1 a) to x)	Power frequency withstand voltage - HV winding :	20	kV		
48	A.1.1 a) to x)	Power frequency withstand voltage - LV winding :	3	kV		
49	A.1.1 a) to x)	Power frequency withstand voltage - tertiary winding :	N/A	kV		
50	A.1.1 a) to x)	Power frequency withstand voltage - neutral terminal :	3	kV		
51		**Lightning impulse withstand voltage**				
52	A.1.1 a) to x)	Lightning impulse withstand voltage - HV winding :	60	kV		
53	A.1.1 a) to x)	Lightning impulse withstand voltage - LV winding :	N/A	kV		
54	A.1.1 a) to x)	Lightning impulse withstand voltage - tertiary winding :	N/A	kV		
55	A.1.1 a) to x)	Lightning impulse withstand voltage - neutral terminal :	N/A	kV		
56	5.7.2, 7.1.1 , A.1.1 a) to x)	Number of phases :	3			
57	6.4.3.a, A.1.1 a) to x)	Direction of power flow :	step-down			
58	7.1.5, 5.7.2, 7.1.1, A.1.1 a) to x)	Connection and phase displacement symbol (vector group) :	Dyn11			
59	A.1.1 a) to x), A.1.2 a) to t), B.4	Percentage impedance on air natural rating at principal tap :	6	%		
60	5.7.2	High limit for zero sequence impedance :	N/A	ohms/ph		
61	5.7.2	Low limit for zero sequence impedance :	N/A	Ohms/ph		
62	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (HV) :	1600	kVA		
63	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (LV) :	1600	kVA		
64	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (tertiary) :	N/A	kVA		
65	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (HV) :	N/A	kVA		
66	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (LV) :	N/A	kVA		
67	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (tertiary) :	N/A	kVA		
68	5.4.3	Variation in V/Hz ratio from no load to rated load when exceeding 105 % :	Not more than 105	%		
69	A.1.1 a) to x), A.1.2 a) to t), A.2 a) to f)	Parallel operation :	No			
70	5.1.1	Requirement of 1.8 times overloading for transformer feeding a group of motors :	No			
71	5.8, A.1.1 a) to x)	Insulating liquid :	synthetic organic liquid		MIDEL 7131	
72	A.1.1 a) to x), A.1.2 a) to t), Table 1	Tolerance on total losses when not in accordance with IEC 60076-1 :	N/A	%		
73	6.5, A.1.1 a) to x), A.1.2 a) to t), Table 1	Tolerance on impedance value when not in accordance with IEC 60076-1 :	N/A	%		

74		**4.2.2 Neutral terminal**				
75	9,4	Level of DC current in neutral :	<5	%		
76	A.1.1 a) to x)	Transformer neutral earthing for HV winding :	N/A			
77	A.1.1 a) to x)	Transformer neutral earthing for LV winding :	solid			
78	A.1.1 a) to x)	Transformer neutral earthing for tertiary winding :	N/A			
79	9,2	Sizing of the low voltage neutral terminal :	100	%		
80		**4.2.3 Winding**				
81	A.1.1 a) to x)	Winding conductor material :	copper			
82	5.7.2	Requirement of delta connected stabilizing winding :	No			
83	5.7.2	Method of earthing of delta connected stabilizing winding :	N/A			
84	A.1.1 a) to x)	Winding class of insulation :	A			
85	A.1.1 a) to x)	Non-uniform (graded) insulation :	No			
86	A.1.1 a) to x)	High temperature insulation :	No			
87	A.1.2 a) to t)	Thermally upgraded paper :	No			
88		**4.2.4 Termination**				
89	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (HV) :	cable box			
90	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (LV) :	cable box			
91	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (tertiary) :	N/A			
92	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (neutral) :	cable box			
93	A.1.1 a) to x), A.1.2 a) to t)	Cable box type :	air insulated			
94	A.1.1 a) to x)	Main cable box design :	supplier standard			
95	A.1.1 a) to x)	Cable type :	insulated			
96	A.1.1 a) to x)	Number of cables (HV) :	TBC			
97	A.1.1 a) to x)	Number of cables (LV) :	TBC			
98	A.1.1 a) to x)	Number of cables (tertiary) :	N/A			
99	9.6.11.1.4, A.1.1 a) to x)	Cable conductor size (HV) :	TBC	mm²		
100	9.6.11.1.4	Cable conductor size (LV) :	TBC	mm²		
101	9.6.11.1.4	Cable conductor size (tertiary) :	N/A	Select		
102	9.6.11.1.4, A.1.1 a) to x)	Number of cores per cable (HV) :	TBC			
103	9.6.11.1.4	Number of cores per cable (LV) :	TBC			
104	9.6.11.1.4	Number of cores per cable (tertiary) :	N/A			
105	9.6.11.1.4, A.1.1 a) to x)	Number of cables per phase (HV) :	TBC			
106	9.6.11.1.4	Number of cables per phase (LV) :	TBC			
107	9.6.11.1.4	Number of cables per phase (tertiary) :	N/A			
108	5.6, A.1.1 a) to x)	Separate neutral terminal box :	No			
109	9.6.9.5, A.1.1 a) to x)	Canopy required for cable box :	No			
110	9.6.9.9.7	Breather with dessicant or drain for main cable boxes :	No			
111	A.1.1 a) to x)	Busduct type :	N/A			
112	A.1.1(a to x)	**Bushings**				
113	A.1.1 a) to x)	Type of bushings (HV) :	Porcelain			
114	A.1.1 a) to x)	Type of bushings (LV) :	Porcelain			
115	A.1.1 a) to x)	Type of bushings (tertiary) :	N/A			
116	A.1.1 a) to x)	Type of bushings (neutral) :	Porcelain			
117		**4.2.5 Tap changer**				
118	6.1, A.1.1 a) to x)	Tap changer required and type :	DETC			
119	6.4.2.a, 6.4.3.c	Voltage variation required on: :	HV			
120	A.1.1 a) to x)	Type of de-energized tap changer (DETC) :	Hand operated			
121	9.6.17.2.2	Tap changer switching medium :	liquid			
122	6.2.a, 6.2.b, 6.2.c	Category of voltage variation :	CFVV			
123	6.4.1, 6.4.2.b, 6.4.3.b, 6.4.3.c, A.1.1 a) to x), B.4	Tapping range :	±2x2,5	%		
124	6.4.1, 6.4.2.b, 6.4.3.b, 6.4.3.c, A.1.1 a) to x)	Number of tapping positions :	5 steps			
125	6.4.3.b	Principal tapping position :	symmetrical			
126	6,3	Maximum current tapping position :	147,3A			
127	9.6.17.3.4	Remote tap-changer cabinet for OLTC :	No			
128		**4.2.6 Cooling**				
129	5.2, 5.1.3, A.1.1 a) to x)	Type of cooling :	KNAN			
130	5.1.3, 9.3, A.1.2 a) to t)	Temperature rise of insulating liquid when not in accordance with IEC 60076-2 :	N/A			
131	5.1.3, A.1.2 a) to t)	Temperature rise of winding when not in accordance with IEC 60076-2 or IEC 60076-11 :	N/A			
132	4.2 a) to e)	Cooling water inlet temperature when not in accordance with IEC 60076-2 and IEC 60076-11 :	N/A			
133	5,2	Provision for mounting of cooling fans :	N/A			
134	A.1.1 a) to x)	AF fan motor cabinet :	N/A			
135		**4.2.7 Miscellaneous requirements**				
136		**a. Construction**				
137	A.1.1 a) to x)	Type of cover for liquid immersed transformer and reactor :	bolted			
138	A.1.1 a) to x)	Surface finish of tank and radiators :	zinc coated			
139	9.6.18.1	Painting class required :	VH			
140	A.1.1 a) to x)	Paint shade :	Supplier Standard			
141		**b. Interface**				
142	A.1.1 a) to x)	Auxiliary supply voltage details for cooling fans :	N/A	V		
143	A.1.1 a) to x)	Auxiliary supply voltage details for RTCC :	N/A	V		
144	8.3 d) to k)	Requirement of current transformer in neutral terminal box :	Yes			
145	A.1.1 a) to x)	Current transformer ratio :	2500/1	A		
146	A.1.1 a) to x)	Current transformer accuracy class :	5P20			
147	A.1.1 a) to x)	Current transformer burden :	10	VA		
148		**c. Transport**				
149	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (height) :	2500 ±20	mm		
150	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (width) :	1635 ±20	mm		
151	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (depth) :	2480 ±20	mm		
152	5.7.4.1, A.1.2 a) to t)	Limiting transportation weight :	5050	kg		
153	A.1.1(a to x)	Impact recorder requirement during transportation :	No			
154	5.7.4.2	Acceleration in excess of 1 g during transportation :	Yes			
155		**4.3 Reactor specific requirements**				
156	A.1.1 a) to x)	Application :	N/A			
157	A.1.1 a) to x)	Rated current :	N/A	A		
158	A.1.1 a) to x)	Rated short circuit current :	N/A	A		
159	A.1.1 a) to x)	Time to withstand rated short circuit current :	N/A	s		
160	6.5, A.1.1 a) to x)	Impedance at rated voltage and current :	N/A	Ohms		

161		**5. Accessories**				
162	9.1.2, A.1.1 a) to x)	Lifting lugs :	Yes			
163	9.3, A.1.1 a) to x)	Silica gel breather for main tank :	Yes			
164	A.1.1 a) to x)	Type of silica gel breather :	manual			
165	A.1.1 a) to x), Annex F, Table F.1	Liquid level indicator :	Yes			
166	A.1.1 a) to x), Annex F, Table F.1	Magnetic liquid level gauge with alarm and trip contacts :	Yes			
167	9.6.3.4, 9.6.3.5, A.1.1 a) to x), Annex F, Table F.1	Buchholz relay with alarm and trip contacts :	Yes			
168	9.6.1.1, A.1.1 a) to x), Annex F	Pressure Relief Device (PRD) for transformer/reactor tank :	No			
169	9.6.1.1	Pressure relief device for OLTC :	No			
170	9.6.10.3.2	Pressure relief device for liquid filled cable box :	N/A			
171	9.6.1.3	Facility for directing emissions of liquid from the relief device in the direction specified :	No			
172	A.1.1 a) to x)	Sudden pressure relay :	Yes			
173	A.1.1 a) to x), Annex F, Table F.1	Liquid temperature Indicator with alarm and trip contacts :	Yes			
174	A.1.1 a) to x), Annex F, Table F.2	Winding temperature indicator with alarm and trip contacts :	Yes			
175	A.1.1 a) to x), Annex F, Table F.3	Winding temperature measurement type :	PT100 RTD			
176	A.1.1 a) to x)	Cooling fans :	N/A			
177	A.1.1 a) to x)	Redundancy of cooling fans :	N/A			
178	A.1.1 a) to x), Annex F, Table F.1	Control panel for fan starters (for AF type transformer) :	N/A			
179	A.1.1 a) to x), Annex F, Table F.2	Marshalling box :	Yes			
180	A.1.1 a) to x)	HV cable box :	Yes			
181	A.1.1 a) to x)	LV cable box :	Yes			
182	A.1.1 a) to x)	Tertiary cable box :	N/A			
184	9.6.13, A.1.1 a) to x)	Surge arrester requirement :	No			
185	9.6.13	Surge arrester class :	Distribuition class			
186	Annex F	Requirement of online dissolved gas analysis (DGA) :	No			
187	Annex F	Requirement of fiber optic temperature sensing :	No			
188	Annex F	Number of channels of fiber optic temperature sensor :	No			
189	9.6.6.2	Core earthing terminals at accessible location. :	Yes			
190	9.6.6.3, A.1.1 a) to x)	Earthing cable lug size :	TBC	mm		
193	9,3	Alarm contact for diaphragm failure for transformer with diaphragm in conservator :	No			
194	A.1.1 a) to x)	Bi-directional rollers :	Yes			
195	4.2 f	Anti-condensation heater for cable box :	Yes			
196	9.6.17.3.5	Anti-condensation heater for remote tap-changer cabinet :	No			
197	9.1.2. Note	Requirement of ladder :	No			
198		**6. Design data from vendor**				
199		**6.1 Electrical parameters**				
200	A.1.1 a) to x), A.1.2 a) to t)	No-load loss at rated voltage and principal tap :	1,08	kW		
201	A.1.1 a) to x), A.1.2 a) to t)	Load loss at rated voltage and principal tap :	12	kW		
202	A.1.1 a) to x)	Percentage regulation at unity power factor :	0,93	%		
203	A.1.1 a) to x)	Percentage regulation at 0.8 lagging power factor :	4,265	%		
204	5.1.1, A.1.1 a) to x)	Efficiency at unity power factor, 50 % load :	99,49	%		
205	5.1.1, A.1.1 a) to x)	Efficiency at unity power factor, 100 % load :	99,19	%		
206	5.1.1, 6.4.3.e, A.1.1 a) to x)	Efficiency at 0.8 lagging power factor, 50 % load :	99,37	%		
207	5.1.1, 6.4.3.e, A.1.1 a) to x)	Efficiency at 0.8 lagging power factor, 100 % load :	98,99	%		
208	6.5, 6.5, 6.5 , A.1.1 a) to x), B.4	Percentage impedance on AN rating at principal tap :	6	%		
209	5.7.2 , A.1.1 a) to x)	Zero sequence impedance :	0,0064	Ohms/ph		
210		**6.2 Construction**				
211	A.1.1 a) to x)	Winding conductor material :	copper			
212		**Winding type**				
213	A.1.1 a) to x)	HV :	Non-foil			
214	A.1.1 a) to x)	LV :	foil			
215	A.1.1 a) to x)	Tertiary :	Select			
216	A.1.1 a) to x)	Weight of core and windings :	2750	kg		
217	A.1.1 a) to x), A.1.2 a) to t)	Total weight with insulating liquid :	5050	kg		
218	A.1.1 a) to x)	Weight of insulating liquid :	750	kg		
219	5.8, A.1.1 a) to x)	Insulating liquid :	synthetic organic liquid			
220	A.1.1 a) to x)	On-load tap changer make :	N/A			
221	A.1.1 a) to x)	On-load tap changer power required :	N/A	kW		
222	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled length :	2500 ±20	mm		
223	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled width :	1635 ±20	mm		
224	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled height :	2480 ±20	mm		
225	A.1.1 a) to x)	Dimension details for remote tap changer cabinet length :	N/A	mm		
226	A.1.1 a) to x)	Dimension details for remote tap changer cabinet width :	N/A	mm		
227	A.1.1 a) to x)	Dimension details for remote tap changer cabinet height :	N/A	mm		
228	A.1.1 a) to x), A.1.2 a) to t)	Transportation weight :	5050	kg		
229	5.7.3, A.1.1 a) to x), A.1.2 a) to t)	Sound power level :	60	dB(A)		
230	5.8, A.1.1 a) to x), A.1.2 a) to t)	Use of environmentally harmful materials :	No			
231	4.2.f	Seismic zone certification :	No			

232		**7. Testing requirements**				
233	11.1.3.a	Temperature rise test :	Yes			
234	6.6.b	Temperature rise test at tapping other than the maximum current tapping :	No			
235	11.1.3.d	Power consumption of fans and liquid pump motors :	N/A			
236	11.1.3.b, A.1.2 a) to t)	Dielectric type tests :	Yes			
237	11.1.3.c	Sound level test :	Yes			
238	11.1.3.e	Measurement of no-load loss and current at 90 % and 110 % of rated voltage :	Yes			
239	11.1.4.a, A.1.2 a) to t)	Dielectric special tests :	No			
240	11.1.4.b, A.1.2 a) to t)	Winding hot-spot temperature-rise measurements :	No			
241	11.1.4.c, A.1.2 a) to t)	Determination of capacitances windings-to-earth and between windings :	Yes			
242	11.1.4.e, A.1.2 a) to t)	Determination of transient voltage transfer characteristics :	No			
243	11.1.4.f, A.1.2 a) to t)	Measurement of zero-sequence impedance :	Yes			
244	11.1.4.g, A.1.2 a) to t)	Short-circuit withstand test :	Yes		ONLY CALCULATION	
245	11.1.4.i, A.1.2 a) to t)	Vacuum deflection test :	No			
246	11.1.4.j, A.1.2 a) to t)	Pressure deflection test :	No			
247	11.1.4	Pressure deflection test for OLTC tank :	No			
248	11.1.4.k, A.1.2 a) to t)	Vacuum tightness test :	No			
249	11.1.4	Vacuum tightness test for OLTC tank :	No			
250	11.1.4.l, A.1.2 a) to t)	Measurement of frequency response :	No			
251	11.1.4.m, A.1.2 a) to t)	Check of external coating :	Yes			
252	A.1.2 a) to t)	Measurement of dissolved gasses before and after dielectric tests :	Yes			
253	11.1.4.o, A.1.2 a) to t)	Mechanical test :	No			
254	11.1.4	Simulated transformer/motor on load start test for unit transformer :	N/A			
255	11.1.4	Routine test for Ex 'P' type transformer in accordance with IEC 60079-13 :	N/A			
256	11.1.4	Routine tests for Ex 'O' type transformer in accordance with IEC 60079-6 :	N/A			

Row		S-720D Data Sheet for Transformers				Issue
2	Tag No. :	*Insert Tag Number*				
3	Service :	*Insert Service Description*				
4	Ref. Clause	Description			Additional notes	
5		**1. General**				
6		Manufacturer :	MF Trasformatori srl			
7		Vendor :	MF Trasformatori srl			
8		Equipment identifier :	TR-200ED1			
9		Quantity :	1			
10	9,3	Type of liquid preservation system :	conservator with bladder or diaphragm type			
11	4.1, 5.7.1, A.1.1 a) to x)	Service :	Distribution transformer			
12		Conformity assessment system :	D			
13		**2. Environmental conditions**				
14	5.5, A.1.1a) to x)	Altitude (if more than 1000m or 3280ft) :	not more than 1000 m	m		
15	4.2 a) to e), 4.2 f, A.1.1 a) to x)	Minimum ambient temperature :	-8,4	°C		
16	4.2 a) to e), 4.2 f , A.1.1 a) to x)	Maximum ambient temperature :	25	°C		
17	4.2 a) to e), A.1.1 a) to x)	Yearly average ambient temperature :	10,5	°C		
18	5.5, A.1.1 a) to x)	Design ambient temperature (if more than 40 °C or 104 °F) :	not more than 40°C	°C	Offshore (Netherlands)	
19	4.2 a) to e), 4.2 f, A.1.1 a) to x)	Relative humidity at maximum operating temperature (if more than 90 %) :	95	%		
20	4.2 f	Climatic conditions (K) for liquid immersed transformer :	4K26			
21	4.2 f	Special climatic conditions (Z) for liquid immersed transformer :	4Z1,4Z5,4Z14, 4Z15, 4Z17, 4Z10			
22	4.2 f	Biological conditions (B) for liquid immersed transformer :	4B2			
23	4.2 f	Chemically active substances (C) for liquid immersed transformer :	4CX			
24	4.2 f	Mechanically active substances (S) for liquid immersed transformer :	4S11			
25	4.2 f	Mechanical conditions (M) for liquid immersed transformer :	4M11			
26	9.6.18.1, 9.6.18.3	Corrosion class :	CX			
27	A.1.1 a) to x)	Seismic zone as per IEC 60721-2-6, figure 5 :	zone 2			
28	4.2 f , 4.2 i, 5.7.4.2, A.1.1 a) to x)	Location :	offshore fixed			
29	A.1.1 a) to x)	Unusual service conditions :	No			
30	5.7.3, 5.7.3	Sound power level :	50	dB(A)		
31		**3. Hazardous area classification**				
32	4.2 g, A.1.1 a) to x)	Hazardous area classification zone :	non hazardous			
33	4.2 g, A.1.1 a) to x)	Hazardous area classification gas group :	N/A			
34	4.2 g, A.1.1 a) to x)	Hazardous area classification temperature class :	N/A			
35		**4. Technical data**				
36		**4.1 Electrical system data**				
37	5.4.1, A.1.1 a) to x)	Rated voltage (HV) :	6,6	kV		
38	5.4.1	Rated voltage (LV) :	0,8	kV		
39	5.4.1	Rated voltage (tertiary) :	N/A	kV		
40	5.4.2, A.1.1 a) to x)	Rated frequency :	50	Hz		
41	A.1.1 a) to x), A.1.2 a) to t)	System short circuit apparent power :	26,67	MVA		
42	6.4.3.e	Minimum full load power factor :	0,8			
43	A.1.1 a) to x), A.1.2 a) to t)	Supply voltage harmonic content :	5	%		
44		**4.2 Transformer/reactor data**				
45		**4.2.1 General**				
46		**Power frequency withstand voltage**				
47	A.1.1 a) to x)	Power frequency withstand voltage - HV winding :	20	kV		
48	A.1.1 a) to x)	Power frequency withstand voltage - LV winding :	3	kV		
49	A.1.1 a) to x)	Power frequency withstand voltage - tertiary winding :	N/A	kV		
50	A.1.1 a) to x)	Power frequency withstand voltage - neutral terminal :	3	kV		
51		**Lightning impulse withstand voltage**				
52	A.1.1 a) to x)	Lightning impulse withstand voltage - HV winding :	60	kV		
53	A.1.1 a) to x)	Lightning impulse withstand voltage - LV winding :	N/A	kV		
54	A.1.1 a) to x)	Lightning impulse withstand voltage - tertiary winding :	N/A	kV		
55	A.1.1 a) to x)	Lightning impulse withstand voltage - neutral terminal :	N/A	kV		
56	5.7.2, 7.1.1 , A.1.1 a) to x)	Number of phases :	3			
57	6.4.3.a, A.1.1 a) to x)	Direction of power flow :	step-down			
58	7.1.5, 5.7.2, 7.1.1, A.1.1 a) to x)	Connection and phase displacement symbol (vector group) :	Dyn11			
59	A.1.1 a) to x), A.1.2 a) to t), B.4	Percentage impedance on air natural rating at principal tap :	6	%		
60	5.7.2	High limit for zero sequence impedance :	N/A	ohms/ph		
61	5.7.2	Low limit for zero sequence impedance :	N/A	Ohms/ph		
62	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (HV) :	500	kVA		
63	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (LV) :	500	kVA		
64	5.1.1, A.1.1 a) to x)	Rated power in air natural mode (tertiary) :	N/A	kVA		
65	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (HV) :	N/A	kVA		
66	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (LV) :	N/A	kVA		
67	5.1.1, 5.1.3, A.1.1 a) to x)	Rated power in forced cooling mode (tertiary) :	N/A	kVA		
68	5.4.3	Variation in V/Hz ratio from no load to rated load when exceeding 105 % :	Not more than 105	%		
69	A.1.1 a) to x), A.1.2 a) to t), A.2 a) to f)	Parallel operation :	No			
70	5.1.1	Requirement of 1.8 times overloading for transformer feeding a group of motors :	No			
71	5.8, A.1.1 a) to x)	Insulating liquid :	synthetic organic liquid		MIDEL 7131	
72	A.1.1 a) to x), A.1.2 a) to t), Table 1	Tolerance on total losses when not in accordance with IEC 60076-1 :	N/A	%		
73	6.5, A.1.1 a) to x), A.1.2 a) to t), Table 1	Tolerance on impedance value when not in accordance with IEC 60076-1 :	N/A	%		

74		**4.2.2 Neutral terminal**				
75	9,4	Level of DC current in neutral :	<5	%		
76	A.1.1 a) to x)	Transformer neutral earthing for HV winding :	N/A			
77	A.1.1 a) to x)	Transformer neutral earthing for LV winding :	solid			
78	A.1.1 a) to x)	Transformer neutral earthing for tertiary winding :	N/A			
79	9,2	Sizing of the low voltage neutral terminal :	100	%		
80		**4.2.3 Winding**				
81	A.1.1 a) to x)	Winding conductor material :	copper			
82	5.7.2	Requirement of delta connected stabilizing winding :	No			
83	5.7.2	Method of earthing of delta connected stabilizing winding :	N/A			
84	A.1.1 a) to x)	Winding class of insulation :	A			
85	A.1.1 a) to x)	Non-uniform (graded) insulation :	No			
86	A.1.1 a) to x)	High temperature insulation :	No			
87	A.1.2 a) to t)	Thermally upgraded paper :	No			
88		**4.2.4 Termination**				
89	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (HV) :	cable box			
90	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (LV) :	cable box			
91	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (tertiary) :	N/A			
92	A.1.1 a) to x), A.1.2 a) to t)	Main external termination details (neutral) :	cable box			
93	A.1.1 a) to x), A.1.2 a) to t)	Cable box type :	air insulated			
94	A.1.1 a) to x)	Main cable box design :	supplier standard			
95	A.1.1 a) to x)	Cable type :	insulated			
96	A.1.1 a) to x)	Number of cables (HV) :	TBC			
97	A.1.1 a) to x)	Number of cables (LV) :	TBC			
98	A.1.1 a) to x)	Number of cables (tertiary) :	N/A			
99	9.6.11.1.4, A.1.1 a) to x)	Cable conductor size (HV) :	TBC	mm²		
100	9.6.11.1.4	Cable conductor size (LV) :	TBC	mm²		
101	9.6.11.1.4	Cable conductor size (tertiary) :	N/A	Select		
102	9.6.11.1.4, A.1.1 a) to x)	Number of cores per cable (HV) :	TBC			
103	9.6.11.1.4	Number of cores per cable (LV) :	TBC			
104	9.6.11.1.4	Number of cores per cable (tertiary) :	N/A			
105	9.6.11.1.4, A.1.1 a) to x)	Number of cables per phase (HV) :	TBC			
106	9.6.11.1.4	Number of cables per phase (LV) :	TBC			
107	9.6.11.1.4	Number of cables per phase (tertiary) :	N/A			
108	5.6, A.1.1 a) to x)	Separate neutral terminal box :	No			
109	9.6.9.5, A.1.1 a) to x)	Canopy required for cable box :	No			
110	9.6.9.9.7	Breather with dessicant or drain for main cable boxes :	No			
111	A.1.1 a) to x)	Busduct type :	N/A			
112	A.1.1(a to x)	**Bushings**				
113	A.1.1 a) to x)	Type of bushings (HV) :	Porcelain			
114	A.1.1 a) to x)	Type of bushings (LV) :	Porcelain			
115	A.1.1 a) to x)	Type of bushings (tertiary) :	N/A			
116	A.1.1 a) to x)	Type of bushings (neutral) :	Porcelain			
117		**4.2.5 Tap changer**				
118	6.1, A.1.1 a) to x)	Tap changer required and type :	DETC			
119	6.4.2.a, 6.4.3.c	Voltage variation required on: :	HV			
120	A.1.1 a) to x)	Type of de-energized tap changer (DETC) :	Hand operated			
121	9.6.17.2.2	Tap changer switching medium :	liquid			
122	6.2.a, 6.2.b, 6.2.c	Category of voltage variation :	CFVV			
123	6.4.1, 6.4.2.b, 6.4.3.b, 6.4.3.c, A.1.1 a) to x), B.4	Tapping range :	±2x2,5	%		
124	6.4.1, 6.4.2.b, 6.4.3.b, 6.4.3.c, A.1.1 a) to x)	Number of tapping positions :	5 steps			
125	6.4.3.b	Principal tapping position :	symmetrical			
126	6,3	Maximum current tapping position :	46A			
127	9.6.17.3.4	Remote tap-changer cabinet for OLTC :	No			
128		**4.2.6 Cooling**				
129	5.2, 5.1.3, A.1.1 a) to x)	Type of cooling :	KNAN			
130	5.1.3, 9.3, A.1.2 a) to t)	Temperature rise of insulating liquid when not in accordance with IEC 60076-2 :	N/A			
131	5.1.3, A.1.2 a) to t)	Temperature rise of winding when not in accordance with IEC 60076-2 or IEC 60076-11 :	N/A			
132	4.2 a) to e)	Cooling water inlet temperature when not in accordance with IEC 60076-2 and IEC 60076-11 :	N/A			
133	5,2	Provision for mounting of cooling fans :	N/A			
134	A.1.1 a) to x)	AF fan motor cabinet :	N/A			
135		**4.2.7 Miscellaneous requirements**				
136		**a. Construction**				
137	A.1.1 a) to x)	Type of cover for liquid immersed transformer and reactor :	bolted			
138	A.1.1 a) to x)	Surface finish of tank and radiators :	zinc coated			
139	9.6.18.1	Painting class required :	VH			
140	A.1.1 a) to x)	Paint shade :	Supplier Standard			
141		**b. Interface**				
142	A.1.1 a) to x)	Auxiliary supply voltage details for cooling fans :	N/A	V		
143	A.1.1 a) to x)	Auxiliary supply voltage details for RTCC :	N/A	V		
144	8.3 d) to k)	Requirement of current transformer in neutral terminal box :	No			
145	A.1.1 a) to x)	Current transformer ratio :	NA	A		
146	A.1.1 a) to x)	Current transformer accuracy class :	NA			
147	A.1.1 a) to x)	Current transformer burden :	NA	VA		
148		**c. Transport**				
149	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (height) :	2460 ±20	mm		
150	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (width) :	1495 ±20	mm		
151	5.7.4.1, A.1.2 a) to t)	Limiting transportation dimensions (depth) :	2086 ±20	mm		
152	5.7.4.1, A.1.2 a) to t)	Limiting transportation weight :	3340	kg		
153	A.1.1(a to x)	Impact recorder requirement during transportation :	No			
154	5.7.4.2	Acceleration in excess of 1 g during transportation :	Yes			
155		**4.3 Reactor specific requirements**				
156	A.1.1 a) to x)	Application :	N/A			
157	A.1.1 a) to x)	Rated current :	N/A	A		
158	A.1.1 a) to x)	Rated short circuit current :	N/A	A		
159	A.1.1 a) to x)	Time to withstand rated short circuit current :	N/A	s		
160	6.5, A.1.1 a) to x)	Impedance at rated voltage and current :	N/A	Ohms		

161		**5. Accessories**				
162	9.1.2, A.1.1 a) to x)	Lifting lugs :	Yes			
163	9.3, A.1.1 a) to x)	Silica gel breather for main tank :	Yes			
164	A.1.1 a) to x)	Type of silica gel breather :	manual			
165	A.1.1 a) to x), Annex F, Table F.1	Liquid level indicator :	Yes			
166	A.1.1 a) to x), Annex F, Table F.1	Magnetic liquid level gauge with alarm and trip contacts :	Yes			
167	9.6.3.4, 9.6.3.5, A.1.1 a) to x), Annex F, Table F.1	Buchholz relay with alarm and trip contacts :	Yes			
168	9.6.1.1, A.1.1 a) to x), Annex F	Pressure Relief Device (PRD) for transformer/reactor tank :	No			
169	9.6.1.1	Pressure relief device for OLTC :	No			
170	9.6.10.3.2	Pressure relief device for liquid filled cable box :	N/A			
171	9.6.1.3	Facility for directing emissions of liquid from the relief device in the direction specified :	No			
172	A.1.1 a) to x)	Sudden pressure relay :	Yes			
173	A.1.1 a) to x), Annex F, Table F.1	Liquid temperature Indicator with alarm and trip contacts :	Yes			
174	A.1.1 a) to x), Annex F, Table F.2	Winding temperature indicator with alarm and trip contacts :	Yes			
175	A.1.1 a) to x), Annex F, Table F.3	Winding temperature measurement type :	PT100 RTD			
176	A.1.1 a) to x)	Cooling fans :	N/A			
177	A.1.1 a) to x)	Redundancy of cooling fans :	N/A			
178	A.1.1 a) to x), Annex F, Table F.1	Control panel for fan starters (for AF type transformer) :	N/A			
179	A.1.1 a) to x), Annex F, Table F.2	Marshalling box :	Yes			
180	A.1.1 a) to x)	HV cable box :	Yes			
181	A.1.1 a) to x)	LV cable box :	Yes			
182	A.1.1 a) to x)	Tertiary cable box :	N/A			
184	9.6.13, A.1.1 a) to x)	Surge arrester requirement :	No			
185	9.6.13	Surge arrester class :	Distribuition class			
186	Annex F	Requirement of online dissolved gas analysis (DGA) :	No			
187	Annex F	Requirement of fiber optic temperature sensing :	No			
188	Annex F	Number of channels of fiber optic temperature sensor :	No			
189	9.6.6.2	Core earthing terminals at accessible location. :	Yes			
190	9.6.6.3, A.1.1 a) to x)	Earthing cable lug size :	TBC	mm		
193	9,3	Alarm contact for diaphragm failure for transformer with diaphragm in conservator :	No			
194	A.1.1 a) to x)	Bi-directional rollers :	Yes			
195	4.2 f	Anti-condensation heater for cable box :	Yes			
196	9.6.17.3.5	Anti-condensation heater for remote tap-changer cabinet :	No			
197	9.1.2. Note	Requirement of ladder :	No			
198		**6. Design data from vendor**				
199		**6.1 Electrical parameters**				
200	A.1.1 a) to x), A.1.2 a) to t)	No-load loss at rated voltage and principal tap :	0,459	kW		
201	A.1.1 a) to x), A.1.2 a) to t)	Load loss at rated voltage and principal tap :	3,9	kW		
202	A.1.1 a) to x)	Percentage regulation at unity power factor :	0,96	%		
203	A.1.1 a) to x)	Percentage regulation at 0.8 lagging power factor :	4,286	%		
204	5.1.1, A.1.1 a) to x)	Efficiency at unity power factor, 50 % load :	99,43	%		
205	5.1.1, A.1.1 a) to x)	Efficiency at unity power factor, 100 % load :	99,14	%		
206	5.1.1, 6.4.3.e, A.1.1 a) to x)	Efficiency at 0.8 lagging power factor, 50 % load :	99,29	%		
207	5.1.1, 6.4.3.e, A.1.1 a) to x)	Efficiency at 0.8 lagging power factor, 100 % load :	98,92	%		
208	6.5, 6.5, 6.5 , A.1.1 a) to x), B.4	Percentage impedance on AN rating at principal tap :	6	%		
209	5.7.2 , A.1.1 a) to x)	Zero sequence impedance :	0,074	Ohms/ph		
210		**6.2 Construction**				
211	A.1.1 a) to x)	Winding conductor material :	copper			
212		**Winding type**				
213	A.1.1 a) to x)	HV :	Non-foil			
214	A.1.1 a) to x)	LV :	foil			
215	A.1.1 a) to x)	Tertiary :	Select			
216	A.1.1 a) to x)	Weight of core and windings :	1750	kg		
217	A.1.1 a) to x), A.1.2 a) to t)	Total weight with insulating liquid :	3340	kg		
218	A.1.1 a) to x)	Weight of insulating liquid :	540	kg		
219	5.8, A.1.1 a) to x)	Insulating liquid :	synthetic organic liquid			
220	A.1.1 a) to x)	On-load tap changer make :	N/A			
221	A.1.1 a) to x)	On-load tap changer power required :	N/A	kW		
222	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled length :	2460 ±20	mm		
223	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled width :	1495 ±20	mm		
224	A.1.1 a) to x), A.1.2 a) to t)	Transformer overall assembled height :	2086 ±20	mm		
225	A.1.1 a) to x)	Dimension details for remote tap changer cabinet length :	N/A	mm		
226	A.1.1 a) to x)	Dimension details for remote tap changer cabinet width :	N/A	mm		
227	A.1.1 a) to x)	Dimension details for remote tap changer cabinet height :	N/A	mm		
228	A.1.1 a) to x), A.1.2 a) to t)	Transportation weight :	3340	kg		
229	5.7.3, A.1.1 a) to x), A.1.2 a) to t)	Sound power level :	50	dB(A)		
230	5.8, A.1.1 a) to x), A.1.2 a) to t)	Use of environmentally harmful materials :	No			
231	4.2.f	Seismic zone certification :	No			

232		**7. Testing requirements**				
233	11.1.3.a	Temperature rise test :	Yes			
234	6.6.b	Temperature rise test at tapping other than the maximum current tapping :	No			
235	11.1.3.d	Power consumption of fans and liquid pump motors :	N/A			
236	11.1.3.b, A.1.2 a) to t)	Dielectric type tests :	Yes			
237	11.1.3.c	Sound level test :	Yes			
238	11.1.3.e	Measurement of no-load loss and current at 90 % and 110 % of rated voltage :	Yes			
239	11.1.4.a, A.1.2 a) to t)	Dielectric special tests :	No			
240	11.1.4.b, A.1.2 a) to t)	Winding hot-spot temperature-rise measurements :	No			
241	11.1.4.c, A.1.2 a) to t)	Determination of capacitances windings-to-earth and between windings :	Yes			
242	11.1.4.e, A.1.2 a) to t)	Determination of transient voltage transfer characteristics :	No			
243	11.1.4.f, A.1.2 a) to t)	Measurement of zero-sequence impedance :	Yes			
244	11.1.4.g, A.1.2 a) to t)	Short-circuit withstand test :	Yes		ONLY CALCULATION	
245	11.1.4.i, A.1.2 a) to t)	Vacuum deflection test :	No			
246	11.1.4.j, A.1.2 a) to t)	Pressure deflection test :	No			
247	11.1.4	Pressure deflection test for OLTC tank :	No			
248	11.1.4.k, A.1.2 a) to t)	Vacuum tightness test :	No			
249	11.1.4	Vacuum tightness test for OLTC tank :	No			
250	11.1.4.l, A.1.2 a) to t)	Measurement of frequency response :	No			
251	11.1.4.m, A.1.2 a) to t)	Check of external coating :	Yes			
252	A.1.2 a) to t)	Measurement of dissolved gasses before and after dielectric tests :	Yes			
253	11.1.4.o, A.1.2 a) to t)	Mechanical test :	No			
254	11.1.4	Simulated transformer/motor on load start test for unit transformer :	N/A			
255	11.1.4	Routine test for Ex 'P' type transformer in accordance with IEC 60079-13 :	N/A			
256	11.1.4	Routine tests for Ex 'O' type transformer in accordance with IEC 60079-6 :	N/A			

CROSSWIND	HOLLANDSE KUST NOORD WIND PARK Project Contract No. CW-I-WP4-2023-05	ROSETTI MARINO
Document Title:	Technical Data Sheet (TDS) for Neutral Earthing Resistor (NER)	Sh. 7 of 7 Date: 04/06/2024 Rev. 04

Row	Ref. Clause	Description			Additional notes	Rev.
		Data Sheet for Neutral Earthing Resistor (NER)				
1	Tag No. :	*Insert Tag Number*				
2	Service :	*Insert Service Description*				
3	Ref. Clause	Description			Additional notes	
4		**1. General**				
5		Manufacturer :	Input Data			
6		Vendor :	Input Data			
7		Equipment identifier :	TR-100AD1 - NER			
8		Quantity :	1			
9		Type :	dry type natural air-cooled resistors			
10		Service :	for distribution transformer			
12		Conformity assessment system :	D			
11		**2. Environmental conditions**				
12		Altitude (if more than 1000m or 3280ft) :	not more than 1000 m	m		
13		Minimum ambient temperature :	-8,4	°C		
14		Maximum ambient temperature :	25	°C		
15		Yearly average ambient temperature :	10,5	°C		
16		Design ambient temperature (if more than 40 °C or 104 °F) :	not more than 40°C	°C	Offshore (Netherlands)	
17		Relative humidity at maximum operating temperature (if more	95	%		
18		Corrosion class :	CX			
19		Seismic zone as per IEC 60721-2-6, figure 5 :	zone 2			
20		Location :	offshore fixed			
21		Installation :	Outdoor			
22		Unusual service conditions :	No			
23		**3. Hazardous area classification**				
24		Hazardous area classification zone :	non hazardous			
25		Hazardous area classification temperature class :	N/A			
26		**4. Technical data**				
27		**4.1 Electrical system data**				
28		Rated voltage :	6,6	kV		
29		Rated frequency :	50	Hz		
30		**4.2 NER data**				
31		**4.2.1 General**				
32		**Resistor specific requirements**				
33		Application :	Permanent connection between star-point and earth			
34		Rated short time current :	400	A		
35		Time to withstand rated short circuit current :	10	s		
36		Initial current during continuous rating :	20	A		
37		Ohm value at 20°C :	9,96	Ohms		
38		Maximum permanent voltage :	199	V		
39		Reated Voltage :	6,9	kV		
40		Rated insulation level :	12	kV		
41		Power frequency withstand voltage :	28	kV		
42		Impulse withstand voltage :	75	kV		
43		**4.2.2 Resistor**				
44		Type of resistive elements :	metal punch grid			
45		Insulation of resistor elements :	completely insulated from earth			
46		Maximun resistance variation :	67	%		
47		Maximum temperature rise above 30 °C of resistor elements	760	°C		
48		Maximum temperature rise above 30 °C of resistor elements for	385	°C		
49		Maximum over temperature of enclosure for continuous current	<70	°C		
50		Design temperature :	25	°C		
51		**4.2.3 Termination**				
52		Type of terminals :	Tinnes copper			
53		Main external termination details :	cable box			
54		Cable box type :	air insulated			
55		Main cable box design :	supplier standard			
56		Cable type :	insulated			
57		Number of cables :	TBC			
58		Cable conductor size :	TBC	mm²		
59		Number of cores per cable :	TBC			
60		**4.2.4 Cooling**				
61		Type of cooling :	Natural ventilation			
62		Provision for mounting of cooling fans :	N/A			
63		**4.2.5 Mechanical characteristics**				
64		**a. Construction**				
65		Enclosure thickness :	2	mm		
66		Protection degree of resistor compartment (IP) :	55			
67		Protection degree of auxiliary termknal box compartment (IP) :	55			
68		Access required for installation /connection / maintenance :	Front			
69		Incoming / outgoing cables :	From bottom			
70		Cables ingress :	Removable plate			
71		Surface finish :	stainless steel			
72		Painting class required :	stainless steel			
73		**b. Interface**				
74		Auxiliary supply voltage details for heater :	230	V ac		
75		**4.3. Accessories**				
76		Lifting lugs :	Yes			
77		Earthing cable lug size :	TBC	mm		
78		Current transformer :	N/A			
79		Auxiliary terminal-box :	Yes			
80		Heater :	Yes			
81		Nameplate :	Yes			
82		Warning labels :	Yes			
83		**4.4. Dimensions & weight**				
84		Length :	1200	mm		
85		Depth :	1050	mm		
86		Height :	2250	mm	500mm enclosure feet	
87		Net weight :	390	kg		
88		**5. Transport (packaged)**				
89		Limiting transportation dimensions (height) :	1350	mm		
90		Limiting transportation dimensions (width) :	1200	mm		
91		Limiting transportation dimensions (depth) :	2650	mm		
92		Limiting transportation weight :	680	kg		