IEC 61850 and IEC 61400-25 Logical Node Classes

(This is an inofficial list compiled by Karlheinz Schwarz, SCC, schwarz@scc-online.de)

Remarks:

Part	Source	Comments
7-4 Ed2 FDIS	LNs_from_57-61850-7-4-draft_FDIS-R0-01_090807	Checked against official FDIS/57/1045. Several LNs from 7-410 have been moved to 7-4 Ed2 FDIS; these will be removed from 7-410 Ed2.
7-410 Ed1 IS	LNs_From_FDIS_61850-7-410_2007-02-19.doc	Checked against IS
7-420 Ed1 IS	LNs_From_IEC 61850-420 DER Logical Nodes FDIS June 21, 2008_To-IEC-CO.doc	Checked against IS
61400-25-2 Ed1 IS	LNs_From_88-61400-25-2-PUB-E_Convenor_2006-11-28.doc	Checked against IS

LN Group	#	Clause	Description	Name	Document
L System LNs	1	5.3.2	Physical device information	LPHD	7-4 Ed2 FDIS
	2	5.3.3	Common Logical Node	Common LN	7-4 Ed2 FDIS
	3	5.3.4	Logical node zero	LLN0	7-4 Ed2 FDIS
	4	5.3.5	Physical Communication channel Supervision	LCCH	7-4 Ed2 FDIS
	5	5.3.6	GOOSE subscription	LGOS	7-4 Ed2 FDIS
	6	5.3.7	Sampled value subscription	LSVS	7-4 Ed2 FDIS
	7	5.3.8	Time management	LTIM	7-4 Ed2 FDIS
	8	5.3.9	Time master supervision	LTMS	7-4 Ed2 FDIS
	9	5.3.10	Service tracking	LTRK	7-4 Ed2 FDIS
A Automatic Control	10	5.4.2	Neutral current regulator	ANCR	7-4 Ed2 FDIS
	11	5.4.3	Reactive power control	ARCO	7-4 Ed2 FDIS
	12	5.4.4	Resistor control	ARIS	7-4 Ed2 FDIS
	13	5.4.5	Automatic tap changer controller	ATCC	7-4 Ed2 FDIS
	14	5.4.6	Voltage control	AVCO	7-4 Ed2 FDIS
C Control	15	5.5.2	Alarm handling	CALH	7-4 Ed2 FDIS
	16	5.5.3	Cooling group control	CCGR	7-4 Ed2 FDIS
	17	5.5.4	Interlocking	CILO	7-4 Ed2 FDIS
	18	5.5.5	Point-on-wave switching	CPOW	7-4 Ed2 FDIS
	19	5.5.6	Switch controller	CSWI	7-4 Ed2 FDIS
	20	5.5.7	Synchronizer controller	CSYN	7-4 Ed2 FDIS

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LN Group	#	Clause	Description	Name	Document
D Decentralized Energy Resources	21	5.2.2	DER plant corporate characteristics at the ECP	DCRP	7-420 Ed1 IS
	22	5.2.3	Operational characteristics at ECP	DOPR	7-420 Ed1 IS
	23	5.2.4	DER operational authority at the ECP	DOPA	7-420 Ed1 IS
	24	5.2.5	Operating mode at ECP	DOPM	7-420 Ed1 IS
	25	5.2.6	Status information at the ECP	DPST	7-420 Ed1 IS
	26	5.2.7	DER economic dispatch parameters	DCCT	7-420 Ed1 IS
	27	5.2.8	DER energy and/or ancillary services schedule control	DSCC	7-420 Ed1 IS
	28	5.2.9	DER energy and/or ancillary services schedule	DSCH	7-420 Ed1 IS
	29	5.3.2	DER controller characteristics	DRCT	7-420 Ed1 IS
	30	5.3.3	DER controller status	DRCS	7-420 Ed1 IS
	31	5.3.4	DER supervisory control	DRCC	7-420 Ed1 IS
	32	6.1.2	DER unit generator	DGEN	7-420 Ed1 IS
	33	6.1.3	DER generator ratings	DRAT	7-420 Ed1 IS
	34	6.1.4	DER advanced generator ratings	DRAZ	7-420 Ed1 IS
	35	6.1.5	Generator cost	DCST	7-420 Ed1 IS
	36	6.2.2	Excitation ratings	DREX	7-420 Ed1 IS
	37	6.2.3	Excitation	DEXC	7-420 Ed1 IS
	38	6.3.2	Speed/Frequency Controller	DSFC	7-420 Ed1 IS
	39	7.1.3	Reciprocating Engine	DCIP	7-420 Ed1 IS
	40	7.2.3	Fuel cell controller	DFCL	7-420 Ed1 IS
	41	7.2.4	Fuel cell stack	DSTK	7-420 Ed1 IS
	42	7.2.5	Fuel processing module	DFPM	7-420 Ed1 IS
	43	7.3.3	Photovoltaics module ratings	DPVM	7-420 Ed1 IS
	44	7.3.4	Photovoltaics array characteristics	DPVA	7-420 Ed1 IS
	45	7.3.5	Photovoltaics array controller	DPVC	7-420 Ed1 IS
	46	7.3.6	Tracking controller	DTRC	7-420 Ed1 IS
	47	7.4.3	CHP system controller	DCHC	7-420 Ed1 IS
	48	7.4.4	Thermal storage	DCTS	7-420 Ed1 IS
	49	7.4.5	Boiler	DCHB	7-420 Ed1 IS
	50	7.1.3	Reciprocating Engine	DCIP	7-420 Ed1 IS
	51	7.2.3	Fuel cell controller	DFCL	7-420 Ed1 IS
	52	8.1.3	Fuel delivery system	DFLV	7-420 Ed1 IS
F Functional Blocks	53	5.6.2	Counter	FCNT	7-4 Ed2 FDIS
	54	5.6.3	Curve shape description	FCSD	7-4 Ed2 FDIS
	55	5.6.4	Generic Filter	FFIL	7-4 Ed2 FDIS
	56	5.6.5	Control function output limitation	FLIM	7-4 Ed2 FDIS
	57	5.6.6	PID regulator	FPID	7-4 Ed2 FDIS
	58	5.6.7	Ramp function	FRMP	7-4 Ed2 FDIS
	59	5.6.8	Set-point control function	FSPT	7-4 Ed2 FDIS
	60	5.6.9	Action at over threshold	FXOT	7-4 Ed2 FDIS
	61	5.6.10	Action at under threshold	FXUT	7-4 Ed2 FDIS
	62	7.2.2	Counter	FCNT	7-410 Ed1 IS
	63	7.2.3	Curve shape description	FCSD	7-410 Ed1 IS
	64	7.2.4	Generic Filter	FFIL	7-410 Ed1 IS
	65	7.2.5	Control function output limitation	FLIM	7-410 Ed1 IS
	66	7.2.6	PID regulator	FPID	7-410 Ed1 IS
	67	7.2.7	Ramp function	FRMP	7-410 Ed1 IS
	68	7.2.8	Set-point control function	FSPT	7-410 Ed1 IS
	69	7.2.9	Action at over threshold	FXOT	7-410 Ed1 IS
	70	7.2.10	Action at under threshold	FXUT	7-410 Ed1 IS
	71	8.4.2	Sequencer	FSEQ	7-420 Ed1 IS

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LN Group	#	Clause	Description	Name	Document
G Generic	72	5.7.2	Generic automatic process control	GAPC	7-4 Ed2 FDIS
	73	5.7.3	Generic process I/O	GGIO	7-4 Ed2 FDIS
	74	5.7.4	Generic log	GLOG	7-4 Ed2 FDIS
	75	5.7.5	Generic security application	GSAL	7-4 Ed2 FDIS
H Hydro Power	76	7.3.2	Turbine - generator shaft bearing	HBRG	7-410 Ed1 IS
	77	7.3.3.	Combinator	HCOM	7-410 Ed1 IS
	78	7.3.4	Hydropower dam	HDAM	7-410 Ed1 IS
	79	7.3.5	Dam leakage supervision	HDLS	7-410 Ed1 IS
	80	7.3.6	Gate position indicator	HGPI	7-410 Ed1 IS
	81	7.3.7	Dam gate	HGTE	7-410 Ed1 IS
	82	7.3.8	Intake gate	HITG	7-410 Ed1 IS
	83	7.3.9	Joint control	HJCL	7-410 Ed1 IS
	84	7.3.10	Leakage supervision	HLKG	7-410 Ed1 IS
	85	7.3.11	Water level indicator	HLVL	7-410 Ed1 IS
	86	7.3.12	Mechanical brake	HMBR	7-410 Ed1 IS
	87	7.3.13	Needle control	HNDL	7-410 Ed1 IS
	88	7.3.14	Water net head data	HNHD	7-410 Ed1 IS
	89	7.3.15	Dam over-topping protection	HOTP	7-410 Ed1 IS
	90	7.3.16	Hydropower / water reservoir	HRES	7-410 Ed1 IS
	91	7.3.17	Hydropower unit sequencer	HSEQ	7-410 Ed1 IS
	92	7.3.18	Speed monitoring	HSPD	7-410 Ed1 IS
	93	7.3.19	Hydropower unit	HUNT	7-410 Ed1 IS
	94	7.3.20	Water control	HWCL	7-410 Ed1 IS
I Interfacing and Archiving	95	5.8.2	Archiving	IARC	7-4 Ed2 FDIS
	96	5.8.3	Human machine interface	IHMI	7-4 Ed2 FDIS
	97	5.8.4	Safety alarm function	ISAF	7-4 Ed2 FDIS
	98	5.8.5	Telecontrol interface	ITCI	7-4 Ed2 FDIS
	99	5.8.6	Telemonitoring interface	ITMI	7-4 Ed2 FDIS
	100	5.8.7	Teleprotection communication interfaces	ITPC	7-4 Ed2 FDIS
	101	7.4.2	Safety alarm function	ISAF	7-410 Ed1 IS
K Mechanical and non-electric primary equipment	102	5.9.2	Fan	KFAN	7-4 Ed2 FDIS
	103	5.9.3	Filter	KFIL	7-4 Ed2 FDIS
	104	5.9.4	Pump	KPMP	7-4 Ed2 FDIS
	105	5.9.5	Tank	KTNK	7-4 Ed2 FDIS
	106	5.9.6	Valve control	KVLV	7-4 Ed2 FDIS
	107	7.5.2	Fan	KFAN	7-410 Ed1 IS
	108	7.5.3	Filter	KFIL	7-410 Ed1 IS
	109	7.5.4	Pump	KPMP	7-410 Ed1 IS
	110	7.5.5	Tank	KTNK	7-410 Ed1 IS
	111	7.5.6	Valve control	KVLV	7-410 Ed1 IS

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LN Group	#	Clause	Description	Name	Document
M Metering and measurement	112	5.10.2	Environmental information	MENV	7-4 Ed2 FDIS
	113	5.10.3	Flicker Measurement Name	MFLK	7-4 Ed2 FDIS
	114	5.10.4	Harmonics or interharmonics	MHAI	7-4 Ed2 FDIS
	115	5.10.5	Non phase related harmonics or interharmonics	MHAN	7-4 Ed2 FDIS
	116	5.10.6	Hydrological information	MHYD	7-4 Ed2 FDIS
	117	5.10.7	DC measurement	MMDC	7-4 Ed2 FDIS
	118	5.10.8	Meteorological information	MMET	7-4 Ed2 FDIS
	119	5.10.9	Metering	MMTN	7-4 Ed2 FDIS
	120	5.10.10	Metering	MMTR	7-4 Ed2 FDIS
	121	5.10.11	Non phase related Measurement	MMXN	7-4 Ed2 FDIS
	122	5.10.12	Measurement	MMXU	7-4 Ed2 FDIS
	123	5.10.13	Sequence and imbalance	MSQI	7-4 Ed2 FDIS
	124	5.10.14	Metering Statistics	MSTA	7-4 Ed2 FDIS
	125	7.6.2	Environmental information	MENV	7-410 Ed1 IS
	126	7.6.3	Hydrological information	MHYD	7-410 Ed1 IS
	127	7.6.4	DC measurement	MMDC	7-410 Ed1 IS
	128	7.6.5	Meteorological information	MMET	7-410 Ed1 IS
	129	8.1.2	Fuel characteristics	MFUL	7-420 Ed1 IS
	130	8.5.3	Pressure measurements	MPRS	7-420 Ed1 IS
	131	8.5.4	Heat measured values	MHET	7-420 Ed1 IS
	132	8.5.5	Flow measurements	MFLW	7-420 Ed1 IS
	133	8.5.7	Emissions measurements	MENV	7-420 Ed1 IS
P Protection functions	134	5.11.2	Differential	PDIF	7-4 Ed2 FDIS
	135	5.11.3	Direction comparison	PDIR	7-4 Ed2 FDIS
	136	5.11.4	Distance	PDIS	7-4 Ed2 FDIS
	137	5.11.5	Directional overpower	PDOP	7-4 Ed2 FDIS
	138	5.11.6	Directional underpower	PDUP	7-4 Ed2 FDIS
	139	5.11.7	Rate of change of frequency	PFRC	7-4 Ed2 FDIS
	140	5.11.8	Harmonic restraint	PHAR	7-4 Ed2 FDIS
	141	5.11.9	Ground detector	PHIZ	7-4 Ed2 FDIS
	142	5.11.10	Instantaneous overcurrent	PIOC	7-4 Ed2 FDIS
	143	5.11.11	Motor restart inhibition	PMRI	7-4 Ed2 FDIS
	144	5.11.12	Motor starting time supervision	PMSS	7-4 Ed2 FDIS
	145	5.11.13	Over power factor	POPF	7-4 Ed2 FDIS
	146	5.11.14	Phase angle measuring	PPAM	7-4 Ed2 FDIS
	147	5.11.15	Rotor protection	PRTR	7-4 Ed2 FDIS
	148	5.11.16	Protection scheme	PSCH	7-4 Ed2 FDIS
	149	5.11.17	Sensitive directional earthfault	PSDE	7-4 Ed2 FDIS
	150	5.11.18	Transient earth fault	PTEF	7-4 Ed2 FDIS
	151	5.11.19	Tyristor protection	PTHF	7-4 Ed2 FDIS
	152	5.11.20	Time overcurrent	PTOC	7-4 Ed2 FDIS
	153	5.11.21	Overfrequency	PTOF	7-4 Ed2 FDIS
	154	5.11.22	Overvoltage	PTOV	7-4 Ed2 FDIS
	155	5.11.23	Protection trip conditioning	PTRC	7-4 Ed2 FDIS
	156	5.11.24	Thermal overload	PTTR	7-4 Ed2 FDIS
	157	5.11.25	Undercurrent	PTUC	7-4 Ed2 FDIS
	158	5.11.26	Underfrequency	PTUF	7-4 Ed2 FDIS
	159	5.11.27	Undervoltage	PTUV	7-4 Ed2 FDIS
	160	5.11.28	Underpower factor	PUPF	7-4 Ed2 FDIS
	161	5.11.29	Voltage controlled time overcurrent	PVOC	7-4 Ed2 FDIS
	162	5.11.30	Volts per Hz	PVPH	7-4 Ed2 FDIS
	163	5.11.31	Zero speed or underspeed	PZSU	7-4 Ed2 FDIS
	164	7.7.2	Rotor protection	PRTR	7-410 Ed1 IS
	165	7.7.3	Thyristor protection	PTHF	7-410 Ed1 IS

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LN Group	#	Clause	Description	Name	Document
Q Power quality events	166	5.12.2	Frequency Variation	QFVR	7-4 Ed2 FDIS
	167	5.12.3	Current Transient	QITR	7-4 Ed2 FDIS
	168	5.12.4	Current Unbalance Variation	QIUB	7-4 Ed2 FDIS
	169	5.12.5	Voltage Transien	QVTR	7-4 Ed2 FDIS
	170	5.12.6	Voltage Unbalance Variation	QVUB	7-4 Ed2 FDIS
	171	5.12.7	Voltage Variation	QVVR	7-4 Ed2 FDIS
R Protection related functions	172	5.13.2	Disturbance recorder channel analogue	RADR	7-4 Ed2 FDIS
	173	5.13.3	Disturbance recorder channel binary	RBDR	7-4 Ed2 FDIS
	174	5.13.4	Breaker failure	RBRF	7-4 Ed2 FDIS
	175	5.13.5	Directional element	RDIR	7-4 Ed2 FDIS
	176	5.13.6	Disturbance recorder function	RDRE	7-4 Ed2 FDIS
	177	5.13.7	Disturbance record handling	RDRS	7-4 Ed2 FDIS
	178	5.13.8	Fault locator	RFLO	7-4 Ed2 FDIS
	179	5.13.9	Differential measurements	RMXU	7-4 Ed2 FDIS
	180	5.13.10	Power swing detection/blocking	RPSB	7-4 Ed2 FDIS
	181	5.13.11	Autoreclosing	RREC	7-4 Ed2 FDIS
	182	5.13.12	Synchronism-check	RSYN	7-4 Ed2 FDIS
	183	7.8.2	synchronising or synchro-check device	RSYN	7-410 Ed1 IS
S Supervision and monitoring	184	5.14.2	Monitoring and diagnostics for arcs	SARC	7-4 Ed2 FDIS
	185	5.14.3	Circuit breaker supervision	SCBR	7-4 Ed2 FDIS
	186	5.14.4	Insulation medium supervision (gas)	SIMG	7-4 Ed2 FDIS
	187	5.14.5	Insulation medium supervision (liquid)	SIML	7-4 Ed2 FDIS
	188	5.14.6	Tap changer Supervision	SLTC	7-4 Ed2 FDIS
	189	5.14.7	Supervision of Operating Mechanism	SOPM	7-4 Ed2 FDIS
	190	5.14.8	Monitoring and diagnostics for partial discharges	SPDC	7-4 Ed2 FDIS
	191	5.14.9	Power Transformer Supervision	SPTR	7-4 Ed2 FDIS
	192	5.14.10	Circuit Switch Supervision	SSWI	7-4 Ed2 FDIS
	193	5.14.11	Temperature supervision	STMP	7-4 Ed2 FDIS
	194	5.14.12	Vibration supervision	SVBR	7-4 Ed2 FDIS
	195	7.9.2	temperature supervision	STMP	7-410 Ed1 IS
	196	7.9.3	vibration supervision	SVBR	7-410 Ed1 IS
	197	8.5.6	Vibration conditions	SVBR	7-420 Ed1 IS
	198	8.5.2	Temperature measurements	STMP	7-420 Ed1 IS
T Instrument Ttransformers and sensors	199	5.15.2	Angle	TANG	7-4 Ed2 FDIS
	200	5.15.3	Axial displacement	TAXD	7-4 Ed2 FDIS
	201	5.15.4	Current transformer	TCTR	7-4 Ed2 FDIS
	202	5.15.5	Distance	TDST	7-4 Ed2 FDIS
	203	5.15.6	Liquid flow	TFLW	7-4 Ed2 FDIS
	204	5.15.7	Frequency	TFRQ	7-4 Ed2 FDIS
	205	5.15.8	Generic sensor	TGSN	7-4 Ed2 FDIS
	206	5.15.9	Humidity	THUM	7-4 Ed2 FDIS
	207	5.15.10	LMedia level	TLVL	7-4 Ed2 FDIS
	208	5.15.11	Magnetic field	TMGF	7-4 Ed2 FDIS
	209	5.15.12	Movement senso	TMVM	7-4 Ed2 FDIS
	210	5.15.13	Position indicator	TPOS	7-4 Ed2 FDIS
	211	5.15.14	Pressure sensor	TPRS	7-4 Ed2 FDIS
	212	5.15.15	Rotation transmitter	TRTN	7-4 Ed2 FDIS
	213	5.15.16	Sound pressure sensor	TSND	7-4 Ed2 FDIS
	214	5.15.17	Temperature sensor	TTMP	7-4 Ed2 FDIS
	215	5.15.18	Mechanical tension / stress	TTNS	7-4 Ed2 FDIS
	216	5.15.19	Vibration sensor	TVBR	7-4 Ed2 FDIS
	217	5.15.20	Voltage transformer	TVTR	7-4 Ed2 FDIS
	218	5.15.21	Water acidity	TWPH	7-4 Ed2 FDIS
	219	7.10.2	Angle sensor	TANG	7-410 Ed1 IS

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LN Group	#	Clause	Description	Name	Document
	220	7.10.3	Axial displacement sensor	TAXD	7-410 Ed1 IS
	221	7.10.4	Distance sensor	TDST	7-410 Ed1 IS
	222	7.10.5	Flow sensor	TFLW	7-410 Ed1 IS
	223	7.10.6	Frequency sensor	TFRQ	7-410 Ed1 IS
	224	7.10.7	Humidity sensor	THUM	7-410 Ed1 IS
	225	7.10.8	Level sensor	TLEV	7-410 Ed1 IS
	226	7.10.9	Magnetic field sensor	TMGF	7-410 Ed1 IS
	227	7.10.10	Movement sensor	TMVM	7-410 Ed1 IS
	228	7.10.11	Position indicator	TPOS	7-410 Ed1 IS
	229	7.10.12	Pressure sensor	TPRS	7-410 Ed1 IS
	230	7.10.13	Rotation transmitter	TRTN	7-410 Ed1 IS
	231	7.10.14	Sound pressure sensor	TSND	7-410 Ed1 IS
	232	7.10.15	Temperature sensor	TTMP	7-410 Ed1 IS
	233	7.10.16	Mechanical tension /stress sensor	TTNS	7-410 Ed1 IS
	234	7.10.17	Vibration sensor	TVBR	7-410 Ed1 IS
	235	7.10.18	Water pH sensor	TWPH	7-410 Ed1 IS
W Wind Turbines	236	Table 7	Wind turbine general information	WTUR	61400-25-2 Ed1 IS
	237	Table 8	Wind turbine rotor information	WROT	61400-25-2 Ed1 IS
	238	Table 9	Wind turbine transmission information	WTRM	61400-25-2 Ed1 IS
	239	Table 10	Wind turbine generator information	WGEN	61400-25-2 Ed1 IS
	240	Table 11	Wind turbine converter information	WCNV	61400-25-2 Ed1 IS
	241	Table 12	Wind turbine transformer information	WTRF	61400-25-2 Ed1 IS
	242	Table 13	Wind turbine nacelle information	WNAC	61400-25-2 Ed1 IS
	243	Table 14	Wind turbine yawing information	WYAW	61400-25-2 Ed1 IS
	244	Table 15	Wind turbine tower information	WTOW	61400-25-2 Ed1 IS
	245	Table 16	Wind power plant meteorological information	WMET	61400-25-2 Ed1 IS
	246	Table 17	Wind power plant alarm information	WALM	61400-25-2 Ed1 IS
	247	Table 18	Wind turbine state log information	WSLG	61400-25-2 Ed1 IS
	248	Table 19	Wind turbine analogue log information	WALG	61400-25-2 Ed1 IS
	249	Table 20	Wind turbine report information	WREP	61400-25-2 Ed1 IS
	250	Table 21	Wind power plant active power control information	WAPC	61400-25-2 Ed1 IS
	251	Table 22	Wind power plant reactive power control information	WRPC	61400-25-2 Ed1 IS
X Switchgear	252	5.16.2	Circuit breaker	XCBR	7-4 Ed2 FDIS
	253	5.16.3	Circuit switch	XSWI	7-4 Ed2 FDIS
	254	8.3.2	Fuse	XFUS	7-420 Ed1 IS
Y Power transformers	255	5.17.2	Earth fault neutralizer (Petersen coil)	YEFN	7-4 Ed2 FDIS
	256	5.17.3	Tap changer	YLTC	7-4 Ed2 FDIS
	257	5.17.4	Power shunt	YPSH	7-4 Ed2 FDIS
	258	5.17.5	Power transformer	YPTR	7-4 Ed2 FDIS
Z further power system equipment	259	5.18.2	Auxiliary network	ZAXN	7-4 Ed2 FDIS
	260	5.18.3	Battery	ZBAT	7-4 Ed2 FDIS
	261	5.18.4	Bushing	ZBSH	7-4 Ed2 FDIS
	262	5.18.5	Power cable	ZCAB	7-4 Ed2 FDIS
	263	5.18.6	Capacitor bank	ZCAP	7-4 Ed2 FDIS
	264	5.18.7	Converter	ZCON	7-4 Ed2 FDIS
	265	5.18.8	Generator	ZGEN	7-4 Ed2 FDIS
	266	5.18.9	Gas insulated line	ZGIL	7-4 Ed2 FDIS
	267	5.18.10	Power overhead line	ZLIN	7-4 Ed2 FDIS
	268	5.18.11	Motor	ZMOT	7-4 Ed2 FDIS
	269	5.18.12	Reactor	ZREA	7-4 Ed2 FDIS
	270	5.18.13	Resistor	ZRES	7-4 Ed2 FDIS
	271	5.18.14	Rotating reactive component	ZRRC	7-4 Ed2 FDIS

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LN Group	#	Clause	Description	Name	Document
	272	5.18.15	Surge arrestor	ZSAR	7-4 Ed2 FDIS
	273	5.18.16	Semi-conductor controlled rectifier	ZSCR	7-4 Ed2 FDIS
	274	5.18.17	Synchronous machine	ZSMC	7-4 Ed2 FDIS
	275	5.18.18	Thyristor controlled frequency converter	ZTCF	7-4 Ed2 FDIS
	276	5.18.19	Thyristor controlled reactive component	ZTCR	7-4 Ed2 FDIS
	277	7.11.2	Neutral resistor	ZRES	7-410 Ed1 IS
	278	7.11.3	Semiconductor rectifier controller	ZSCR	7-410 Ed1 IS
	279	7.11.4	Synchronous machine	ZSMC	7-410 Ed1 IS
	280	6.4.2	Rectifier	ZRCT	7-420 Ed1 IS
	281	6.4.3	Inverter	ZINV	7-420 Ed1 IS
	282	8.2.2	Battery systems	ZBAT	7-420 Ed1 IS
	283	8.2.3	Battery charger	ZBTC	7-420 Ed1 IS