

REO air chokes Product catalogue

REO air chokes –

One series, maximum versatility

Air chokes are particularly used where high inductive linearity is required. Due to their relatively simple mechanical structure, they are not only compact, but also very robust.

With our expertise, the REO air chokes perform to the required standard, even in the most arduous conditions..

As a customer, you benefit from many years of experience, advanced analytical techniques and the assurance that all required standards are always met, combined with a maximum flexibility in the selection of conductor materials, winding technology and ingress protection „REO Mix & Match“.

REO Mix & Match principle

With REO Mix & Match you can choose from a wide range of options - combine the various options in order to always get the best product for your application.

REO Mix & Match principle:



Advantages of REO air chokes.

- No saturation
- Wide range of material selection
- Special protective coating
- High linearity L (i)
- Very good mechanical strength
- No hysteresis
- Optimal weight by forced air cooling
- Directional air flow through GRP conduits.
- Very efficient liquid cooling option (waveguide)
- Able to be universally applied.

One series – maximum material selection

REO is able to offer different designs and winding techniques, a variety of conductor materials and structures.

Depending on the specific requirements, we are able to produce an optimal solution by combining these parameters to provide the perfect solution.

The material used for the conductor is vital in determining the losses and the weight of an air choke.

REO is able to offer standard materials, like aluminum and copper. In addition and through unique in-house development, REO can combine the advantages of the two materials in one, by offering a conductor with less losses than aluminium but is lighter than copper.

Copper

- ★★★★ Construction volume
- ★★★★ Losses
- ★★ Weight
- ★ Price

Legend

★★★★ = very good, e.g. in copper this means a small construction volume, low losses but higher weight

Aluminum

- ★ Construction volume
- ★★ Losses
- ★★★★ Weight
- ★★★★ Price

NEW

REO Hybrid Alu/Copper

- ★★★★ Construction volume
- ★★★★ Losses
- ★★★★ Weight
- ★★ Price

Comparison of materials of an air choke 0.6 mH, 300 A, 5 m/s

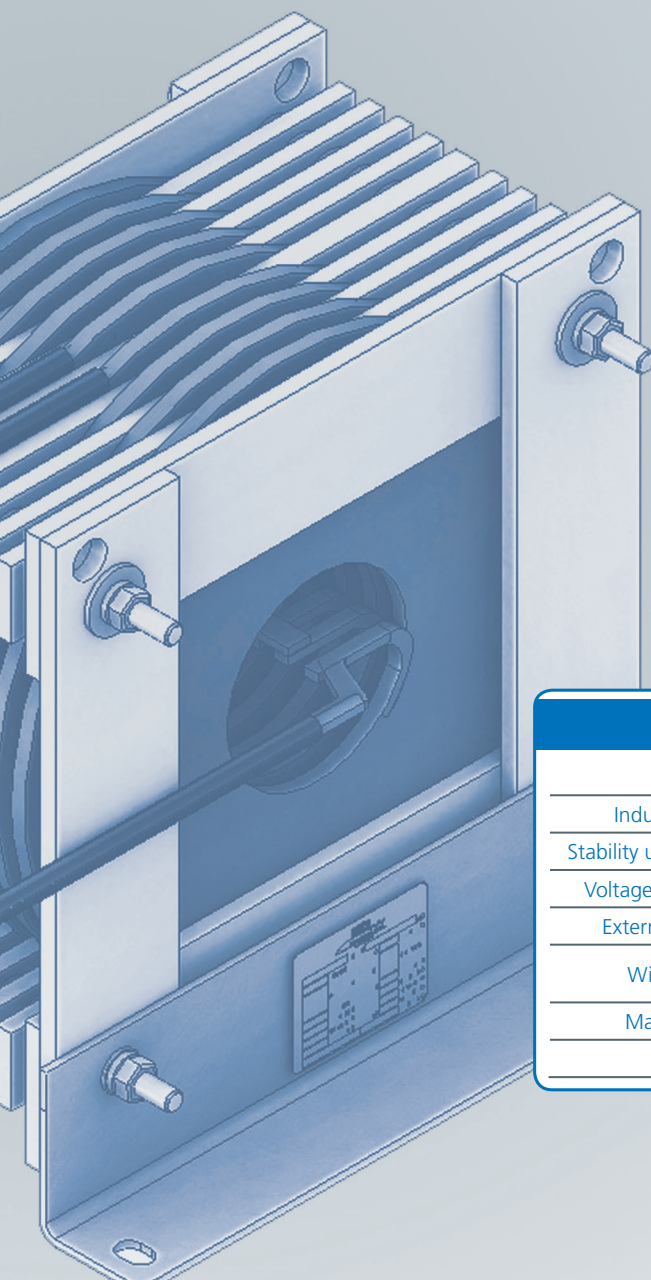
	L [mm]	W [mm]	H [mm]	Copper [kg]	Aluminum [mm]	Total [kg]	P [W]
Copper	120	300	300	20	0	25	1500
Aluminum	120	340	340	0	11	16	1500
Copper / Alu	120	320	320	6	9,5	20	1500

One series – maximum function

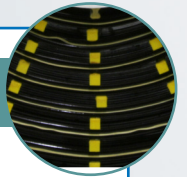
The construction technique is the basis for the function and behavior of a choke.

This determines the electrical performance as well as mechanical stability.

Using disc or layer windings you can cool using natural convection, determine the magnetic field direction and thus adapt exactly to your space requirement.

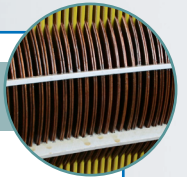


Layer winding



- ★★★★ Inductance
- ★★★★★ Current pulse strength
- ★★★ Dielectric strength

Disc winding



- ★★★★ Inductance
- ★★★ Current pulse strength
- ★★★★ Dielectric strength

Comparison between NTT chokes

	Layer winding	Disc winding	Toroid
Inductance / volume	Good	Very good	Low
Stability under current impulse	Very good	Medium	Medium
Voltage insulation strength	Good	Very good	Good
External magnetic field	Large	Large	Small
Winding material	Wire, litz wire, strip wire	Wire, litz wire	Wire, litz wire
Maximum current	1000 – 2500A	800 - 1200A	300 – 500A
Cooling	AN, AF	AN, AF	AN, AF

One series – maximum protection

Moisture and humidity, combined with pollution and changing temperatures, will impair correct function of a typical choke. Whereas moisture or dirt in the coil or electric wiring will create an issue with insulation which can lead to loss of function of the choke and damage to the choke or connected equipment.

REO offers you several ways to protect your product - whether using a special protective coating or a complete enclosure REO products reach a high protection class and a special resistance to dirt and moisture and other environmental influences.

The REO protective coating is mainly used where pollution and or extreme environmental conditions are expected (Moisture to waterlogging, condensation, abrasion, foreign bodies, etc.).

Our new protection REO Xtreme can even reach high test voltages when immersed in water. REO Xtreme and the REO protective coating meet the requirements of EN 45545-2 R22 / R23 HL3.



**Fire protection
EN 45545-2**

Paint coating

- * Protection against contact
- ★ Protection against foreign bodies
- ★ Protection against moisture
- ★ IP protection rating
- ★★★★ Fire safety

REO-Protective coating

- * Protection against contact
- ★★ Protection against foreign bodies
- ★★★★ Protection against moisture
- ★★ IP protection rating
- ★★★★ Fire safety

Housing*

- ★★★★ Protection against contact
- ★★★★ Protection against foreign bodies
- ★★ Protection against moisture
- ★★★★ IP protection rating
- ★★★★ Fire safety

REO Xtreme

The required test voltage can be achieved when the product is immersed in water

- * Protection against contact
- ★★ Protection against foreign bodies
- ★★★★★ Protection against moisture
- ★★ IP protection rating
- ★★★★ Fire safety



* Chokes treated with paint coating / protective coating must also be protected against contact.

* Achieved values here in connection with paint or protective coating.

Air-core chokes: technical data

Conductor material: **Copper** Type of winding: **Layer winding**

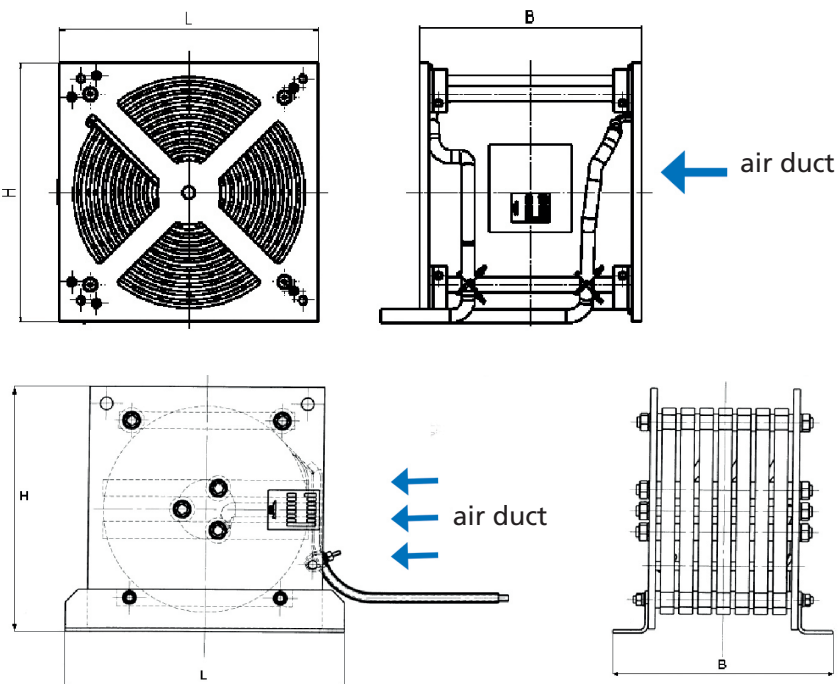
Technical data - copper layer winding															
Type	Inductance [mH]	Cooling									Mechanical data				
		3 m/s			5 m/s			8 m/s			Dimensions			Weight	
		I [A]	magn. Energy [J]	P [kVA] at 20°C	I [A]	magn. Energy [J]	P [kVA] at 20°C	I [A]	magn. Energy [J]	P [kVA] at 20°C	W [mm]	H [mm]	D [mm]	Cu [kg]	total [kg]
LD 100/50/0,2	0,2	50	0,25	0,1	60	0,4	0,1	70	0,5	0,2	150	150	60	1,5	5
LD 100/100/0,2	0,2	100	1	0,2	120	1,4	0,2	145	2,1	0,4	180	180	80	3,6	7
LD 100/200/0,2	0,2	200	4	0,4	240	5,8	0,6	280	7,8	0,8	220	220	130	8,5	13
LD 100/400/0,2	0,2	400	16	0,9	490	24	1,4	585	34,2	1,9	350	350	170	19,7	27
LD 100/700/0,2	0,2	700	49	1,6	850	72,3	2,3	1020	104	3,3	350	350	270	51,3	62
LD 100/1000/0,2	0,2	1000	100	1,7	1225	150,1	2,6	1450	210,3	3,7	400	400	340	110	123
LD 100/50/0,5	0,5	50	0,625	0,2	60	0,9	0,2	72	1,3	0,3	180	180	60	2,2	6
LD 100/100/0,5	0,5	100	2,5	0,3	122	3,7	0,4	145	5,3	0,6	200	200	90	6,2	10
LD 100/200/0,5	0,5	200	10	0,6	245	15	0,9	295	21,8	1,3	300	300	140	16,7	23
LD 100/400/0,5	0,5	400	40	1,5	490	60	2,2	585	85,6	3,1	400	400	170	36,5	45
LD 100/700/0,5	0,5	700	122,5	2,7	865	187,1	4,1	1030	265,2	5,7	400	400	270	86,4	98
LD 100/1000/0,5	0,5	1000	250	3,1	1200	360	4,5	1430	511,2	6,4	500	500	310	173	188
LD 100/50/1	1	50	1,25	0,2	60	1,8	0,3	72	2,6	0,5	180	180	70	3,3	7
LD 100/100/1	1	100	5	0,5	125	7,8	0,8	147	10,8	1,1	250	250	110	8,6	12
LD 100/200/1	1	200	20	0,9	240	28,8	1,4	290	42,1	2	350	350	140	23,5	31
LD 100/400/1	1	400	80	2,2	490	120,1	3,3	585	171,1	4,7	420	420	190	55	66
LD 100/700/1	1	700	245	4,1	870	378,5	6,4	1030	530,5	8,9	420	420	360	134,3	148
LD 100/1000/1	1	1000	500	5	1200	720	7,1	1430	1022,5	10,1	550	550	400	266	283
LD 100/50/2	2	50	2,5	0,4	63	4	0,6	75	5,6	0,8	250	250	80	5,1	9
LD 100/100/2	2	100	10	0,9	125	15,6	0,8	147	21,6	1,1	250	250	120	11,7	16
LD 100/200/2	2	200	40	1,4	245	60	2,2	290	84,1	3	400	400	150	35,9	45
LD 100/400/2	2	400	160	3,6	490	240,1	5,3	580	336,4	7,5	420	420	280	88,9	102
LD 100/700/2	2	700	490	6,5	870	756,9	10	1030	1060,9	14,1	450	450	480	212	234
LD 100/1000/2	2	1000	1000	7,2	1250	1562,5	11,2	1480	2190,4	15,8	550	550	580	460	495
LD 100/50/4	4	50	5	0,6	63	7,9	0,9	75	11,3	1,3	250	250	100	7,8	12
LD 100/100/4	4	100	20	1,3	123	30,3	1,9	145	42,1	2,7	300	300	130	17,4	23
LD 100/200/4	4	200	80	2,2	245	120,1	3,3	290	168,2	4,6	400	400	200	55,1	68
LD 100/400/4	4	400	320	5,6	490	480,2	8,5	580	672,8	11,9	450	450	410	141	157
LD 100/700/4	4	700	980	9,9	870	1513,8	15,2	1040	2163,2	21,8	550	550	550	321	354
LD 100/1000/4	4	1000	2000	11	1250	3125	17,8	1480	4380,8	24,9	550	550	770	727	770
LD 100/50/8	8	50	10	11,4	64	16,4	1,4	77	23,7	2	250	250	120	11,8	16
LD 100/100/8	8	100	40	1,9	125	62,5	3	150	90	4,4	350	350	140	26,9	36
LD 100/200/8	8	200	160	3,4	245	240,1	5	290	336,4	7,1	450	450	240	83,9	98
LD 100/400/8	8	400	640	8,5	490	960,4	12,7	585	1368,9	18,2	500	500	470	212	231
LD 100/700/8	8	700	1960	15,3	875	3062,5	23,9	1050	4410	34,4	550	550	750	499	545

Conductor material: **Copper**

Type of winding: **Disc winding**

Technical data - copper disc winding															
Type	Inductance [mH]	Cooling									Mechanical data				
		3 m/s			5 m/s			8 m/s			Dimensions			Weight	
		I [A]	magn. Energy [J]	P [kVA] at 20°C	I [A]	magn. Energy [J]	P [kVA] at 20°C	I [A]	magn. Energy [J]	P [kVA] at 20°C	B [mm]	H [mm]	T [mm]	Cu [kg]	total [kg]
LD 200/100/1	1,0	100	5	0,4	140	9,8	0,7	180	16,2	1,2	300	300	110	11,1	15
LD 200/200/1	1,0	200	20	0,9	270	36,5	1,6	330	54,5	2,4	350	350	130	24,3	32
LD 200/400/1	1,0	400	80	2,1	530	140,5	3,6	660	217,8	5,6	420	420	185	57,2	68
LD 200/700/1	1,0	700	245	3,4	850	361,3	5,6	1000	500,0	13,2	450	450	325	158,4	173
LD 200/100/2	2,0	100	10	0,7	130	16,9	1,6	150	22,5	1,4	300	300	120	12,5	17
LD 200/200/2	2,0	200	40	1,4	250	62,5	2,1	320	102,4	3,5	350	350	180	37,6	46
LD 200/400/2	2,0	400	160	3,3	500	250,0	5,1	600	360,0	7,3	400	400	270	90,0	103
LD 200/700/2	2,0	700	490	5,4	950	902,5	9,9	1100	1210,0	13,2	500	500	475	250,8	286
LD 200/100/4	4,0	100	20	1,1	120	28,8	1,6	140	39,2	2,2	300	300	170	19,7	26
LD 200/200/4	4,0	200	80	2,1	250	125,0	3,3	300	180,0	4,7	350	350	240	58,1	71
LD 200/400/4	4,0	400	320	5,1	500	500,0	7,9	600	720,0	11,4	420	420	360	140,6	157
LD 200/700/4	4,0	700	980	8,2	950	1805,0	15,1	1150	2645,0	22,1	550	550	550	381,3	415
LD 200/100/8	8,0	100	40	1,8	120	57,6	2,5	140	78,4	3,4	300	300	200	31,0	40
LD 200/200/8	8,0	200	160	3,3	250	250,0	5,2	300	360,0	7,5	400	400	320	92,3	107
LD 200/400/8	8,0	400	640	7,7	500	1000,0	12,1	600	1440,0	17,4	500	500	365	214,5	235

Diagram of layer/disc winding



Air-core chokes: technical data

Conductor material: **Aluminum** Type of winding: **Layer winding**

Technical data - aluminum layer winding															
Type	Inductance [mH]	Cooling									Mechanical data				
		3 m/s			5 m/s			8 m/s			Dimensions			Weight	
		I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	W [mm]	H [mm]	D [mm]	Cu [kg]	total [kg]
LD 110/70/0,2	0,2	70	0,49	0,2	87	0,8	0,3	105	1,1	0,4	150	150	100	1	4
LD 110/100/0,2	0,2	100	1	0,2	133	1,8	0,3	160	2,6	0,5	200	200	120	2	5
LD 110/200/0,2	0,2	200	4	0,4	240	5,8	0,6	290	8,4	0,8	300	300	110	4,5	11
LD 110/400/0,2	0,2	400	16	0,9	480	23,0	1,3	570	32,5	1,9	350	350	190	10,9	21
LD 110/700/0,2	0,2	700	49	1,5	820	67,2	2,0	980	96,0	2,9	400	400	250	29	42
LD 110/1000/0,2	0,2	1000	100	2,3	1210	146,4	3,4	1470	216,1	4,7	400	400	450	51,1	68
LD 110/50/0,5	0,5	50	0,625	0,2	60	0,9	0,3	70	1,2	0,4	200	200	80	1	4
LD 110/100/0,5	0,5	100	2,5	0,4	118	3,5	0,6	140	4,9	0,8	200	200	140	2,5	6
LD 110/200/0,5	0,5	200	10	0,7	235	13,8	1,0	280	19,6	1,4	300	300	200	8,3	15
LD 110/400/0,5	0,5	400	40	1,6	485	58,8	2,3	580	84,1	3,3	400	400	210	18,6	30
LD 110/700/0,5	0,5	700	122,5	2,5	820	168,1	3,6	970	235,2	5,0	400	400	380	52	69
LD 110/1000/0,5	0,5	1000	250	3,9	1230	378,2	5,9	1460	532,9	8,2	500	500	420	84,7	106
LD 110/50/1	1,0	50	1,25	0,3	60	1,8	0,5	73	2,7	0,7	250	250	80	1,3	5
LD 110/100/1	1,0	100	5	0,6	125	7,8	1,0	148	11,0	1,4	250	250	130	3,7	8
LD 110/200/1	1,0	200	20	1,0	240	28,8	1,5	290	42,1	2,2	350	350	180	12,1	21
LD 110/400/1	1,0	400	80	2,5	490	120,1	3,7	580	168,2	5,2	450	450	250	29	43
LD 110/700/1	1,0	700	245	3,8	830	344,5	5,3	980	480,2	7,4	550	550	340	75,4	97
LD 110/1000/1	1,0	1000	500	6,0	1240	768,8	9,3	1480	1095,2	13,2	550	550	550	132	158
LD 110/50/2	2,0	50	2,5	0,5	62	3,8	0,8	84	7,1	1,1	250	250	100	2,1	6
LD 110/100/2	2,0	100	10	1,0	122	14,9	1,5	145	21,0	2,1	250	250	220	6	11
LD 110/200/2	2,0	200	40	1,6	245	60,0	2,4	290	84,1	3,4	400	400	230	18,8	29
LD 110/400/2	2,0	400	160	3,9	485	235,2	5,7	575	330,6	8,0	450	450	350	45,2	62
LD 110/700/2	2,0	700	490	6,0	825	680,6	8,3	980	960,4	11,8	500	500	500	119	142
LD 110/1000/2	2,0	1000	1000	9,1	1230	1512,9	13,8	1450	2102,5	19,7	550	550	660	200	232
LD 110/50/4	4,0	50	5	0,8	62	7,7	1,2	73	10,7	1,6	250	250	140	3,2	7
LD 110/100/4	4,0	100	20	1,5	125	31,3	2,3	150	45,0	3,3	300	300	200	9,8	15
LD 110/200/4	4,0	200	80	2,4	245	120,1	3,6	290	168,2	5,1	400	400	250	28,4	41
LD 110/400/4	4,0	400	320	6,2	490	480,2	9,3	585	684,5	13,2	450	450	520	72,3	95
LD 110/700/4	4,0	700	980	9,2	830	1377,8	12,9	980	1920,8	18,0	550	550	620	182	212
LD 110/1000/4	4,0	1000	2000	13,8	1240	3075,2	21,2	1480	4380,8	30,2	630	630	750	302	348
LD 110/50/8	8,0	50	10	1,1	62	15,4	1,7	74	21,9	2,5	250	250	160	4,7	10
LD 110/100/8	8,0	100	40	2,2	130	67,6	3,7	155	96,1	5,2	350	350	190	12,9	21
LD 110/200/8	8,0	200	160	3,8	245	240,1	5,7	290	336,4	8,0	450	450	350	44,6	60
LD 110/400/8	8,0	400	640	9,4	490	960,4	14,1	580	1345,6	19,7	500	500	610	109,8	137
LD 110/700/8	8,0	700	1960	13,8	820	2689,6	19,0	980	3841,6	27,1	650	650	670	275	313

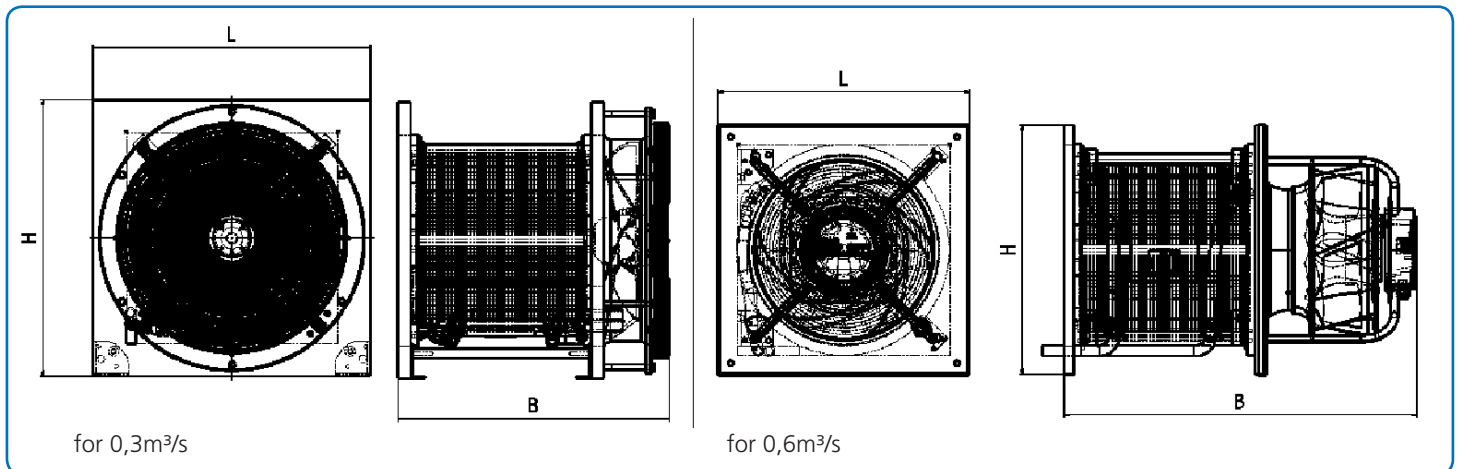
Conductor material: Aluminum Type of winding: Disc winding

Technical data - Aluminum disc winding

Type	Inductance [mH]	Cooling									Mechanical data				
		3 m/s			5 m/s			8 m/s			Dimensions			Weight	
		I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	W [mm]	H [mm]	D [mm]	Cu [kg]	total [kg]
LD 210/100/1	1	100	5	0,5	140	9,8	0,9	180	16,2	1,5	300	300	130	5,06	14
LD 210/200/1	1	200	20	1	280	39,2	2,1	350	61,3	3,2	400	400	180	12,32	21
LD 210/400/1	1	400	80	3	500	125	4,6	600	180	6,6	500	500	190	23,54	49
LD 210/700/1	1	700	245	5,1	850	361,3	7,5	1000	500	10,4	500	500	330	53,79	75
LD 210/100/2	2	100	10	0,7	150	22,5	1,8	180	32,4	2,4	350	350	180	7,81	13
LD 210/200/2	2	200	40	1,6	300	90	3,6	380	144,4	5,8	400	400	220	18,92	29
LD 210/400/2	2	400	160	4,4	500	250	6,9	600	360	9,9	450	450	280	34,1	51
LD 210/700/2	2	700	490	8	850	722,5	11,7	1000	1000	16,2	550	550	420	83,6	107
LD 210/100/4	4	100	20	1,2	150	45	2,6	180	64,8	3,7	350	350	230	12,21	17
LD 210/200/4	4	200	80	2,5	300	180	5,7	380	288,8	9,1	420	420	290	29,37	43
LD 210/400/4	4	400	320	6,9	500	500	10,8	600	720	15,6	500	500	370	53,79	77
LD 210/700/4	4	700	980	12,4	850	1445	18,2	1000	2000	25,2	600	600	540	129,8	160
LD 210/100/8	8	100	40	1,7	150	90	3,9	180	129,6	5,6	350	350	270	18,26	27
LD 210/200/8	8	200	160	3,8	300	360	8,7	380	577,6	13,9	450	450	350	44,99	60
LD 210/400/8	8	400	640	10,7	500	1000	16,7	600	1440	24	550	550	430	82,83	110
LD 210/700/8	8	700	1960	19	850	2890	28	1000	4000	38,7	650	650	680	199,1	240

Fan options of REO

Figure: choke with cooling unit, examples



Optional: Sensors

The following sensors can optionally be supplied for the chokes:

- Switch NO / NC
- PT100
- NTC
- PTC

Air-core chokes: technical data

Conductor material: **AL-CU** Type of winding: **Layer winding**

Technical data - aluminum copper layer winding															
Type	Inductance [mH]	Cooling									Mechanical data				
		3 m/s			5 m/s			8 m/s			Dimensions			Weight	
		I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	W [mm]	H [mm]	D [mm]	Cu [kg]	total [kg]
LD 120/200/0,2	0,2	200	4	0,4	240	5,8	0,6	285	8,1	0,8	250	250	150	6,6	11
LD 120/400/0,2	0,2	400	16	0,9	510	26,0	1,5	610	37,2	2,1	350	350	180	16	25
LD 120/700/0,2	0,2	700	49	1,3	860	74,0	2,0	1030	106,1	2,9	350	350	280	44,6	54
LD 120/1000/0,2	0,2	1000	100	2,2	1170	136,9	3,0	1400	196,0	4,2	400	400	420	77,2	92
LD 120/200/0,5	0,5	200	10	0,7	245	15,0	1,0	295	21,8	1,5	300	300	180	11,9	18
LD 120/400/0,5	0,5	400	40	1,6	510	65,0	2,5	600	90,0	3,5	400	400	210	27,8	38
LD 120/700/0,5	0,5	700	122,5	2,4	870	189,2	3,7	1030	265,2	5,2	400	400	350	80	93
LD 120/1000/0,5	0,5	1000	250	3,6	1200	360,0	5,1	1440	518,4	7,4	500	500	360	127	147
LD 120/200/1	1,0	200	20	1,0	255	32,5	1,6	300	45,0	2,2	350	350	170	17,8	26
LD 120/400/1	1,0	400	80	2,4	500	125,0	3,7	600	180,0	5,4	450	450	240	39,1	57
LD 120/700/1	1,0	700	245	3,7	870	378,5	5,8	1030	530,5	8,1	450	450	460	125	139
LD 120/1000/1	1,0	1000	500	5,5	1200	720,0	7,9	1420	1008,2	11,1	550	550	490	197	222
LD 120/200/2	2,0	200	40	1,6	250	62,5	2,4	300	90,0	3,5	400	400	190	26,9	37
LD 120/400/2	2,0	400	160	3,8	500	250,0	5,9	600	360,0	8,5	450	450	360	67,5	83
LD 120/700/2	2,0	700	490	5,8	870	756,9	8,9	1040	1081,6	12,7	450	450	580	192	217
LD 120/1000/2	2,0	1000	1000	8,5	1190	1416,1	12,1	1410	1988,1	17,0	550	550	640	305	341
LD 120/200/4	4,0	200	80	2,3	255	130,1	3,8	300	180,0	5,3	400	400	230	40,6	55
LD 120/400/4	4,0	400	320	6,3	500	500,0	9,8	600	720,0	14,1	450	450	530	109	129
LD 120/700/4	4,0	700	980	8,6	810	1312,2	13,4	1040	2163,2	19,1	550	550	620	289	326
LD 120/1000/4	4,0	1000	2000	12,7	1250	3125,0	19,9	1500	4500,0	28,7	600	600	820	503	555
LD 120/200/8	8,0	200	160	3,6	250	250,0	5,6	300	360,0	8,1	450	450	320	64,1	81
LD 120/400/8	8,0	400	640	9,3	500	1000,0	14,5	600	1440,0	20,8	500	500	600	169	192
LD 120/700/8	8,0	700	1960	13,5	870	3027,6	20,9	1050	4410,0	30,4	550	550	830	453	506

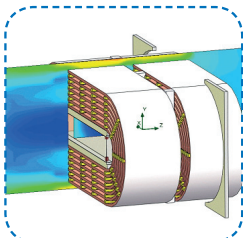
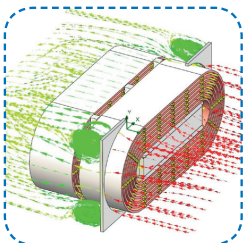
Conductor material: **AL-CU** Type of winding: **Disc winding**

Technical data - aluminum copper disc winding															
Type	Inductance [mH]	Cooling									Mechanical data				
		3 m/s			5 m/s			8 m/s			Dimensions			Weight	
		I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	I [A]	magn. energy [J]	P [kVA] at 20°C	W [mm]	H [mm]	D [mm]	Cu [kg]	total [kg]
LD 220/200/0,5	0,5	200	10	0,7	250	15,6	1,1	300	22,5	1,6	250	250	180	11,4	16
LD 220/400/0,5	0,5	400	40	1,8	500	62,5	2,9	600	90	4,2	350	350	180	20,9	29
LD 220/700/0,5	0,5	700	122,5	2,4	850	180,6	3,6	1000	250	5	400	400	370	74,8	86
LD 220/200/1	1	200	20	1,1	250	31,3	1,7	300	45	2,4	300	300	220	17,6	33
LD 220/400/1	1	400	80	2,8	500	125	4,4	600	180	6,3	400	400	220	32,5	37
LD 220/700/1	1	700	245	3,8	850	361,3	5,5	1000	5	7,7	400	400	450	116	124
LD 220/200/2	2	200	40	1,7	250	62,5	2,6	300	90	3,7	350	350	230	26,7	40
LD 220/400/2	2	400	160	4,4	500	250	6,9	600	360	10	400	400	310	51,4	87
LD 220/700/2	2	700	490	5,7	850	722,5	8,4	1000	1000	11,6	450	450	490	175	182
LD 220/200/4	4	200	80	2,5	250	125	3,9	300	180	5,6	400	400	250	40,2	54
LD 220/400/4	4	400	320	6,9	500	500	10,8	600	720	15,6	420	420	400	80,3	97
LD 220/700/4	4	700	980	8,7	850	1445	12,8	1000	2000	17,7	500	500	570	267	301



The benefits of REO:

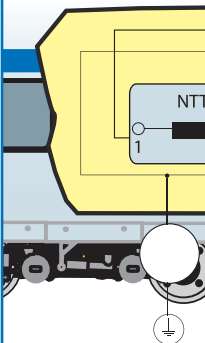
- IRIS certification: Our production for railway technology is IRIS certified.
- EN 45545: REO manufactured according to the European fire standard EN 45545 and DIN 5510, NF F 16-101 / 102*
- All in one: With REO you get all the components for your frequency converter
- Individual solutions adapted to your application
- Use of advanced analysis, simulation and test methods, such as FEM thermal simulation, 3D magnetic field simulation and finite element analysis of Structural Mechanics
- REO speaks your language: With worldwide sales locations we are always close to our customers.
- Safety audits by: Full type testing and validation of the development according to EN 60310



* Applies only to train products

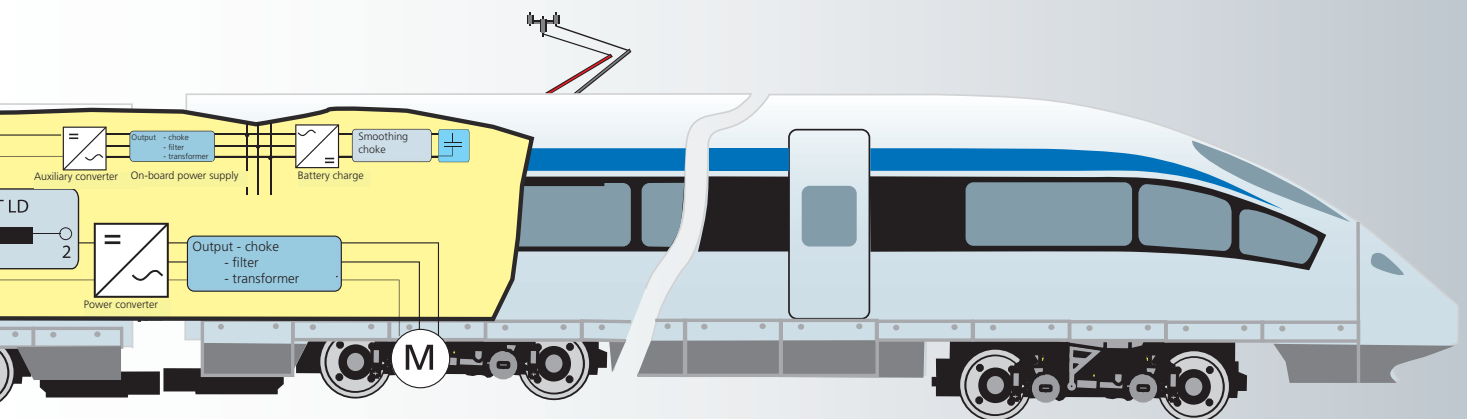
Train components NTT LD – transporting you safely

Electrical data	
Choke Type:	Air choke
Frequency of the current:	DC und AC
Tolerances:	+ 10 / - 10 %, + 5 / - 5 %
Taps:	By default, no taps (available on request)
Insulation:	F or H
Cooling method and cooling liquid according to IEC 60310:	AN, AF or WF
Voltages - Working voltage, RMS (max. operating voltage winding to ground permanently):	< <1kV up to 3,6 kV
Test voltage:	up to 12kV 60s 50Hz, up to 25kV 1,2/50µs
Mounting:	Suspended, vertical or horizontal
Mechanical strength Mechanical simulation (FEM) Shock - and vibration stress	EN 12663 IEC 61373 Kat. 1 Kl. B
Electrical connections:	Wire cable-free installation for each connection Flat connectors (IP00) Cable (IP00-IPX4) Terminal box (IP65)
Impregnation:	Vacuum pressure impregnation process protects the product against corrosion and optimizes heat dissipation
Additional protection of the surface	With a special coating and various encapsulation methods REO products reach a high protection class and an increased resistance against dirt, moisture and influences, such as salt mist, etc.



Ambient conditions for operation, transport and storage

Environmental impact	Requirement
Ambient temperature in normal outdoor use	-20°C ... +40°C OPTIONAL -50°C ... + 65°C
Ambient conditions for transport and storage	-20°C ... +85°C OPTIONAL bis +50°C
Pollution according to EN 50124-1	PD1 – PD4
Cooling method and cooling liquid according to IEC 60310	AF, AN or liquid cooling
Coolant inlet temperature	-20°C bis +40°C OPTIONAL
Altitude (max. operating altitude)	≤1000m OPTIONAL bis ≤2000m
Environmental conditions according to EN 50125-1 Classification according to IEC 721-3-5	
Climate class	5K1
Chemically active substances	5C2
Mechanically active substances	5S2
C ontaminant	5F2



EMC-Compatibility

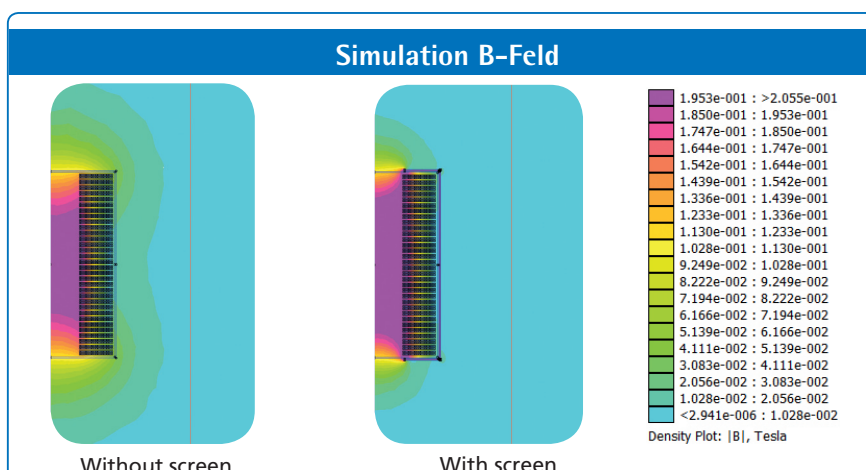
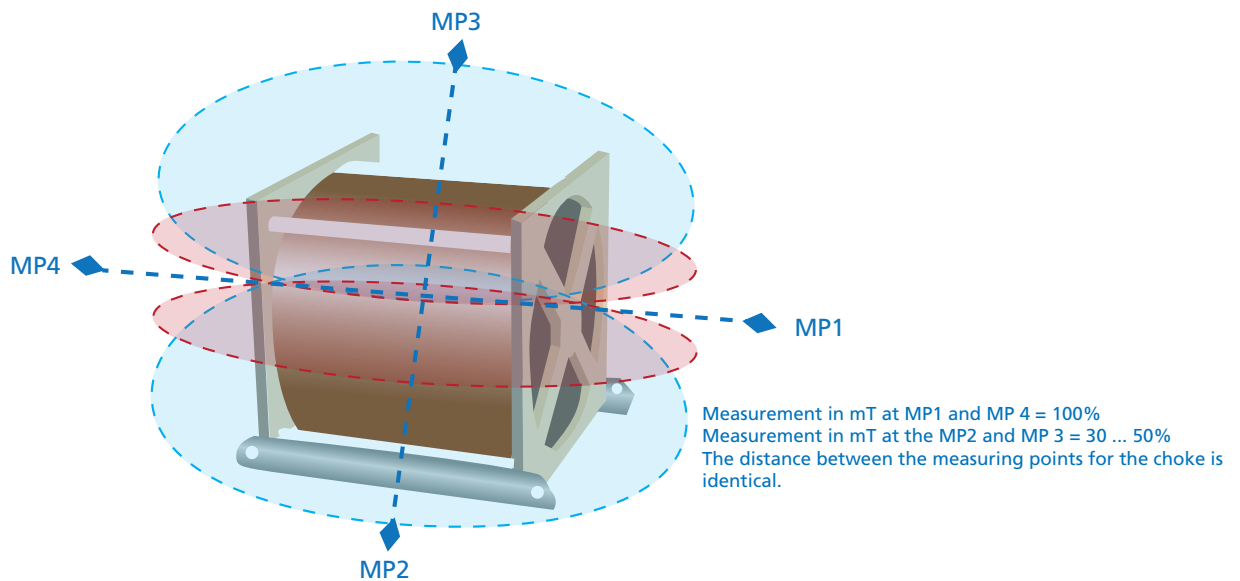
All transformers and chokes have a stray magnetic field which depends on many factors and varies in intensity.

VDE 0848 and especially parts 3-1 specifies safety for electric, magnetic and electromagnetic fields - Protection of persons with active electrical component in the frequency range 0 Hz to 300 GHz. These limits must be observed and thanks to extensive measurements, optimization of the windings and construction methods developed by REO, we have the experience and solutions for critical environments that allow minimization of the electromagnetic fields and compliance with the limits.

We can show a simplified schematic drawing of the electromagnetic field of a typical air choke to provide examples of the effects of distance and reduction methods.

The reduction in the intensity of the electromagnetic field relative to the distance to the reactor, are shown. For simplicity, we refer only to a point and move away from the choke taking measurements every 10 cm to a max distance of 1 m.

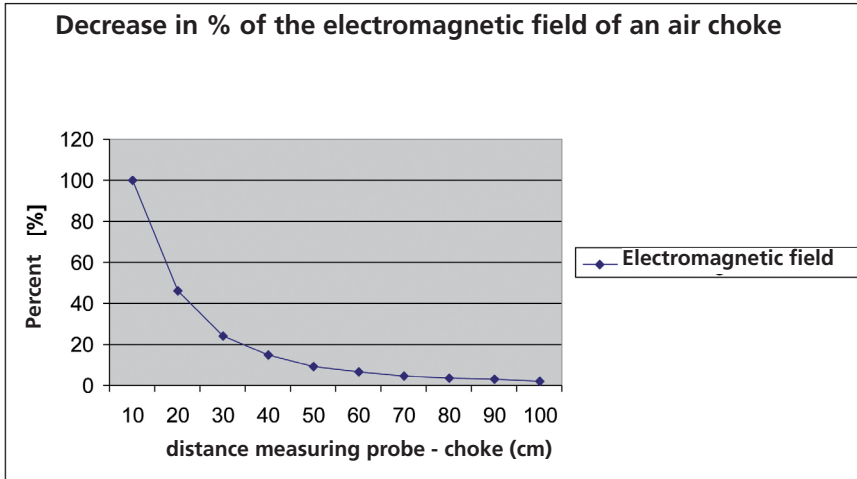
The results are shown in the graph below.



To reduce this field in a confined space, steel plates are used to shield the environment and sensitive areas. These steel plates can vary in thickness and spacing, depending on the requirements.

Other measurements were performed at a distance of 300 mm from the inductor. Steel plates of different thicknesses at intervals of 22.5 mm, 55 mm or 100 mm are used to screen the choke.

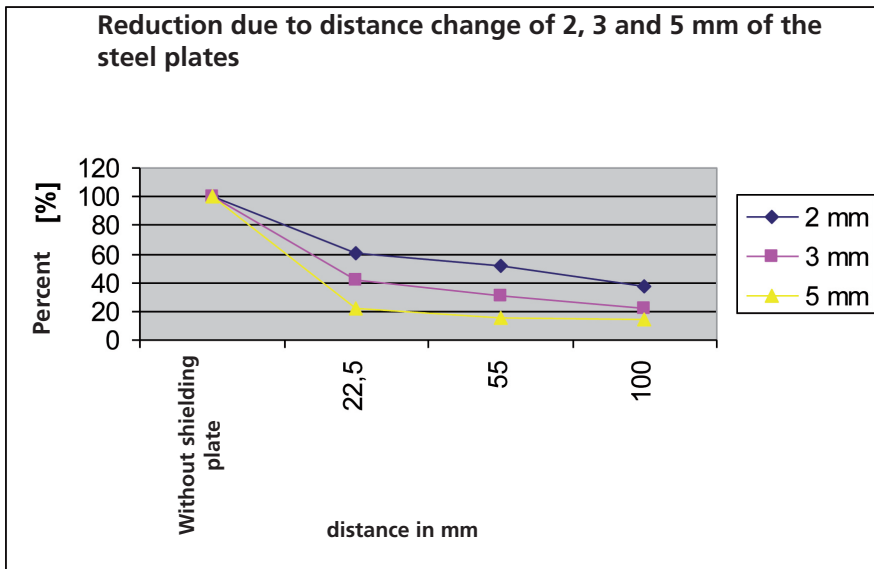
The results are described in the following graphic.



For further investigation, the 5 mm steel plate is divided into 2 + 3 mm steel plates and put at different distances from each other in the 300 mm test area. The differences are so small that it can be attributed to measurement tolerance.

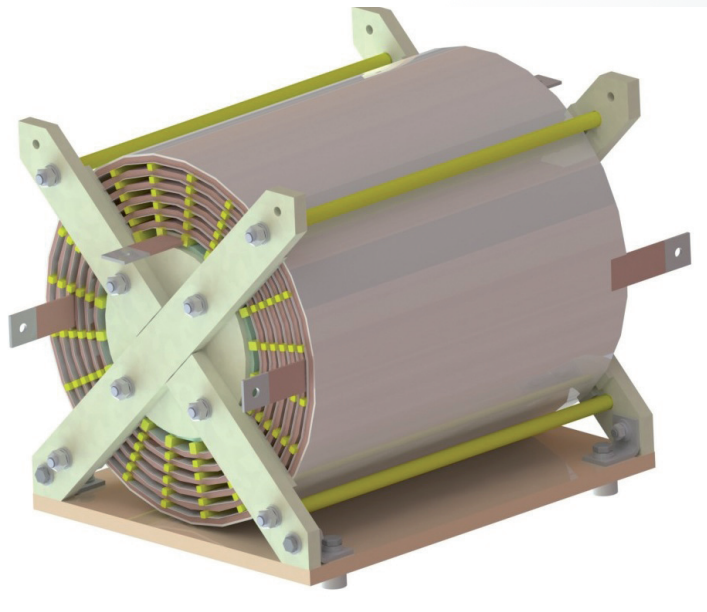
Shielding of the choke with steel sheet reduction the values:

- > 80% at the measuring point 1 and MP 4 with 2 mm ST-sheet
- > 40% at the measuring point 2 and MP 3 with 2 mm ST-sheet
- > 60% at the measuring point 1 and MP 4 with 3 mm St-sheet
- > 33% at the measuring point 2 and MP 3 with 3 mm St-sheet



Testing and Load reactors NPT LD

Technical data	
Type	NPT LD 715/597
Rated voltage	800 V
Rated current	450 A
Selectable inductance	2,95 / 3,53 mH
Copper	ca. 250 kg
Weight	ca. 279 kg
Protection class	IP 00

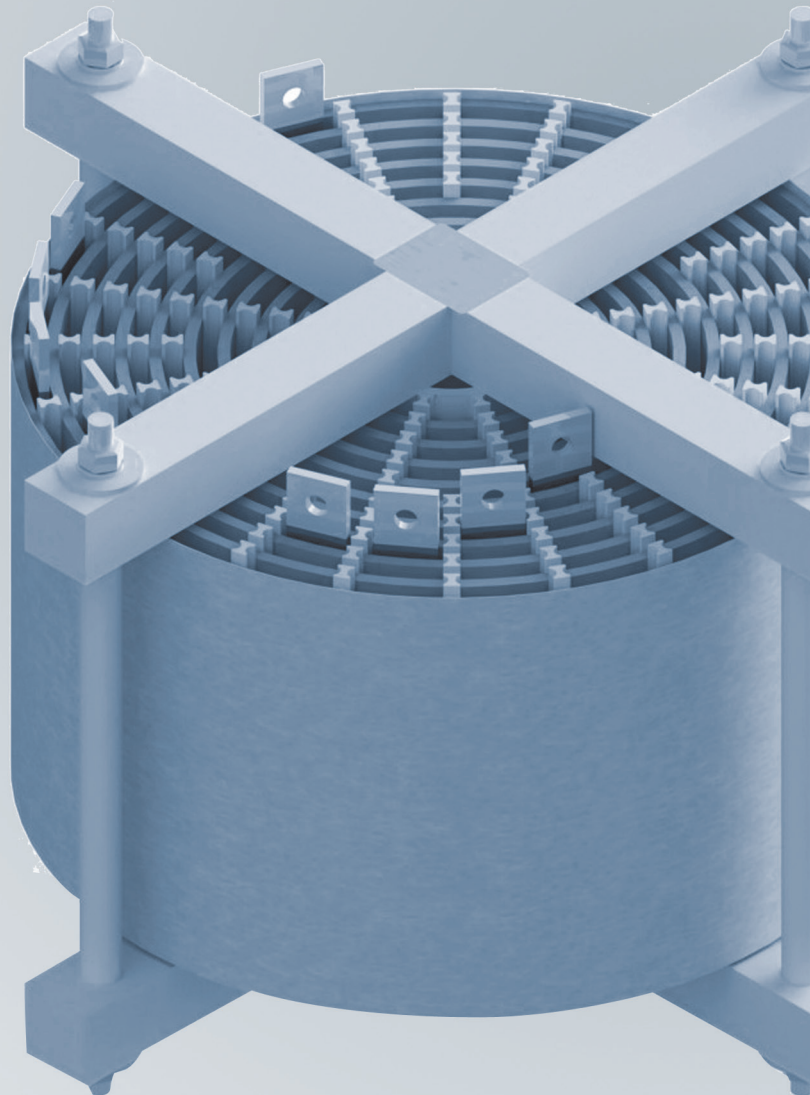


These chokes are used to test the actual operation environment of a product in application. It is common for short circuit tests, burn-in or lifecycle - tests to be made. It is crucial at this point that the choke construction or performance does not degenerate in any way or else risk compromising the test.

A test choke is usually specifically designed for the task, very tight tolerances of the electrical parameters must be observed.

Test chokes are mostly used in short-term operation. This makes it possible to use significantly less material than air chokes, which are operated in S1 mode.

It is possible to construct these chokes with specified tapings, to ensure maximum flexibility and reduce space requirements.



Other influencing factors in the use of air chokes

Besides the size and weight, there are a number of other requirements which influence the design of a component. To meet the different environmental conditions and customer needs, REO determines which standards may be applied to each choke type.

Here are some examples of requirements in the design and development:

Environmental conditions

Dirt can get into components and affect the life and functionality.


Moisture

Moisture and humidity, in connection with pollution and changing temperatures, can affect the function. If moisture enters the coil or electric wiring one, it can cause a short circuit and thermal overloads.

Thanks to a special coating REO products offer a high protection class and provide special resistance to dirt and moisture and other environmental influences.

Fire protection

Due to the variety of different standards, the requirements are often very confusing. The European fire standard EN 45545-2 serves to unify them. REO has performed different tests before these standards came into operation and the materials used by REO comply with the new fire safety standard DIN EN 45545-2. Insulating materials are tested in accredited laboratories as request record R22 / R23. These materials are summarized in the REO Fire Protection - System DIN EN-I.



Applied standards of REO-air chokes:

- DIN EN 60310
- DIN EN 60076-6
- DIN EN 61373
- DIN EN 50125-1
- DIN EN 60077
- DIN EN ISO 9001
- IRIS certification

Other national standards as

- DIN EN 5510-2
- NF F 16-101 / -102
- UNI CEI 11170-1 / -2 / -3
- UL 94-VO
- NFPA 130

can be implemented on request

By default, the devices are designed according to EN 45545-2.

Fire protection	
Material group	Evidence R22/R23
Solid GRP profiles, EL7A / EL7B	OI = 79,8%, Dsmax= 193 ;CIT NLP=0,03; HL2/HL3
Panels, EL7A/EL7B	OI = 49,1%, Dsmax= 42,1 ;CIT NLP=0,07; HL3/HL3
Tubes, EL7A/EL7B	OI = 76,9%; Dsmax= 82 ;CIT NLP=0,09; HL3/HL3
Coating, EL7A/EL7B	OI=95,2% Dsmax =2 , CIT NLP=0,32 Paint coating: OI = 40,5 Dsmax=35, CIT NLP=0,21 REO-Protective coating: OI=45,3, Dsmax=34, CIT NLP= 0,34 HL3/HL3
Casting, EL7A/EL7B	OI = 37,8%; Dsmax= 210 ;CIT NLP=0,1; HL2/HL3
Winding conductor, EL7A/EL7B	OI=99,5% Dsmax=24 CIT NLP=0,02 HL3/HL3 Complies with EN 60332-1-2
Cables, lines, EL1A/EL1B	Requirements R15 / R16 in accordance to EN 45545-2; HL3/HL3

Protection against contact, foreign bodies and moisture	
Degree of protection according to IEC 60529	<p>IP 00 – IP X4 (winding) IP Version 00: impregnation + open connections IP X4 variant: impregnation + REO special protective coating</p> <p>IP 00 – IP 65 (connections) IP Version 00: open connections as copper bar Version IP 65: Connections cable or terminal box with cable gland</p>
Protection class according to DIN IEC 536	I, II
ground connection	With mounting brackets



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