

VV/HH

High voltage fuse-links 890

Technical data 899

KEMA Labs

HIGH VOLTAGE FUSES



High voltage fuse-links

High voltage high-breaking capacity VV fuse-links

General information

ETI HV (High-voltage Current-limiting fuse-links) named VVT TD3 are designed to protect devices in switch-gears and other equipment (distribution transformers, power capacitors, MV motors) from thermal and dynamic effects of short-circuits and over-currents. Time-current characteristics correspond to standard IEC 60282-1, item 3.3.3. Back-up fuse. They are suitable for installation in:

- indoor and outdoor RMU (Ring-Main Units) switchgear
- SF6 - insulated enclosures
- special service conditions (different from normal conditions, described in item 4.1. of standard IEC 60282-1)

The most significant features of ETI VVT TD3 high-voltage fuses:

- Low temperature rise because of low power dissipation
- Low minimum breaking currents
- High breaking capacity 63 kA (up to 24kV)
- Two types of striker pins: 50N and 80 N (with integrated temperature dependent limiter)
- Reliable sealing system against humidity irruption
- Low switching voltages
- Upon a request, fuse links can be supplied into non-standard dimensions

Overview of standard and non-standard dimensions

ETI VV TD3	1A	2A	4A	6A	6,3A	10A	16A	20A	25A	31,5A	32A	40A	50A	63A	80A	100A	125A	160A	200A	250A	315A	
6/7,2 kV	192 x Ø 53												192 x Ø 68			192 x Ø 83,5						
	292 x Ø 53												292 x Ø 68			292 x Ø 83,5						
	442 x Ø 53												442 x Ø 68			442 x Ø 83,5						
	442 x Ø 53												442 x Ø 68			442 x Ø 83,5						
10/12 kV	192 x Ø 53						192 x Ø 68						292 x Ø 68			292 x Ø 83,5						
	292 x Ø 53						292 x Ø 68						442 x Ø 68			442 x Ø 83,5						
	442 x Ø 53						442 x Ø 68						537 x Ø 83,5			537 x Ø 83,5						
	442 x Ø 53						442 x Ø 68						442 x Ø 68			442 x Ø 83,5						
15/17.5 kV	292 x Ø 53						292 x Ø 68						292 x Ø 83,5			367 x Ø 83,5						
	367 x Ø 53						367 x Ø 68						367 x Ø 83,5			442 x Ø 83,5						
	442 x Ø 53						442 x Ø 68						442 x Ø 68			442 x Ø 83,5						
	442 x Ø 53						442 x Ø 68						442 x Ø 68			442 x Ø 83,5						
20/24 kV	292 x Ø 53						292 x Ø 68						292 x Ø 83,5			442 x Ø 83,5						
	442 x Ø 53						442 x Ø 68						442 x Ø 68			442 x Ø 83,5						
	537 x Ø 53						537 x Ø 68						537 x Ø 68			537 x Ø 83,5						
	537 x Ø 53						537 x Ø 68						537 x Ø 68			537 x Ø 83,5						
30/36 kV	442 x Ø 53						537 x Ø 68						537 x Ø 83,5									
	537 x Ø 53						537 x Ø 68						537 x Ø 83,5									

* purple: standard dimensions
 ** green: non-standard dimensions

KEMA Labs

→ KEMA type test reports

→ Reliable sealing system against humidity irruption

→ High endurance ceramic tube

→ Low temperature rise because of low power dissipation

→ Low minimum breaking currents

→ Low switching voltages

→ High breaking capacity 63 kA

→ Galvanically protected contact caps made of electrolytic copper can be nickel (Ni), tin (Sn) or silver (Ag) plated

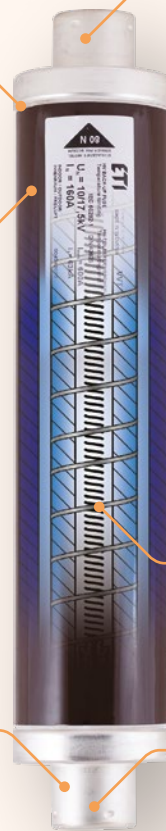
→ Striker system: a temperature sensitive element, which does not react to short time overloads, only to inadmissible values of temperatures. Convenient for the protection of the fuse-links, installed in enclosures or SF6 switchgears

→ Rigid striker pin

→ Various striker variants (50N, 80N, without striker, thermo, non-thermo...)

→ Silver melting element

→ Easier mounting because of improved contact cap



Standards

ETI MV/VV High voltage fuse-links comply with the following standards and specifications:

- IEC 60282-1 "Current-limiting fuses", Edition 8.0 from 2020-04
- DIN 43625 "Hochspannungs-Sicherungen; Nennspannung 3,6 bis 36kV; maÙe für Sicherungseinsätze"
- VDE 0670 T402, Wechselstromschaltgeräte für Spannungen über 1kV, "Auswahl von strombegrenzenden Sicherungseinsätzen für Transformatorstromkreise"
- IEC TR 62655 "Tutorial and application guide for high-voltage fuses"
- IEC 60644 "Specification for high-voltage fuse-links for motor circuit applications"
- IEC 60549 "High-voltage fuses for external protection of shunt capacitors"

Certificates, Test reports

- KEMA Type Test Certificates of breaking performance
- Test reports for 25kV, 38.5kV, 40.5kV and 42kV versions

Construction:

ETI High voltage fuse-links are designed to assure stable and reliable technical characteristics. The glazed porcelain tube (made in ETI own ceramic factory) is extremely high mechanical and thermal resistant.

Galvanically protected contact caps made of electrolytic copper are nickel (Ni) or tin (Sn) or upon customer request silver (Ag) plated. Caps are rolled by pressing into the groove of the tube. The tightness of this connection is assured by a special seal resistant to ageing and high temperatures.

The design and method of production of the melting elements ensures precisely tolerances and stable time/current characteristics. Fuse elements are wound on a ceramic carrier and electrically welded on a special copper strips.

The inside of the tube is filled with quartz sand with an exactly determined granulation and chemical structure. The sand guarantees good and reliable extinguishing of the electric arc.

An important element in the fuse-link construction is also the striker system. Part of that system is temperature sensitive element, which reacts in cases of temperature increasing of the fuse-link due to various reasons. The system reacts in such a way that short time overloads do not cause the fuse to interrupt the circuit unnecessarily. Only when inadmissible values of temperatures are exceeded, the fuse-link open the switch via the striker pin.

Because of these characteristics, ETI "thermal" striker pin is convenient for the protection of the fuse-links, installed in enclosures or SF6 switchgears, which requires additional protection features against inadmissible temperatures.

Striker pin Type description:

- VVA3; without striker
- VVC3; 50N striker force.
- VVT-D3; 80N striker force, with temperature limiter (VVT)

High voltage fuse-links

Ordering Code Numbers

rated voltage U_n [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVA (without striker pin)	VVC3 Striker type 50N	VVT-D3 Striker type 80N THERMO		Tube diameter "d" (mm)	weight [kg]				
					Ni plated contacts	Ag plated contacts*						
6/12	192	2 A		004230103	004232103		53	1.1				
		4 A		004230104	004232104							
		6 A		004230105	004232105							
		6,3 A		004230106	004232106							
		10 A		004230107	004232107							
		16 A		004230108	004232108							
		20 A		004230109	004232109							
		25 A		004230110	004232110							
		31,5 A		004230111	004232111							
		32 A		004230112	004232112							
	40 A		004230113	004232113								
	50 A		004230114	004232114								
	292	53	1 A	004231102				53	1.6			
			2 A	004231103	004230003	004232003	004232033					
			4 A	004231104	004230004	004232004	004232034					
			6 A	004231105	004230005	004232005	004232035					
			6,3 A	004231106	004230006	004232006	004232036					
			10 A	004231107	004230007	004232007	004232037					
			16 A	004231108	004230008	004232008	004232038					
			20 A	004231109	004230009	004232009	004232039					
			25 A	004231110	004230010	004232010	004232040					
			31,5 A	004231111	004230011	004232011	004232041					
			32 A	004231112	004230012	004232012	004232042					
			40 A	004231113	004230013	004232013	004232043					
			50 A	004231114	004230014	004232014	004232044					
			63 A	004231115	004230015	004232015	004232045					
			80 A	004231116	004230016	004232016	004232046					
			100 A	004231117	004230017	004232017	004232047					
	125 A	004231118	004230018	004232018	004232048							
	160 A	004231119	004230019	004232019	004232049							
	442	53	2 A		004230503	004232503		53	2.3			
			4 A		004230504	004232504						
			6 A		004230505	004232505						
			6,3 A		004230506	004232506						
			10 A		004230507	004232507						
			16 A		004230508	004232508						
			20 A		004230509	004232509						
			25 A		004230510	004232510						
			31,5 A		004230511	004232511						
			32 A		004230512	004232512						
			40 A		004230513	004232513						
			50 A		004230514	004232514						
			63 A		004230515	004232515						
			80 A		004230516	004232516						
			100 A		004230517	004232517						
125 A				004230518	004232518							
160 A				004230519	004232519							
200 A				004230520	004232520							
537			83,5	160 A		004230619	004232619				83,5	7.0
				200 A		004230620	004232620					
	250 A			004230621	004232621							

Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.

Note 2: Orange colored types according to IEC 60282-1 dimensions.

* Other dimensions available upon request



Technical data

rated voltage	Dimension "e" according to DIN and IEC	rated current	Striker type	Rated breaking capacity	Rated minimum breaking current	cold resistance	power dissipation	pre-arcing I ² t value	total I ² t value				
[kV]	(mm)	I _n [A]		(kA)	(A)	[mΩ]	[W]	[A ² s]	[A ² s]				
6/12	192	2	C-type, D-type	50	12	980	6	6,1	57				
		4			20	650	15	17,3	164				
		6			27	435	21	36	340				
		6,3			27	435	21	36	340				
		10			42	130	15	165	1.450				
		16			64	70	23	320	5.200				
		20			80	44	21	450	7.000				
		25			100	33	28	700	10.000				
		31,5			126	29	38	1.400	15.000				
		32			126	29	41	1.400	15.000				
		40			160	21	48	3.200	27.000				
		50			200	16,5	54	5.800	44.000				
		6/12			292	1	C-type, D-type	63	12	1970	5		
						2			12	980	6	6,1	57
4	20		650	15		17,3			164				
6	25		435	21		36			340				
6,3	25		435	21		36			340				
10	43		130	15		165			1.450				
16	56		70	23		320			5.200				
20	70		44	21		450			7.000				
25	87		33	28		700			10.000				
31,5	110		29	38		1.400			15.000				
32	110		29	41		1.400			15.000				
40	140		21	48		3.200			27.000				
50	175		16,5	54		5.800			44.000				
63	220		12	62		12.000			70.000				
80	280		9	75		19.000			140.000				
100	360		6,7	114		35.000			202.000				
125	450		5,2	138		55.000			300.000				
160	600		4,1	179		94.000			580.000				
6/12	442	2	C-type, D-type	63	12	980	6	6,1	57				
		4			20	650	15	17,3	164				
		6			25	435	21	36	340				
		6,3			25	435	21	36	340				
		10			43	130	15	165	1.450				
		16			56	70	23	320	5.200				
		20			70	44	21	450	7.000				
		25			87	33	28	700	10.000				
		31,5			110	29	38	1.400	15.000				
		32			110	29	41	1.400	15.000				
		40			140	21	48	3.200	27.000				
		50			175	16,5	54	5.800	44.000				
		63			220	12	62	12.000	70.000				
		80			280	9	75	19.000	140.000				
		100			360	6,7	114	35.000	202.000				
		125			450	5,2	138	55.000	300.000				
	160	600	4,1	179	94.000	580.000							
	200	1000	3,3	238	151.780	789.270							
	537	537	160	C-type, D-type	63	600	4,1	179	94.000	580.000			
			200			1000	3,3	238	151.780	789.270			
250			1250			2,65	305	228.610	1.188.800				

Technical data

Transformer rated capacity Pt (kVA)	67,2 kV				10/12 kV				15/17,5kV				20/24 kV				30/36 kV			
	Transformer rated primary current Ip(A) at	LV Fuse-Link gG		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link gG		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link gG		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link gG		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link gG		LV Fuse-Link gG LV Fuse-Link gR
		LV Fuse-Link rated current	lnV			LV Fuse-Link rated current	lnV			LV Fuse-Link rated current	lnVmin			LV Fuse-Link rated current	lnVmin			LV Fuse-Link rated current	lnVmin	
50	6kV	(A)	(A)	(A)	10kV	(A)	(A)	(A)	15kV	(A)	(A)	(A)	20kV	(A)	(A)	(A)	30kV	(A)	(A)	(A)
	4,8	10	50	72	2,9	6	50	72	1,9	6	50	72	1,4	4	50	72	1,0	4	50	72
75	7,2	16	80	108	4,3	10	80	108	2,9	6	80	108	2,2	6	80	108	1,4	4	80	108
100	9,6	20	100	144	5,8	10	100	144	3,8	10	100	144	2,9	6	100	144	1,9	6	100	144
125	12,0	20	125	180	7,2	16	125	180	4,8	10	125	180	3,6	10	125	180	2,4	6	125	180
160	15,3	25	160	231	9,2	20	160	231	6,2	16	160	231	4,6	10	160	231	3,1	6	160	231
200	19,2	32	200	289	11,5	20	200	289	7,7	16	200	289	5,8	10	200	289	3,8	10	200	289
250	24,0	40	250	361	14,4	25	250	361	9,6	20	250	361	7,2	16	250	361	4,8	10	250	361
315	30,3	50	315	455	18,2	32	315	455	12,1	20	315	455	9,1	16	315	455	6,0	16	315	455
400	38,5	63	400	577	23,1	40	400	577	15,4	25	400	577	11,5	20	400	577	7,7	16	400	577
500	48,1	80	500	722	28,8	50	500	722	19,2	32	500	722	14,4	20	500	722	9,6	20	500	722
630	60,6	100	630	909	36,4	63	630	909	24,2	40	630	909	18,2	25	630	909	12,1	20	630	909
800	77,0	100	800	1.155	46,2	80	800	1.155	30,8	50	800	1.155	23,1	40	800	1.155	15,4	25	800	1.155
1000	96,2	125	1.000	1.443	57,7	80	1.000	1.443	38,5	63	1.000	1.443	28,9	50	1.000	1.443	19,2	32	1.000	1.443
1250	120,0	160	1250	**	72,2	100	1250	**	48,1	80	1250	**	36,1	63	1250	**	24,0	40	1250	**
1600	154,0	200*	1600	**	92,4	125	1600	**	61,6	100	1600	**	46,2	63	1600	**	30,8	50	1600	**
2000	192,5	250*	**	**	115,5	160	**	**	77,0	100	**	**	57,7	80	**	**	38,5	63	**	**