

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			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			537 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 53												442 x Ø 68			442 x Ø 83,5						
	442 x Ø 53												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 83,5						
	537 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						
30/36 kV	442 x Ø 53						537 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

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→ 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

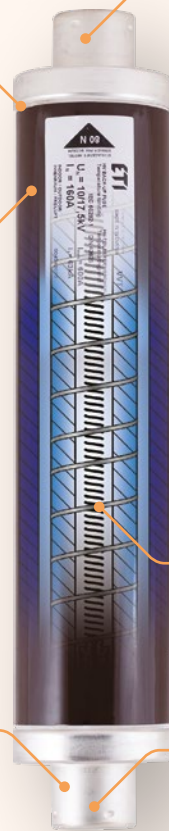
→ Striker system: a temperature sensitive element, which does not react to short time overloads, only to inadmissible values of temperatures. Convenient for the protection of the fuse-links, installed in enclosures or SF6 switchgears

→ 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)

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*			
10/17,5	292	2 A		004240103	004242103		53	1.6	
		4 A		004240104	004242104				
		6 A		004240105	004242105				
		6,3 A		004240106	004242106				
		10 A		004240107	004242107				
		16 A		004240108	004242108				
		20 A		004240109	004242109				
		25 A		004240110	004242110				
		31,5 A		004240111	004242111				
		32 A		004240112	004242112				
		40 A		004240113	004242113				
		50A		004240114	004242114				
		63 A		004240115	004242115				
		80 A		004240116	004242116				
	100 A		004240117	004242117					
		367	1 A	004241102				53	1.9
	2 A		004241103	004240003	004242003	004242033			
	4 A		004241104	004240004	004242004	004242034			
	6 A		004241105	004240005	004242005	004242035			
	6,3 A		004241106	004240006	004242006	004242036			
	10 A		004241107	004240007	004242007	004242037			
	16 A		004241108	004240008	004242008	004242038			
	20 A		004241109	004240009	004242009	004242039			
	25 A		004241110	004240010	004242010	004242040			
	31,5 A		004241111	004240011	004242011	004242041			
	32 A		004241112	004240012	004242012	004242042			
	40 A		004241113	004240013	004242013	004242043			
	50 A		004241114	004240014	004242014	004242044			
	63 A		004241115	004240015	004242015	004242045			
	80A		004241116	004240016	004242016	004242046			
	100 A	004241117	004240017	004242017	004242047				
	125A	004241118	004240018	004242018	004242048				
	160 A	004241119	004240019	004242019	004242049				
		442	2 A		004240503	004242503		53	2.3
	4 A			004240504	004242504				
	6 A			004240505	004242505				
	6,3 A			004240506	004242506				
	10 A			004240507	004242507				
	16 A			004240508	004242508				
20 A			004240509	004242509					
25 A			004240510	004242510					
31,5 A			004240511	004242511					
32 A			004240512	004242512					
40 A			004240513	004242513					
50 A			004240514	004242514					
63 A			004240515	004242515					
80A			004240516	004242516					
100 A		004240517	004242517						
125 A		004240518	004242518						

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

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]	
10/17.5	292	2	C-type, D-type	50	12	1400	8	6,1	57	
		4			20	900	17	17,3	164	
		6			27	670	35	36	340	
		6,3			27	670	35	36	340	
		10			42	160	20	165	1.450	
		16			64	95	31	320	5.200	
		20			80	58	29	450	7.000	
		25			100	45	36	700	10.000	
		31,5			126	38	51	1.400	15.000	
		32			126	38	53	1.400	15.000	
		40			160	28	64	3.200	27.000	
		50			200	21,5	75	5.800	44.000	
		63			252	16,5	100	12.000	70.000	
		80			320	12,5	130	19.000	140.000	
		100			400	9	145	35.000	202.000	
	367	C-type, D-type	63	1	12	2800	6			
				2	12	1400	8	6,1	57	
				4	20	900	17	17,3	164	
				6	25	670	35	36	340	
				6,3	25	670	35	36	340	
				10	42	160	20	165	1.450	
				16	56	95	31	320	5.200	
				20	70	58	29	450	7.000	
				25	87	45	36	700	10.000	
				31,5	110	38	51	1.400	15.000	
				32	110	38	53	1.400	15.000	
				40	140	28	64	3.200	27.000	
				50	175	21,5	75	5.800	44.000	
				63	220	16,5	100	12.000	70.000	
				80	280	12,5	130	19.000	140.000	
	100	360	9	145	35.000	202.000				
	442	C-type, D-type	63	2	12	1400	8	6,1	57	
				4	20	900	17	17,3	164	
				6	25	670	35	36	340	
				6,3	25	670	35	36	340	
				10	42	160	20	165	1.450	
				16	56	95	31	320	5.200	
				20	70	58	29	450	7.000	
				25	87	45	36	700	10.000	
				31,5	110	38	51	1.400	15.000	
				32	110	38	53	1.400	15.000	
				40	140	28	64	3.200	27.000	
				50	175	21,5	75	5.800	44.000	
				63	220	16,5	100	12.000	70.000	
				80	280	12,5	130	19.000	140.000	
100				360	9	145	35.000	202.000		
125	450	7,5	210	55.000	300.000					
160	600	5,6	290	94.000	580.000					

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 I _p (A) at	LV Fuse-Link g0		LV Fuse-Link g1 LV Fuse-Link g1r	Transformer rated primary current I _p (A) at	LV Fuse-Link g0		LV Fuse-Link g1 LV Fuse-Link g1r	Transformer rated primary current I _p (A) at	LV Fuse-Link g0		LV Fuse-Link g1 LV Fuse-Link g1r	Transformer rated primary current I _p (A) at	LV Fuse-Link g0		LV Fuse-Link g1 LV Fuse-Link g1r	Transformer rated primary current I _p (A) at	LV Fuse-Link g0		LV Fuse-Link g1 LV Fuse-Link g1r
		LV Fuse-Link rated current I _{lv}	LV Fuse-Link g0			LV Fuse-Link g1	LV Fuse-Link g0			LV Fuse-Link g1	LV Fuse-Link g0			LV Fuse-Link g1	LV Fuse-Link g0			LV Fuse-Link g1	LV Fuse-Link g0	
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	**	**