

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 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						
																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 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 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

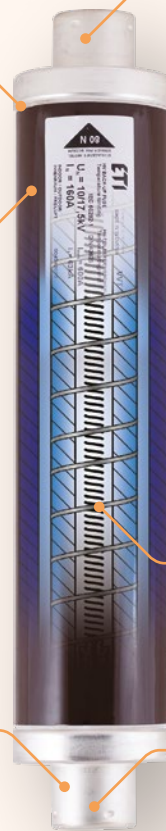
→ Striker system: a temperature sensitive element, which does not react to short time overloads, only to inadmissible values of temperatures. Convenient for the protection of the fuse-links, installed in enclosures or SF6 switchgears

→ 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*		
3/7.2	192	1 A	004221102				53	1.1
		2 A	004221103	004220003	004222003			
		4 A	004221104	004220004	004222004			
		6 A	004221105	004220005	004222005			
		6,3 A	004221106	004220006	004222006			
		10 A	004221107	004220007	004222007			
		16 A	004221108	004220008	004222008			
		20 A	004221109	004220009	004222009			
		25 A	004221110	004220010	004222010			
		31,5 A	004221111	004220011	004222011			
		32 A	004221112	004220012	004222012			
		40 A	004221113	004220013	004222013			
		50A	004221114	004220014	004222014			
		63 A	004221115	004220015	004222015			
		80 A	004221116	004220016	004222016			
		100 A	004221117	004220017	004222017			
		125 A	004221118	004220018	004222018			
		160 A	004221119	004220019	004222019			
3/7.2	292	2 A		004220503	004222503	004222033	53	1.6
		4 A		004220504	004222504	004222034		
		6 A		004220505	004222505	004222035		
		6,3 A		004220506	004222506	004222036		
		10 A		004220507	004222507	004222037		
		16 A		004220508	004222508	004222038		
		20 A		004220509	004222509	004222039		
		25 A		004220510	004222510	004222040		
		31,5 A		004220511	004222511	004222041		
		32 A		004220512	004222512	004222042		
		40 A		004220513	004222513	004222043		
		50 A		004220514	004222514	004222044		
		63 A		004220515	004222515	004222045		
		80 A		004220516	004222516	004222046		
		100 A		004220517	004222517	004222047		
		125 A		004220518	004222518	004222048		
		160 A		004220519	004222519	004222049		
		200 A		004220520	004222520			
250 A		004220521	004222521					
3/7.2	442	2 A		004220603	004222603		68	3.9
		4 A		004220604	004222604			
		6 A		004220605	004222605			
		6,3 A		004220606	004222606			
		10 A		004220607	004222607			
		16 A		004220608	004222608			
		20 A		004220609	004222609			
		25 A		004220610	004222610			
		31,5 A		004220611	004222611			
		32 A		004220612	004222612			
		40 A		004220613	004222613			
		50 A		004220614	004222614			
		63 A		004220615	004222615			
		80 A		004220616	004222616			
		100 A		004220617	004222617			
		125 A		004220618	004222618			
		160 A		004220619	004222619			
		200 A		004220620	004222620			
250 A		004220621	004222621					
315 A		004220622	004222622					
3/7.2	442	200 A		004220620	004222620		83,5	5.8
		250 A		004220621	004222621			
		315 A		004220622	004222622			



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

High-voltage high-breaking capacity VV fuse-links

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]
3/7.2	192	1	C-type, D-type	63	12	1170	3		
		2			12	580	4	6,1	57
		4			20	370	9	17,3	164
		6			25	260	10	36	340
		6,3			25	260	10	36	340
		10			43	75	9	165	1.450
		16			56	44	13,5	320	5.200
		20			70	27	12,5	450	7.000
		25			87	21	16	700	10.000
		31,5			110	18	23,5	1.400	15.000
		32			110	18	25	1.400	15.000
		40			140	13	28,5	3.200	27.000
		50			175	10,5	35,5	5.800	44.000
		63			220	7,5	42,5	12.000	70.000
		80			280	5,9	59	19.000	140.000
		100			360	4,8	73	35.000	202.000
	125	450	3,9	101	55.000	300.000			
	160	600	3	144	94.000	580.000			
	2	292	C-type, D-type	63	12	580	4	6,1	57
	4				20	370	9	17,3	164
	6				25	260	10	36	340
	6,3				25	260	10	36	340
	10				43	75	9	165	1.450
	16				56	44	13,5	320	5.200
	20				70	27	12,5	450	7.000
	25				87	21	16	700	10.000
	31,5				110	18	23,5	1.400	15.000
	32				110	18	25	1.400	15.000
	40				140	13	28,5	3.200	27.000
	50				175	10,5	35,5	5.800	44.000
	63				220	7,5	42,5	12.000	70.000
	80				280	5,9	59	19.000	140.000
	100				360	4,8	73	35.000	202.000
	125				450	3,9	101	55.000	300.000
	160	600	3	144	94.000	580.000			
	200	1000	2,1	155	151.780	789.270			
250	1250	1,7	196	228.610	1.188.800				
2	442	C-type, D-type	63	12	840	4,7	6,1	57	
4				20	530	11,7	17,3	164	
6				25	270	13,4	36	340	
6,3				25	270	13,4	36	340	
10				43	90	11	165	1.450	
16				56	53	16	320	5.200	
20				70	32	15	450	7.000	
25				87	25	19	700	10.000	
31,5				110	21,5	28	1.400	15.000	
32				110	21,5	30	1.400	15.000	
40				140	15,5	34	3.200	27.000	
50				175	12,6	43	5.800	44.000	
63				220	9	51	12.000	70.000	
80				280	7,1	71	19.000	140.000	
100				360	5,8	88	35.000	202.000	
125				450	4,7	121	55.000	300.000	
160	600	3,6	173	94.000	580.000				
200	1000	2,65	195	151.780	789.270				
250	1250	2,2	253	228.610	1.188.800				
315	1575	1,75	320	368.640	1.916.930				

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 rated current		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link rated current		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link rated current		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link rated current		LV Fuse-Link gG LV Fuse-Link gR	Transformer rated primary current Ip(A) at	LV Fuse-Link rated current		LV Fuse-Link gG LV Fuse-Link gR
		hV	hV			hV	hV			hV	hV			hV	hV			hV	hV	
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	**	**