

# High voltage fuse-links

## High voltage high-breaking capacity VV fuse-links

**General information**

ETI HV fuse-links named VV THERMO are designed to protect devices in switch-gears and other equipment (distribution transformers, capacitors, motors) from thermal and dynamic effects of shortcircuits and overcurrents. 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 switchgear
- gas (SF6)-insulated enclosures
- special service conditions (different from normal conditions, described in item 2.1. of standard IEC 60282-1)

**The most significant features of ETI high voltage fuses:**

- Low temperature rise because of low power dissipation
- High breaking capacity 50 kA
- Possibility of three different striker pin forces: 80 N and 120 N (with integrated temperature dependent limiter) and 50 N.
- Reliable sealing system against humidity irruption
- Low switching voltages
- Upon a request, fuse links can be supplied into no-standard dimensions

Overview of standard and non-standard dimensions

ETI VV THERMO	2A	4A	6A	10A	16A	20A	25A	32A	40A	50A	63A	80A	100A	125A	160A	200A	250A	315A		
7,2 kV	192 x Ø 53										192 x Ø 68		192 x Ø 85							
	292 x Ø 53										292 x Ø 68		292 x Ø 85							
	442 x Ø 53										442 x Ø 68		442 x Ø 85							
											442 x Ø 68		442 x Ø 85							
12 kV	192 x Ø 53					192 x Ø 68					292 x Ø 68		292 x Ø 85							
	292 x Ø 53					442 x Ø 53					442 x Ø 68		442 x Ø 85		537 x Ø 85					
											292 x Ø 68		292 x Ø 85							
											442 x Ø 68		442 x Ø 85							
17.5 kV	292 x Ø 53					292 x Ø 68					292 x Ø 85									
	367 x Ø 53					367 x Ø 68					367 x Ø 85									
	442 x Ø 53					442 x Ø 68					442 x Ø 85									
24 kV	292 x Ø 53					292 x Ø 68					292 x Ø 85									
	442 x Ø 53					442 x Ø 68					442 x Ø 85									
	537 x Ø 53					537 x Ø 68					537 x Ø 85									
36 kV	442 x Ø 53					537 x Ø 68					537 x Ø 85									
	537 x Ø 53																			

**Standards**

ETI VV (Medium Voltage) fuse-links comply with the following standards and specifications:

- IEC 60282-1, Sixth edition 11 / 2005 "Current limiting fuses"
- DIN 43625 "Hochspannungs-Sicherungen Nennspannung 3,6 bis 36kV"
- "VDE 0670 T402, Wechselstromschaltgeraete fuer Spannungen ueber 1 kV, Auswahl von strombegrenzenden Sicherungseinsaetzen fuer Transformatorstromkreise" / IEC 60787 "Application guide for the selection of high-voltage current limiting fuse-links for transformer circuits"
- IEC 60644 "Specification for high-voltage fuse-links for motor circuit applications"
- IEC 60549 "High-voltage fuses for external protection of power capacitors"

**Certificates, Test reports**

- CESI (Milan, Italy) certificate for 12kV, 17.5kV and 24kV
- KERI (Chang Wong, S.Korea) certificate for 7.2kV and 24kV
- ICMET (Craiova, Romania) test report for 36kV
- Test reports for 25kV, 38.5kV, 40.5kV and 42kV versions

**Construction:**

ETI high voltage fuses are designed to assure stable and reliable 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 - or upon customer request silver 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 wounded 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 reaction temperature is set to approximately 250 ° C on fuse tube surface. 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 surrounding temperatures are exceeded, the fuse open the switch via the striker pin. Because of these characteristics, ETI "thermal" striker pin is convenient for the protection of the fuse enclosure of SF6 switchgears which requires additional protection features against inadmissible temperatures of certain switchgear parts.

Striker pin Type description, rated voltage 7,2 kV example:

- VVC; 50N striker force (C mark).
- VVT-D; Temperature limiter (VVT), 80N striker force (D mark).
- VVT-E; Temperature limiter (VVT), 120N striker force (E mark).



**Ordering Code Numbers**

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVC Striker type 50N	VVT-D Striker type 80N THERMO	VVT-E Striker type 120N THERMO	Tube diameter "d" (mm)	weight [kg]				
3/7.2	192	2 A	004225003	004226003	004227003	53	1.1				
		4 A	004225004	004226004	004227004						
		6 A	004225005	004226005	004227005						
		10 A	004225006	004226006	004227006						
		16 A	004225007	004226007	004227007						
		20 A	004225008	004226008	004227008						
		25 A	004225009	004226009	004227009						
		32 A	004225010	004226010	004227010						
		40 A	004225011	004226011	004227011						
		50A	004225012	004226012	004227012						
		63 A	004225013	004226013	004227013			68	1.7		
		80 A	004225014	004226014	004227014						
		100 A	004225015	004226015	004227015						
		125A	004225016	004226016	004227016			85	2.7		
		160 A	004225017	004226017	004227017						
		292	292	2A	004225503			004226503	004227503	53	1.6
				4A	004225504			004226504	004227504		
	6 A			004225505	004226505	004227505					
	10 A			004225506	004226506	004227506					
	16 A			004225507	004226507	004227507					
	20 A			004225508	004226508	004227508					
	25 A			004225509	004226509	004227509					
	32 A			004225510	004226510	004227510					
	40 A			004225511	004226511	004227511					
	50 A			004225512	004226512	004227512					
	63 A			004225513	004226513	004227513	68	2.8			
	80A			004225514	004226514	004227514					
	100 A			004225515	004226515	004227515					
	125A			004225516	004226516	004227516	85	4.0			
	160 A			004225517	004226517	004227517					
	200 A			004225518	004226518	004227518					
	250 A			004225519	004226519	004227519					
	2A	004225603	004226603	004227603	68	3.9					
4A	004225604	004226604	004227604								
6A	004225605	004226605	004227605								
10A	004225606	004226606	004227606								
16A	004225607	004226607	004227607								
20A	004225608	004226608	004227608								
25A	004225609	004226609	004227609								
32A	004225610	004226610	004227610								
40A	004225611	004226611	004227611								
50A	004225612	004226612	004227612								
63 A	004225613	004226613	004227613	85			5.8				
80A	004225614	004226614	004227614								
100 A	004225615	004226615	004227615								
125A	004225616	004226616	004227616								
160 A	004225617	004226617	004227617								
200 A	004225618	004226618	004227618								
250 A	004225619	004226619	004227619								
315 A	004225620	004226620	004227620								

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.

## High voltage fuse-links

### Ordering Code Numbers

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVC Striker type 50N	VVT-D Striker type 80N THERMO	VVT-E Striker type 120N THERMO	Tube diameter "d" (mm)	weight [kg]			
6/12	192	2 A	004235103	004236103	004237103	53	1.1			
		4 A	004235104	004236104	004237104					
		6 A	004235105	004236105	004237105					
		10 A	004235106	004236106	004237106					
		16 A	004235107	004236107	004237107					
		20 A	004235108	004236108	004237108					
		25 A	004235109	004236109	004237109					
		32 A	004235110	004236110	004237110					
		40 A	004235111	004236111	004237111					
	50A	004235112	004236112	004237112						
	292	53	2 A	004235003	004236003	004237003	53	1.6		
			4 A	004235004	004236004	004237004				
			6 A	004235005	004236005	004237005				
			10 A	004235006	004236006	004237006				
			16 A	004235007	004236007	004237007				
			20 A	004235008	004236008	004237008				
			25 A	004235009	004236009	004237009				
			32 A	004235010	004236010	004237010				
			40 A	004235011	004236011	004237011				
		50 A	004235012	004236012	004237012					
		68	63 A	004235013	004236013	004237013	68	2.8		
			80 A	004235014	004236014	004237014				
			100 A	004235015	004236015	004237015				
			125 A	004235016	004236016	004237016				
	160 A		004235017	004236017	004237017					
	442	53	2 A	004235503	004236503	004237503	53	2.3		
			4 A	004235504	004236504	004237504				
			6 A	004235505	004236505	004237505				
			10 A	004235506	004236506	004237506				
			16 A	004235507	004236507	004237507				
			20 A	004235508	004236508	004237508				
			25 A	004235509	004236509	004237509				
			32 A	004235510	004236510	004237510				
40 A			004235511	004236511	004237511					
50 A		004235512	004236512	004237512						
68		63 A	004235513	004236513	004237513	68	3.9			
		80 A	004235514	004236514	004237514					
		100 A	004235515	004236515	004237515					
		125 A	004235516	004236516	004237516					
		160 A	004235517	004236517	004237517					
		200 A	004235518	004236518	004237518					
		537	160 A	004235617	004236617			004237617	85	7.0
			200 A	004235618	004236618			004237618		
	250 A		004235619	004236619	004237619					

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





**Ordering Code Numbers**

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVC Striker type 50N	VVT-D Striker type 80N THERMO	VVT-E Striker type 120N THERMO	Tube diameter "d" (mm)	weight [kg]
10/17,5	292	2 A	004245103	004246103	004247103	53	1.6
		4 A	004245104	004246104	004247104		
		6 A	004245105	004246105	004247105		
		10 A	004245106	004246106	004247106		
		16 A	004245107	004246107	004247107		
		20 A	004245108	004246108	004247108		
		25 A	004245109	004246109	004247109	68	2.8
		32 A	004245110	004246110	004247110		
		40 A	004245111	004246111	004247111		
		50A	004245112	004246112	004247112		
		63 A	004245113	004246113	004247113		
		80 A	004245114	004246114	004247114		
	100A	004245015	004246015	004247015	53	1.9	
	2 A	004245003	004246003	004247003			
	4 A	004245004	004246004	004247004			
	6 A	004245005	004246005	004247005			
	10 A	004245006	004246006	004247006			
	16 A	004245007	004246007	004247007			
	20 A	004245008	004246008	004247008			
	25 A	004245009	004246009	004247009			
	32 A	004245010	004246010	004247010			
	40 A	004245011	004246011	004247011			
	50 A	004245012	004246012	004247012			
	63 A	004245013	004246013	004247013			68
	80A	004245014	004246014	004247014			
	100 A	004245015	004246015	004247015			
	125A	004245016	004246016	004247016			
	160 A	004245017	004246017	004247017			
	2 A	004245503	004246503	004247503	53	2.3	
	4 A	004245504	004246504	004247504			
	6 A	004245505	004246505	004247505			
	10 A	004245506	004246506	004247506			
	16 A	004245507	004246507	004247507			
	20 A	004245508	004246508	004247508			
	25 A	004245509	004246509	004247509			
	32 A	004245510	004246510	004247510			
40 A	004245511	004246511	004247511				
50 A	004245512	004246512	004247512				
63 A	004245513	004246513	004247513	68			3.9
80A	004245514	004246514	004247514				
100 A	004245515	004246515	004247515				
125A	004245516	004246516	004247516				
85					85	5.8	

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.

## High voltage fuse-links

### Ordering Code Numbers

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVC Striker type 50N	VVT-D Striker type 80N THERMO	VVT-E Striker type 120N THERMO	Tube diameter "d" (mm)	weight [kg]			
10/24	292	2 A	004255103	004256103	004257103	53	1.6			
		4 A	004255104	004256104	004257104					
		6 A	004255105	004256105	004257105					
		10 A	004255106	004256106	004257106					
		16 A	004255107	004256107	004257107					
		20 A	004255108	004256108	004257108					
		25 A	004255109	004256109	004257109	68	2.8			
		32 A	004255110	004256110	004257110					
		40 A	004255111	004256111	004257111					
		50A	004255112	004256112	004257112					
		63 A	004255113	004256113	004257113					
		63 A	004255113	004256113	004257113					
	442	442	2 A	004255003	004256003	004257003	53	2.3		
			4 A	004255004	004256004	004257004				
			6 A	004255005	004256005	004257005				
			10 A	004255006	004256006	004257006				
			16 A	004255007	004256007	004257007				
			20 A	004255008	004256008	004257008				
			25 A	004255009	004256009	004257009	68	3.9		
			32 A	004255010	004256010	004257010				
			40 A	004255011	004256011	004257011				
			50 A	004255012	004256012	004257012				
			63 A	004255013	004256013	004257013				
			80A	004255014	004256014	004257014				
	537	537	100 A	004255015	004256015	004257015	85	5.8		
			125A	004255016	004256016	004257016				
			2 A	004255503	004256503	004257503			53	2.8
			4 A	004255504	004256504	004257504				
			6 A	004255505	004256505	004257505				
			10 A	004255506	004256506	004257506				
			16 A	004255507	004256507	004257507				
			20 A	004255508	004256508	004257508				
			25 A	004255509	004256509	004257509	68	4.7		
			32 A	004255510	004256510	004257510				
			40 A	004255511	004256511	004257511				
			50 A	004255512	004256512	004257512				
			63 A	004255513	004256513	004257513				
			80A	004255514	004256514	004257514				
			537	537	100 A	004255515	004256515	004257515	85	7.0
					125 A	004255516	004256516	004257516		
					160 A	004255517	004256517	004257517		
					160 A	004255517	004256517	004257517		



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.



**Ordering Code Numbers**

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVC Striker type 50N	VVT-D Striker type 80N THERMO	VVT-E Striker type 120N THERMO	Tube diameter "d" (mm)	weight [kg]		
20/36	442	2 A	004265103	004266103	004267103	53	2.3		
		4 A	004265104	004266104	004267104				
		6 A	004265105	004266105	004267105				
		10 A	004265106	004266106	004267106				
		16 A	004265107	004266107	004267107				
	537	53	2 A	004265003	004266003	004267003	53	2.8	
			4 A	004265004	004266004	004267004			
			6 A	004265005	004266005	004267005			
		68	53	10 A	004265006	004266006	004267006	53	2.8
				16 A	004265007	004266007	004267007		
				20 A	004265008	004266008	004267008		
				25 A	004265009	004266009	004267009		
				32 A	004265010	004266010	004267010		
				40 A	004265011	004266011	004267011		
85	53	50 A	004265012	004266012	004267012	53	2.8		
		63 A	004265013	004266013	004267013				
		80A **	004265014	004266014	004267014	85	7.0		

\*\* derating factor to take into consideration. Special parameters required.

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.

**High voltage fuse-links for liquid-immersed transformers**



**Ordering Code Numbers**

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVT-D Striker type 80N	Tube diameter "d" (mm)	weight [kg]
6/12	292	2A	004236903	53	1,6
		4A	004236904		
		6A	004236905		
		10A	004236906		
		16A	004236907		
		20A	004236908		
		25A	004236909		
		32A	004236910		
		40A	004236911		
10/24	292	2A	004256943	53	1,6
		4A	004256944		
		6A	004256945		
		10A	004256946		
		16A	004256947		
10/24	442	2A	004256903	53	2,3
		4A	004256904		
		6A	004256905		
		10A	004256906		
		16A	004256907		
		20A	004256908		
		25A	004256909		
		32A	004256910		
		40A	004256911		

## High voltage fuse-links

### High voltage fuse-links for protection of voltage transformers

#### Ordering Code Numbers

rated voltage	Dimension "e" according to DIN and IEC (mm)	rated current	VVT-D Striker type 80N	Tube diameter "d" (mm)	weight
$U_n$ [kV]		[A]			[kg]
10/24	235	2A	004251033	53	1,45
		4A	004251034		



### Fuse bases for VV fuse-links

#### 1-pole Indoor mounting

type	Rated voltage [kV]	code No.	packaging [pcs]
VVP 12 1p-N	7,2 in 12	004239010	1
VVP 24 1p-N	17,5 in 24	004259010	1
VVP 36 1p-N	36	004269010	1

#### 1-pole Outdoor mounting

type	Rated voltage [kV]	code No.	packaging [pcs]
VVP 12 1p-Z	7,2 in 12	004239030	1
VVP 24 1p-Z	17,5 in 24	004259030	1
VVP 36 1p-Z	36	004269030	1



### Accessories

#### Accessories for 3-pole Indoor fuse-bases

type	code No.	packaging [pcs]
VVP 12 3p-N	004239020	1
VVP 24 3p-N	004259020	1
VVP 36 3p-N	004269020	1

#### Accessories for 3-pole Outdoor fuse-bases

type	code No.	packaging [pcs]
VVP 12 3p-Z	004239040	1
VVP 24 3p-Z	004259040	1
VVP 36 3p-Z	004269040	1

Note: customer himself can assemble 3-pole fuse-base from 3pcs. of 1-pole fuse-base and 2pcs. of accessories.

