

# 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 (SF<sub>6</sub>)-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 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						
17.5 kV	292 x Ø 53					292 x Ø 68					292 x Ø 85		367 x Ø 68		367 x Ø 85						
	367 x Ø 53					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 68		442 x Ø 85						
	442 x Ø 53					537 x Ø 53					537 x Ø 68		537 x Ø 85								
36 kV	442 x Ø 53					537 x Ø 53					537 x Ø 68		537 x Ø 85								

## 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 1kV, 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	68	1.7	
		40 A	004225011	004226011	004227011			
		50A	004225012	004226012	004227012			
		63 A	004225013	004226013	004227013			
		80 A	004225014	004226014	004227014			
		100 A	004225015	004226015	004227015			
		125A	004225016	004226016	004227016			85
		160 A	004225017	004226017	004227017			
		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	68			2.8
	40 A	004225511	004226511	004227511				
	50 A	004225512	004226512	004227512				
	63 A	004225513	004226513	004227513				
	80A	004225514	004226514	004227514				
	100 A	004225515	004226515	004227515				
	125A	004225516	004226516	004227516				
	160 A	004225517	004226517	004227517				
	200 A	004225518	004226518	004227518				
	250 A	004225519	004226519	004227519	68	3.9		
	2A	004225603	004226603	004227603				
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					
80A	004225614	004226614	004227614					
100 A	004225615	004226615	004227615					
125A	004225616	004226616	004227616					
160 A	004225617	004226617	004227617	85			5.8	
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	292	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			
			63 A	004235013	004236013	004237013			
			80 A	004235014	004236014	004237014			
			100 A	004235015	004236015	004237015			
			125 A	004235016	004236016	004237016			
	160 A	004235017	004236017	004237017					
	442	442	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			
			63 A	004235513	004236513	004237513			
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			537	160 A	004235617	004236617	004237617	85	7.0
				200 A	004235618	004236618	004237618		
				250 A	004235619	004236619	004237619		

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]
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	004245115	004246115	004247115	53	1.9	
	367	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
		80A	004245014	004246014	004247014		
	100 A	004245015	004246015	004247015			
	125A	004245016	004246016	004247016			
	160 A	004245017	004246017	004247017			
	442	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

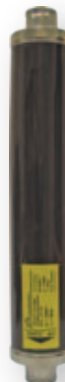
Note 1: Other ratings and dimensions can be supplied by customer request. For particular applications, please contact ETI technical team.  
 Note 2: Orange colored types according to IEC 60282-1 dimensions.

## 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	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				
		32 A	004255010	004256010	004257010				
		40 A	004255011	004256011	004257011				
		50 A	004255012	004256012	004257012				
		63 A	004255013	004256013	004257013			68	3.9
		80A	004255014	004256014	004257014				
		100 A	004255015	004256015	004257015				
		125A	004255016	004256016	004257016			85	5.8
		537	2 A	004255503	004256503			004257503	53
	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				
	32 A		004255510	004256510	004257510				
	40 A		004255511	004256511	004257511				
	50 A		004255512	004256512	004257512				
	63 A		004255513	004256513	004257513	68	4.7		
	80A		004255514	004256514	004257514				
	100 A		004255515	004256515	004257515				
	125 A		004255516	004256516	004257516	85	7.0		
	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			
			10 A	004265006	004266006	004267006			
			16 A	004265007	004266007	004267007			
		68	537	20 A	004265008	004266008	004267008	68	4.7
				25 A	004265009	004266009	004267009		
				32 A	004265010	004266010	004267010		
				40 A	004265011	004266011	004267011		
				50 A	004265012	004266012	004267012		
				63 A	004265013	004266013	004267013		
				80A **	004265014	004266014	004267014		
		85	537					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			
	442	537	2A	004256903	53	2,3
			4A	004256904		
			6A	004256905		
			10A	004256906		
442	537	16A	004256907	53	2,3	
		20A	004256908			
		25A	004256909			
		32A	004256910			
442	537	40A	004256911	53	2,3	

## High voltage fuse-links

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

#### Ordering Code Numbers

rated voltage $U_n$ [kV]	Dimension "e" according to DIN and IEC (mm)	rated current [A]	VVT-D	Tube diameter "d" (mm)	weight [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.	Dimension "e" according to DIN and IEC [mm]	packaging [pcs]
VVP 7,2 1p-N	7,2	004229010	192	1
VVP 12 1p-N	12	004239010	292	1
VVP 17,5 1p-N	17,5	004249010	367	1
VVP 24 1p-N	24	004259010	442	1
VVP 36 1p-N	36	004269010	537	1

\* when choosing right fuse base consider size and rated voltage of fuse-link

\*\* due to safety reasons fuse bases cannot be later adjusted on different length by a user

\*\*\* indoor edition of fuse base may not be used for outside applications

#### 1-pole Outdoor mounting

type	Rated voltage [kV]	code No.	Dimension "e" according to DIN and IEC [mm]	packaging [pcs]
VVP 7,2 1p-Z	7,2	004229030	192	1
VVP 12 1p-Z	12	004239030	292	1
VVP 17,5 1p-Z	17,5	004249030	367	1
VVP 24 1p-Z	24	004259030	442	1
VVP 36 1p-Z	36	004269030	537	1

\* when choosing right fuse base consider size and rated voltage of fuse-link

\*\* due to safety reasons fuse bases cannot be later adjusted on different length by a user

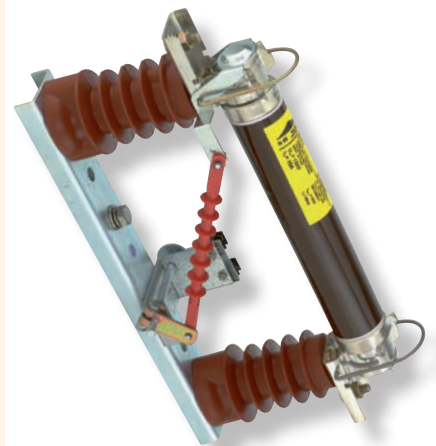
#### 1-pole Indoor mounting with microswitch fuse monitoring

type	Rated voltage [kV]	code No.	Dimension "e" according to DIN and IEC [mm]	packaging [pcs]
VVP 7,2 1p-N + NK 7,2 BSW	7,2	004349019	192	1
VVP 12 1p-N + NK 12 BSW	12	004349020	292	1
VVP 17,5 1p-N + NK 17,5 BSW	17,5	004349021	367	1
VVP 24 1p-N + NK 24 BSW	24	004349022	442	1
VVP 36 1p-N + NK 7,2 BSW	36	004349023	537	1

\* when choosing right fuse base consider size and rated voltage of fuse-link

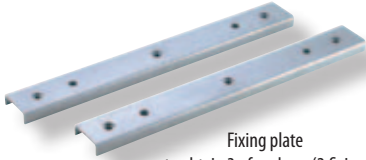
\*\* due to safety reasons fuse bases cannot be later adjusted on different length by a user

\*\*\* Rotation in installation is allowed only with the pin striker pointing upward (as in the photo on the right)

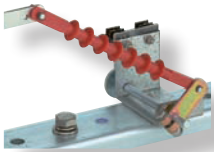




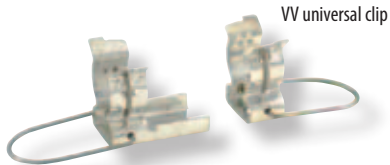
## Accessories



Fixing plate  
to obtain 3p fuse base (2 fixing  
plates are needed)



Microswitch



VV universal clip

VV universal clip with tail

### Accessories for VVP fuse bases

type	Rated voltage [kV]	code No.	packaging [pcs]
Fixing plate for VVP 7,2 3p-N, INDOOR	7,2	004229020	1
Fixing plate for VVP 12 3p-N, INDOOR	12	004239020	1
Fixing plate for VVP 17,5 3p-N, INDOOR	17,5	004249020	1
Fixing plate for VVP 24 3p-N, INDOOR	24	004259020	1
Fixing plate for VVP 36 3p-N, INDOOR	36	004269020	1
Fixing plate for VVP 7,2 3p-Z, OUTDOOR	7,2	004229040	1
Fixing plate for VVP 12 3p-Z, OUTDOOR	12	004239040	1
Fixing plate for VVP 17,5 3p-Z, OUTDOOR	17,5	004249040	1
Fixing plate for VVP 24 3p-Z, OUTDOOR	24	004259040	1
Fixing plate for VVP 36 3p-Z, OUTDOOR	36	004269040	1
Microswitch NK 7,2 BSW, INDOOR	7,2	004349007	1
Microswitch NK 12 BSW, INDOOR	12	004349008	1
Microswitch NK 17,5 BSW, INDOOR	17,5	004349009	1
Microswitch NK 24 BSW, INDOOR	24	004349010	1
Microswitch NK 36 BSW, INDOOR	36	004349011	1
VV universal clip with tail, prepared for M10 screw connection	7,2 - 36	004349015	1
VV universal clip	7,2 - 36	004349016	1

Fixing plate is used for combining 1-pole fuse bases into 3-pole fuse bases.