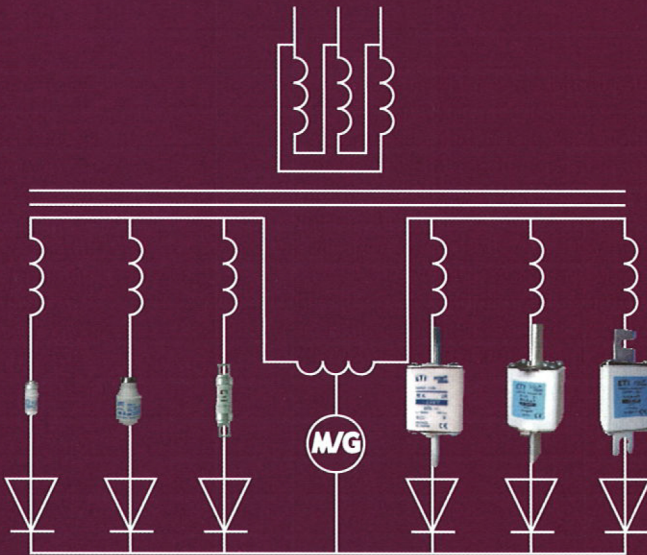


## ULTRA QUICK - SEMICONDUCTOR PROTECTION

ETI fuse-links for semiconductor protection ULTRA QUICK present an optimal solution for protection of power semiconductors, such as diodes, thyristors and other power semiconductors in DC and AC power applications such as AC/DC, DC/AC, DC/DC converters and frequency converters. ETI fuse-links elements for semiconductor protection comply with IEC 60269 and VDE 0636 standards.



SEMICONDUCTOR

# VV/HH

High voltage fuse-links 836

Technical data 845

**CESI** atestirano

## HIGH VOLTAGE FUSES



**ETI** POWER NEEDS CONTROL



**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	537	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		
		85	537	40 A	004265011	004266011	004267011	85	7.0
				50 A	004265012	004266012	004267012		
				63 A	004265013	004266013	004267013		
				80A **	004265014	004266014	004267014		

\*\* 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	442	2A	004256903	53	2,3
			4A	004256904		
			6A	004256905		
			10A	004256906		
442	442	16A	004256907	53	2,3	
		20A	004256908			
		25A	004256909			
		32A	004256910			
442	442	40A	004256911	53	2,3	

## Selection of fuses for transformer protection

For HV fuse-link rated current selection, following transformer technical features has to be known:

- Rated power  $P_n$  (kVA)
- Short-circuit voltage  $U_{cc}$  (%)
- Rated current  $I_{nt}$
- Inrush current usually between  $8-12 \times I_{nt}$
- Short-circuit current  $I_{cc}$
- Overload current usually  $1.4 I_{nt}$
- Maximum short-circuit duration. Standard 2 sec for transformers up to 630 kVA and 3 sec for higher rated powers

Following HV fuse-link technical features has to be known:

- Rated voltage  $U_n$  (kV)
- Rated current  $I_n$  (A)
- I/t Characteristics According to the curves
- Melting current (0.1 sec)  $I_f(0.1sec)$
- Melting current at 2s ec or 3sec melting time
- Minimum breaking current  $I_3$  (A)
- Breaking capacity  $I_1$  (kA)

General about transformer protection:

- Fuse-link rated voltage  $U_n$  must be higher then network voltage.
- Maximum fuse-link breaking current  $I_1$  must be higher then short circuit-current  $I_{cc}$ .
- Inrush current should not melt the fuse-link. Melting current at 100 msec must be higher than 12 times transformer rated current
- Fuse-link has to operate before the expected short-circuit current damage the transformer  $I_{cc} > I_f(2 \text{ sec})$  or  $I_{cc} > I_f(3 \text{ sec})$
- Fuse-link must be able to withstand possible short duration overloads.  $I_n \text{ FUSE} > 1.4 I_n \text{ TRAF0}$

Selection table for VV - THERMO back-up fuse links

Pt (kVA)	6/7,2 kV					10/12 kV					15/17.5kV				
	Transformer rated primary current Ip(A) at 6 kV	Inrush current (A)	HV Fuse-link rated current		LV Fuse- Link NH gG  I <sub>LV</sub> (A)	Transformer rated primary current Ip(A) at 10 kV	Inrush current (A)	HV Fuse-link rated current		LV Fuse- Link NH gG  I <sub>LV</sub> (A)	Transformer rated primary current Ip(A) at 15 kV	Inrush current (A)	HV Fuse-link rated current		LV Fuse- Link NH gG  I <sub>LV</sub> (A)
			I <sub>HV</sub> min (A)	I <sub>HV</sub> max (A)				I <sub>HV</sub> min (A)	I <sub>HV</sub> max (A)				I <sub>HV</sub> min (A)	I <sub>HV</sub> max (A)	
50	5	58	10	16	63	3	35	6	10	63	2	23	6	10	63
75	7	86	16	20	100	4	52	10	16	100	3	35	6	10	100
100	10	115	25	32	125	6	70	10	16	125	4	46	10	16	125
125	12	145	32	40	160	7	86	16	20	160	5	58	10	16	160
160	15	185	40	50	200	9	110	20	25	200	6	74	16	20	200
200	19	230	40	50	250	12	138	25	32	250	8	92	20	25	250
250	24	289	50	63	315	14	173	32	40	315	10	115	25	32	315
315	30	364	50	63	400	18	218	40	50	400	12	145	32	40	400
400	39	462	63	80	500	23	276	50	63	500	15	185	40	50	500
500	48	577	80	100	630	29	346	50	63	630	19	230	40	50	630
630	61	727	100	125	800	36	437	63	80	800	24	293	50	63	800
800	77	923	100	125	1000	46	554	80	100	1000	31	370	63	80	1000
1000	96	1154	125	160	1250	58	692	100	125	1250	38	462	80	100	1250
1250	120	1440	160	200*	1250	72	866	100	125	1250	48	577	100	125	1250
1600	154	1848	200*	250*	1500	92	1109	125	160	1500	62	739	125	160	1500
2000	192	2310	250*	315*	1600	115	1380	160	200*	1600					

\* Note: nonstandard tube dimension

**Selection table for VV - THERMO back-up fuse links**

Pt (kVA)	20/24 kV					30/36 kV				
	Transformer rated pri- mary current Ip(A) at 20 kV	Inrush current (A)	HV Fuse-link rated current		LV Fuse- Link NH gG  I <sub>LV</sub> (A)	Transformer rated pri- mary current Ip(A) at 30 kV	Inrush current (A)	HV Fuse-link rated current		LV Fuse- Link NH gG  I <sub>LV</sub> (A)
			I <sub>HV</sub> min (A)	I <sub>HV</sub> max (A)				I <sub>HV</sub> min (A)	I <sub>HV</sub> max (A)	
50	1	18	4	6	63	1	12	2	4	63
75	2	26	4	6	100	1	17	4	6	100
100	3	35	6	10	125	2	23	6	10	125
125	4	43	6	10	160	2	29	6	10	160
160	5	55	10	16	200	3	37	6	10	200
200	6	70	10	16	250	4	46	10	16	250
250	7	86	16	20	315	5	58	10	16	315
315	9	109	20	25	400	6	73	16	20	400
400	12	138	25	32	500	8	92	20	25	500
500	14	173	32	40	630	10	115	20	25	630
630	18	217	40	50	800	12	145	25	32	800
800	23	277	50	63	1000	15	185	40	50	1000
1000	29	346	50	63	1250	19	230	50	63	1250

