

# Indoor Railway DC Fuses type WBT



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## 1. Features

- simple design,
- high rupturing capacity,
- short circuit current limiting,
- low switching voltages,
- R1, P1 fire-protection grade for the materials used – in accordance with PN-84/K-02500.

## 2. Applications

The fuse links for traction applications are used to protect traction substation and electric traction rolling stock equipment against the effects of overloads greater than  $2 \times I$  and of short-circuits at voltages of 1.9 kV DC and 4 kV DC. Please refer to Table 1 for application details for particular product types.

## 3. Climatic working conditions

Fuse base type PBWMI can be operated indoors at ambient temperatures ranging from  $-5^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . Other parameters are presented below. The fuse links and fuse boards can be operated indoors or in sealed boxes secured under the railway car under the following environmental conditions:

- at ambient temperatures ranging from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ ,
- in ambient air with relative humidity of 95% at a temperature of  $+20^{\circ}\text{C}$ ,
- at an altitude of 1 200 m.

All other operating conditions first require approval from the manufacturer.

## 4. Designations, versions

### 4.1 Marking system

The marking system for particular fuse link, fuse base or fuse board has three alphanumerical sections as shown in the following diagram.



Fuse link type	Rated voltage	Rated current
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Fuse board base type current	Rated voltage	Rated current
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## 5. Technical data

The general technical data of the fuse links are presented in Table 3.

The general technical data of the fuse boards are presented in Table 4.

## 6. Compliance with standards

Fuse links for traction applications meet the requirements specified in Table 2.

## 7. How to order

Order by specifying the following:

- product name,
- type symbol,
- rated voltage,
- rated current,
- quantity.

All additional requirements not listed in this catalogue should be agreed with the manufacturer.

## 8. Order example

1. Type WBTI-3/30 fuse link for traction applications with a rated voltage of 4kV, rated current of 20 A – 20 pcs.
2. Type TBT2-3/20 fuse board for traction applications with a rated voltage of 4 kV, rated current of 20 A – 20 pcs.

Table 1.

Fuse link type	Applications
WBTI-3/3 to 20 WBTI-3/25 to 50 WBTI-3/80	Protection against the effects of short-circuits and overloads in the electric circuits of railway traction substation equipment.
WBTI-3/3 to 20 WBTI-3/25 to 50	Protection against the effects of short circuits and overload in the electric circuits of traction vehicles, railcoach space-heating equipment and electric locomotive.
WBTG-3/3; 4; 6 WBTG-3/3-I	Protection against the effects of short circuits and overloads in electric single and multi-voltage circuits of rail coach space-heating equipment.
WBTGI-3/10; 16; 20	Protection against the effect of short-circuits and overloads in the electric single- and multi- voltage circuits of rail-coach space-heating equipment as well as other d.c. circuits at traction vehicles. The dimension of these fuse- links meet the requirements of German Standards DIN 43625.
WBTS-3/0,6; 1	Protection against the effects of short-circuits and overloads in the voltage measurement circuits and special electric equipment in traction vehicles, if the nominal loads are lower than 1 A.
WBT-1,5/3; 15; 40	Protection against the effects of short circuits and overloads in electric circuits of traction substation equipment and vehicles operating at a rated voltage not greater than 1 900 V DC.

Table 2.

Product type	Compliance with Standards
WBTI-3/3 to 80	PN-69/E-06120 in scope of environmental requirements and vibration and shock resistance. General Requirements according to PN-E-06172:1999, IEC Publ. 77 of 1968 as well as UIC 552VSheets, VII edition.
WBTG-3/3 to 6 WBTG-3/3-I	PN-69/E-06120 in scope of environmental requirements and vibration and shock resistance. General Requirements according to PN-E-06172:1999, IEC Publ. 77 of 1968 as well as UIC 552VSheets of 1993.
WBTGI-3/10 to 20	VII edition PN-69/E-06120 in scope of environmental requirements and vibration and shock resistance. DIN 43625 in scope of dimensional requirements General Requirements according to PN-E-06172:1999-14, IEC Publ. 77 of 1968 as well as UIC 552VSheets.
WBTS-3/0,6; 1	PN-69/E-06120 in scope of environmental requirements and vibration and shock resistance. General Requirements acc. PN-E-06172:1999-14 IEC Publ. 77 of 1968.
WBT-1,5/3; 15; 40 PBT-1,5/40	WTO-67/ZPM Technical Requirements and AE/A10-15004.

The fuse boards for traction applications meet the requirements of the following Standards:  
PN-E-06172 in the scope specified above.

Fuse type	Fuse base type suitable for selected fuse types
WBTI-3/3; WBTI-3/6; WBTI-3/10; WBTI-3/16; WBTI-3/20	PBWM1-6/20, TBT2-3/20 i 50, TBTS2-3/20 i 50, TBTS 2-3/20, TBT2-3/20
WBTI-3/25; WBTI-3/32; WBTI-3/40	PBWM1-6/40, TBT2-3/20 i 50, TBTS2-3/20 i 50, TBT2-3/50
WBTI-3/50	TBT2-3/20 i 50, TBTS2-3/20 i 50, TBT2-3/53
WBTI-3/80	PBWM1-10/100-1
WBTGI-3/10; WBTGI-3/16; WBTGI-3/20	TBTG1A-3/15
WBTG-3/3-I	PBPM-6
WBTG-3/3; WBTG-3/4; WBTG-3/6	TBTG1-3/6
WBTS-3/0,6; WBTS-3/1	TBTS1-3/1
WBT-1,5/3; WBT-1,5/15; WBT-1,5/40	PBT-1,5/40

Other configurations should be agreed with manufacturer.



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## General technical data of fuse links for traction applications

Table 3.

Fuse link type	Highest operating voltage	Rated current		Switching overvolt.	Rated breaking current	Weight	Resistance	
		acc PNE-06172:1999-14	acc UIC-552				Min.	Max
		In	In					
	Un	In	In	U <sub>TRV</sub>	I <sub>1</sub>			
	[kV] DC	[A] DC	[A] DC	[kV]	[kA]	[kg]	[mΩ]	[mΩ]
WBTI-3/3	3.750 <sup>1)</sup>	3	3.5	<12	31.5	1.5	516.6	631.4
WBTI-3/6		6	7				189	231
WBTI-3/10		10	10				130.5	159.5
WBTI-3/16		16	16				64.8	79.2
WBTI-3/20		20	20			2.3	41.4	50.6
WBTI-3/25		25	25				33.3	40.7
WBTI-3/32		32	32				28.8	35.2
WBTI-3/40		40	36				20.7	25.3
WBTI-3/50		50	48			4.6	15.8	19.25
WBTI-3/80		80	-				8.73	10.67

<sup>1)</sup> While testing the breaking capacity, satisfactory results were found for the short-circuit range at recovery voltage of 4 000 V DC. For the overload currents at a recovery voltage of between 3 800-4 000 V DC, various values for particular fuse were obtained. The resistances are measured using either an electrical bridge method or a measuring instrument with an accuracy class not worse than 0.5% at an ambient temperature of t = 20°C ± 2°C.

Fuse link type	Highest operating voltage	Rated current		Switching overvolt.	Rated breaking current	Weight	Resistance	
		acc PNE-06172:1999	acc UIC-552				Min.	Max.
		In	In					
	Un	In	In	U <sub>TRV</sub>	I <sub>1</sub>			
	[kV] DC	[A] DC	[A] DC	[kV]	[kA]	[kg]	[mΩ]	[mΩ]
WBTGI-3/10	3.750	10	10	<12	31.5	0.65	137.7	168.3
WBTGI-3/16		16	16				69.3	84.7
WBTGI-3/20		20	20				45.1	55.3
WBTG-3/3-I	4	3	3	<12	40	0.13	569.7	696.3
WBTG-3/3	4	3	3	<12	40	0.22	569.7	696.3
WBTG-3/4		3.5	4				459	561
WBTG-3/6		6	6				300.6	367.4
WBTG-3/0.6	4	0.6	-	<12	40	0.08	42(Ω)	51.3(Ω)
WBTG-3/1		1	-				1710	2090
WBT-1.5/3		3	-				234	316
WBT-1.5/15	1950	15	-	<6	50	0.5	28.2	38.2
WBT-1.5/40		40	-				11.3	15.3

## General technical data of fuse boards

Table 4.

Fuse board type; Fuse base type	Rated voltage	Rated current	Rated test voltage at 50 Hz	Number of poles	Weight
	Un	In	Ut		
	[kV] DC	[A] DC	[kV]	[pcs]	[kg]
PBWMI-6/20	7.2	20	35 <sup>1)</sup>	1	4.9
PBWMI-6/50		40			5
TBT2-3/20		20			5.5
TBT2-3/20 & 50 <sup>2)</sup>	4	20&50	10	2	5.65
TBT2-3/50		50			5.8
TBT2-3/20		20			7.0
TBT2-3/20 & 50		20&50		2	7.3
TBTG1A-3/15		20		1	1.15
TBTG1-3/6		6			0.85
TBTS1-3/1	4	1	10	1	0.35
PBT-1.5/40	1.9	40	27 <sup>1)</sup> 35 <sup>3)</sup>	1	3.6
PBWMI-10/100-1	12	100	-	1	5.6

Note: Due to the introduction of improvements, we reserve the right to modify the products.

<sup>1)</sup> AC contact-to-contact insulation test voltage.

<sup>2)</sup> One pole is designed for fixing the type WBTI-3/3 to 20 fuse link and the second one for WBTI-3/25 to 50 fuse link.

<sup>3)</sup> AC earth insulation test voltage.



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## 9. Appendices

Fig.1 Cut-off current characteristics for fuse link types WBTI-3...

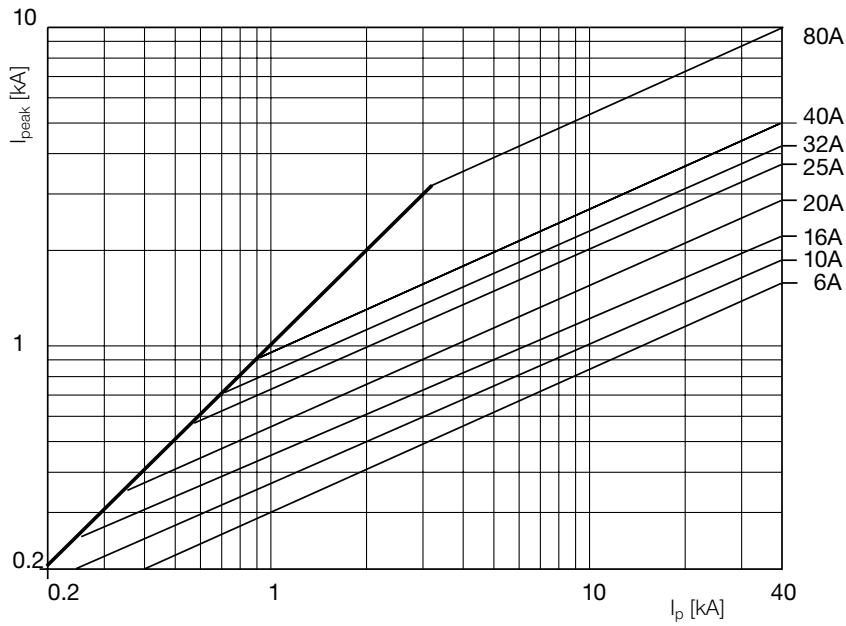
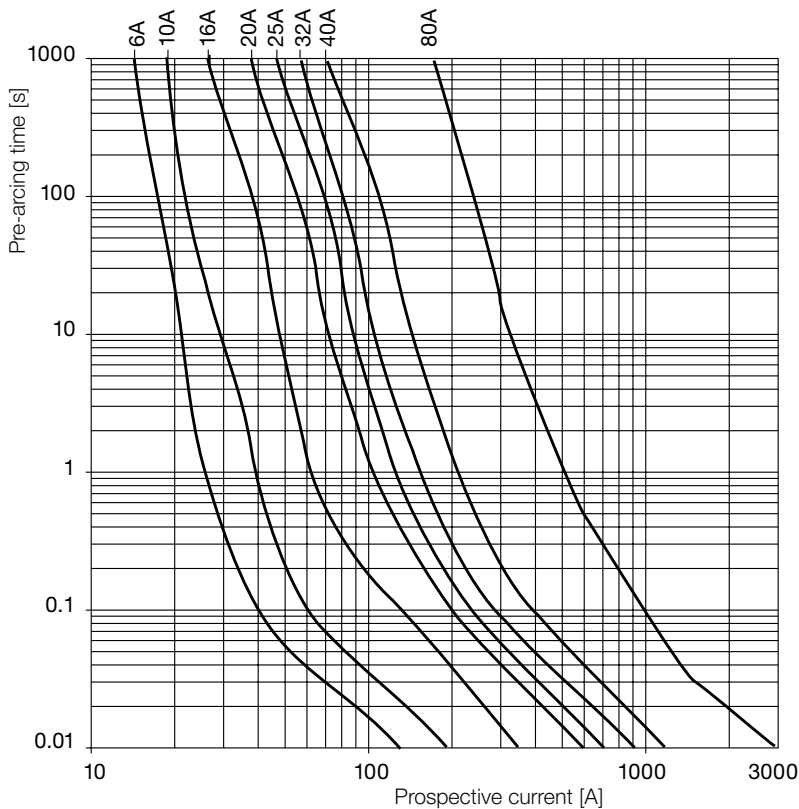


Fig. 2 Time-current characteristics for fuse link types WBTI-3 ...

Current value deviations for any average pre-arcing period value as read from the diagram are presented within  $\pm 20\%$



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Fig. 3 Cut-off current characteristics fuse link types WBTGI-3 ...

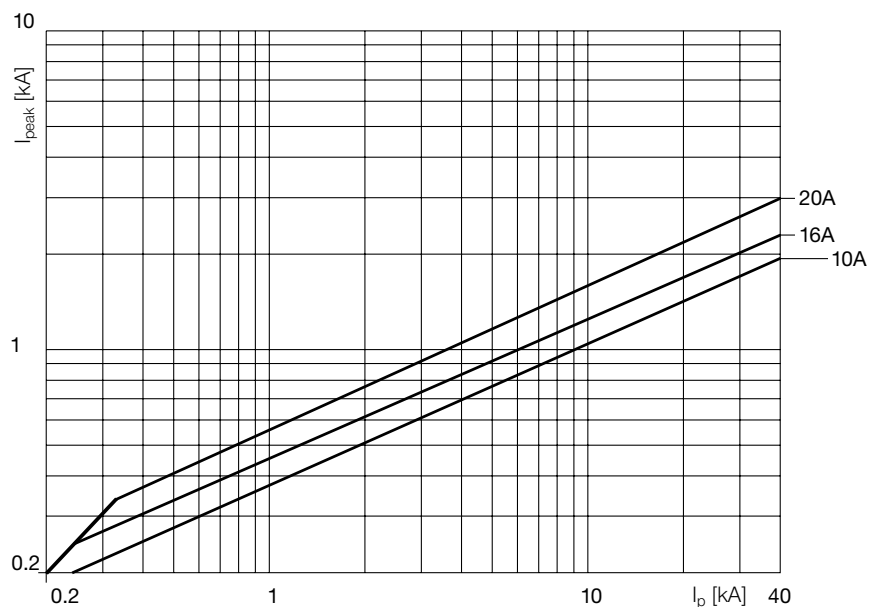
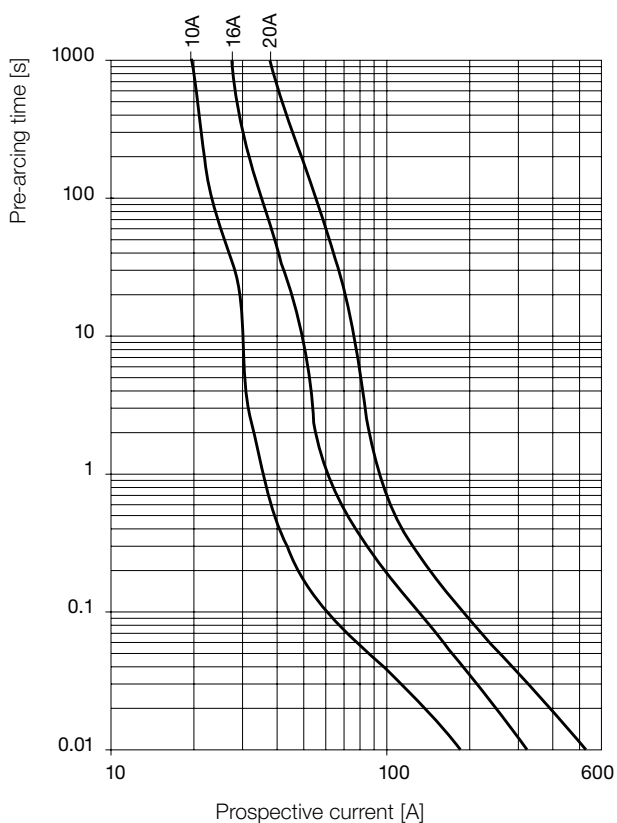


Fig. 4 Time-current characteristics for fuse link types WBTGI-3 ...  
Current value deviations for any average pre-arcing period value as read from the diagram are presented within  $\pm 20\%$



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Fig. 5 Cut-off current characteristics for fuse link types  
WBTG-3/3; 4; 6... and WBTG-3/3-I

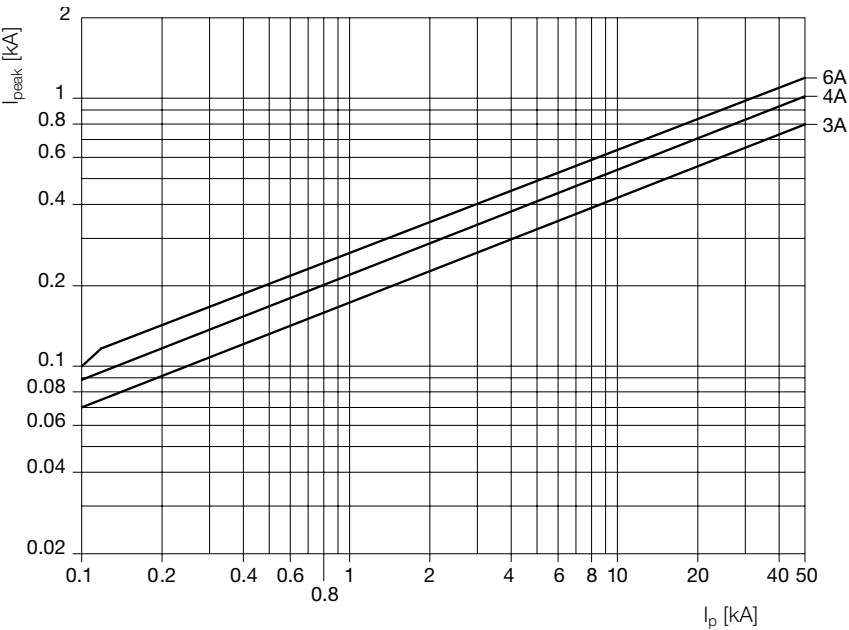


Fig. 6 Time-current characteristics for fuse link types  
WBTG-3/3; 4; 6... and WBTG-3/3-I.  
Current value deviations for any average pre-arcing period value as  
read from the diagram are presented within  $\pm 20\%$ .

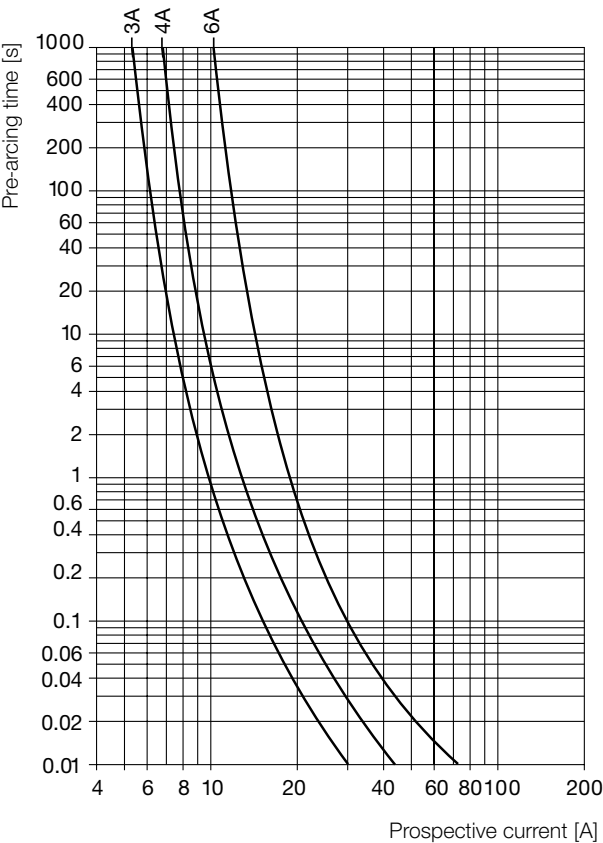


Fig. 7 Cut-off current characteristics for fuse link types WBTS-3/0.6; 1

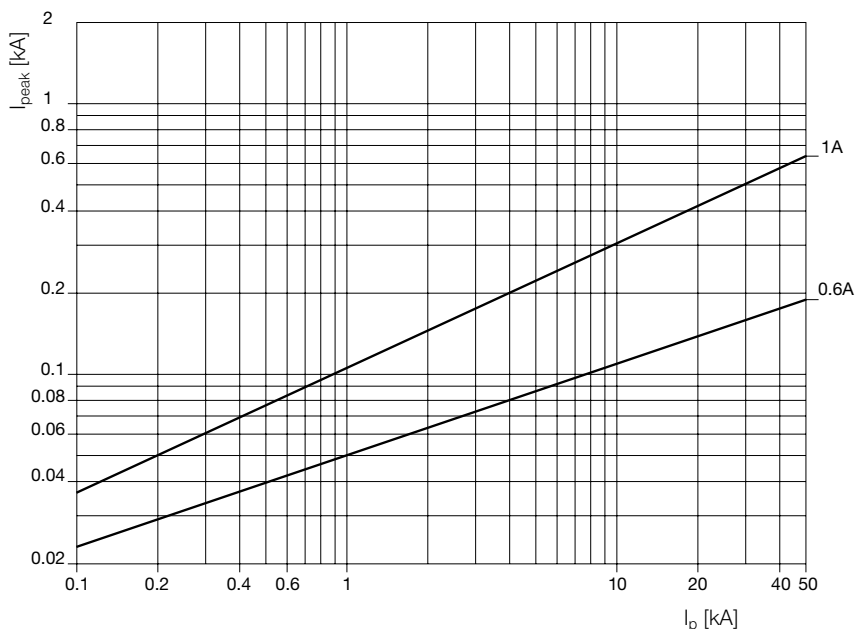
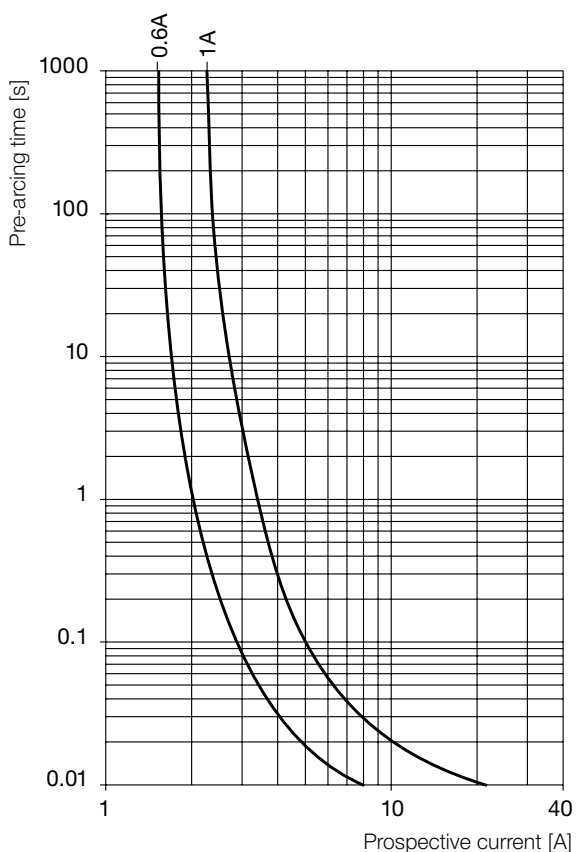


Fig. 8 Time-current characteristics for fuse link types WBTS-3/0.6; 1  
Current value deviations for any average pre-arcing period value as read from the diagram are presented within  $\pm 20\%$ .



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Fig. 9 Cut-off current characteristics for fuse link types WBT-1.5/3; 15; 40

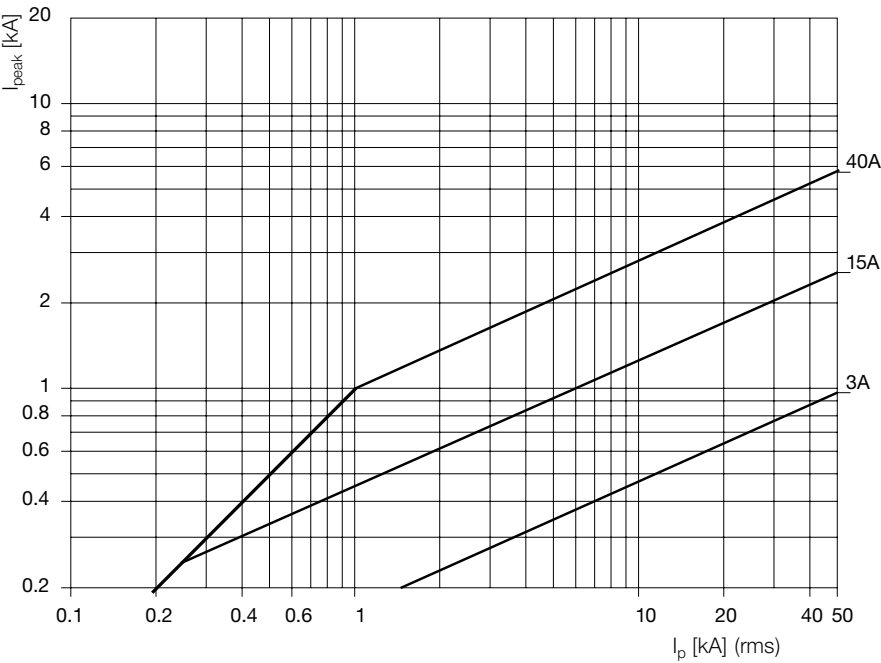
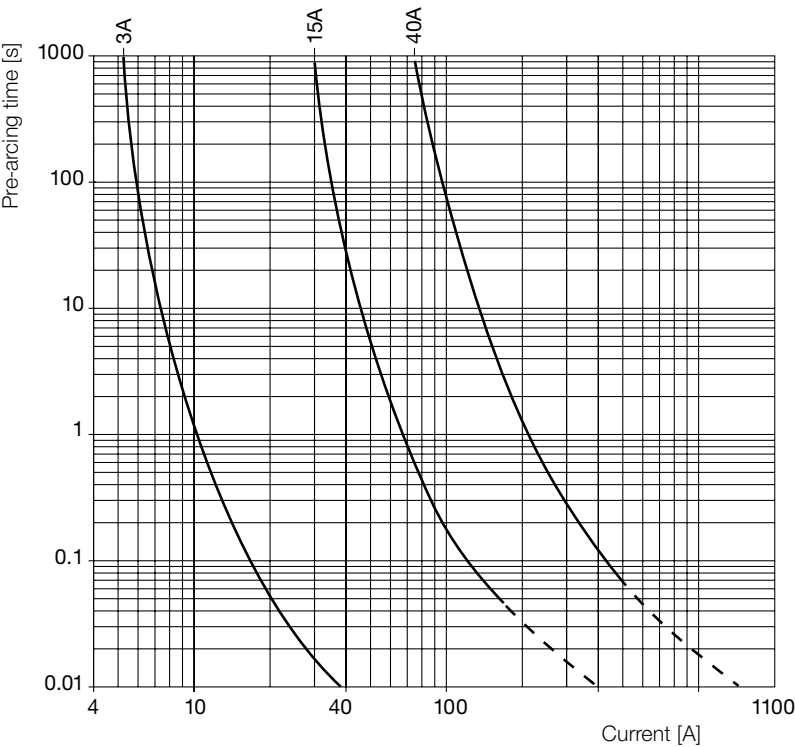


Fig. 10 Time-current characteristics for fuse link types WBT-1.5/3; 15; 40. Current value deviations for any average pre-arcing period value as read from the diagram are presented within  $\pm 20\%$ .

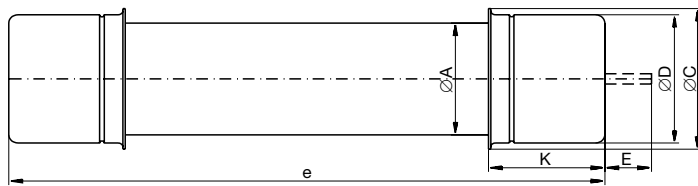


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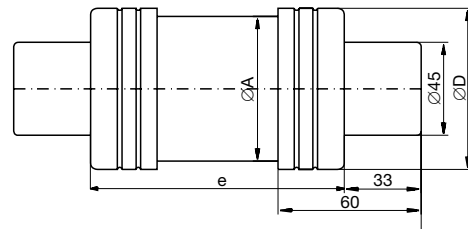
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WBTI-3, WBTG-3, WBTGI-3,  
WBTG-3/3-I, WBTS-3 and WBT-1.5  
fuse links for traction applications

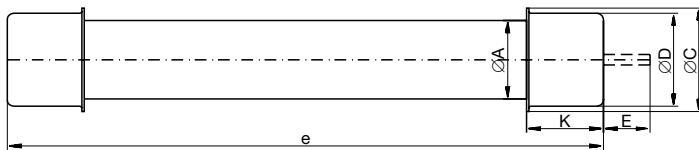
Fuse link type	Dimensions [mm]					
	$\varnothing A$	$\varnothing D$	$\varnothing C$	K	E	e
WBTI-3/3 to 20	55	62	66	50	20	256±2
WBTI-3/25 to 50	70	78	84			
WBTGI-3/10 to 20	38	45	50	33		256±2
WBTG-3/3-I	18	23	-	25	-	209±2
WBTG-3/3 to 6	24	28	-	20	12	200±2
WBTS-3/0.6; 1	18	23	-	25	-	145±2
WBT-1.5/3;15	38	45	50	33	-	109±2
WBT-1.5/40	65	72	-	-	-	109±2



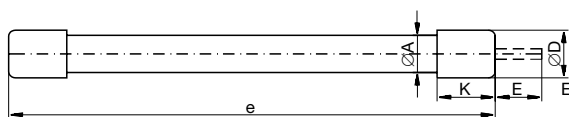
Type WBTI-3-3/... fuse links



Type WBT-1,5/40 fuse links



Type WBTGI-3/...; WBT-1,5/3 ... fuse links



Type WBTG-3/3-6,  
WBTG-3/3-I; WBTS-3/... fuse links



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