Test Report issued under the responsibility of:

DEKRA

TEST REPORT
IEC 60947-2
Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

Report Reference No.....:	2168871.50
Date of issue.....:	2014-12-09
Total number of pages	70
CB Testing Laboratory .....:	DEKRA Certification B.V.
Address .....:	Meander 1051, P.O. Box 5185, Arnhem, The Netherlands
Applicant's name.....:	LSIS Co., Ltd.
Address .....:	127, LS-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Test specification:	
Standard.....:	IEC/EN 60947-2:2006 (Fourth Edition) + A1: 2009 + A2: 2013
Test procedure .....:	CB scheme
Non-standard test method……..:	N/A
Test Report Form No. .....:	IEC60947_2G
Test Report Form(s) Originator .....:	DEKRA Certification BV
Master TRF .....:	Dated 2013-11

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description .....:	Air circuit-breaker
Trade Mark.....:	LS
Manufacturer .....:	LSIS Co., Ltd.
Model/Type reference .....:	2000AF, AN, AS, AH models see page 5~11
Ratings .....:	630 A – 2000 A, see page 9~11

Testing procedure and testing location:		
☐ **CB Testing Laboratory:**		
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature).....:		
☐ **Testing procedure: TMP**		
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature).....:		
☒ **Testing procedure: WMT**		
Testing location/ address.....:	LSIS Co., Ltd. CheongJu Plant 95, Beakbong-ro, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea	
Tested by (name + signature).....:	Mr. Song	
Witnessed by (name + signature) ....:	H.G.M. Kormelink	
Approved by (name + signature).....:	H.L. Schendstok	
☐ **Testing procedure: SMT**		
Testing location/ address.....:		
Tested by (name + signature).....:		
Approved by (name + signature).....:		
Supervised by (name + signature)...:		

List of Attachments (including a total number of pages in each attachment): None, all data is included in report.

Tests performed (name of test and test clause):

The product has been tested in 2007 and certified under NL-13384. This report describes the results of the spot check according the latest standard.

Sequence I ;

8.3.3.1 Tripping limits and characteristics (Spot check on tripping functionality)
8.3.3.2 Dielectric properties
8.3.3.3 Mechanical operation and operational performance capability
8.3.3.5 Verification of dielectric withstand
8.3.3.6 Verification of Temperature-rise
8.3.3.7 Verification of overload releases
8.3.3.9 Verification of main contact position (for circuit breakers suitable for isolation)

Sequence II/III ;

8.3.5.1 Verification of overload releases
8.3.4.1 Rated service short-circuit breaking capacity
8.3.4.2 Verification of operational capability
8.3.4.3 Verification of dielectric withstand
8.3.4.4 Verification of temperature-rise
8.3.4.5 Verification of overload releases
8.3.5.4 Verification of overload releases

Sequence IV ;

8.3.6.1 Verification of overload releases
8.3.6.2 Rated short-time withstand current
8.3.6.3 Verification of temperature-rise
8.3.6.4 Short-circuit breaking capacity at maximum short-time withstand current
8.3.6.5 Verification of dielectric withstand
8.3.6.6 Verification of overload releases

Sequence VI ;

8.3.8.1 Verification of overload releases
8.3.8.2 Rated short-time withstand current
8.3.8.3 Rated service short-circuit breaking capacity
8.3.8.4 Verification of operational capability
8.3.8.5 Verification of dielectric withstand
8.3.8.6 Verification of temperature-rise
8.3.8.7 Verification of overload releases

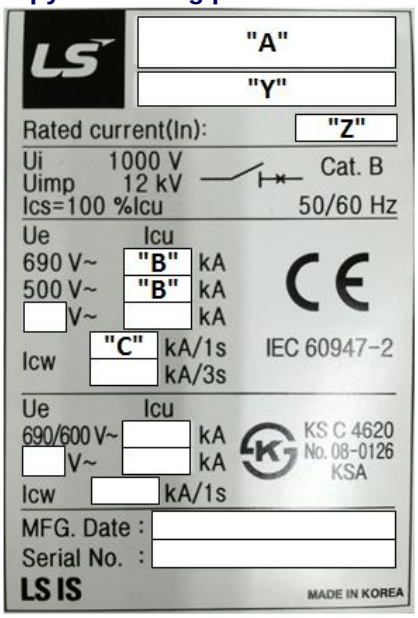
Testing location:

LSIS Co., Ltd. CheongJu Plant
95, Baekbong-ro, Heungdeok-gu, Cheongju-si, Chungcheongbuk-do, Korea, 361-720

Power Testing & Technology Institute (PT&T)

Annex F, Electromagnetic compatibility(EMC) tests F.4 Immunity tests F.4.1 Harmonic currents F.4.4 Electrical fast transient/burst (EFT/B) F.4.6 Conducted disturbances induced by radio-frequency fields (common mode)	
Summary of compliance with National Differences **List of countries addressed: N/A**	

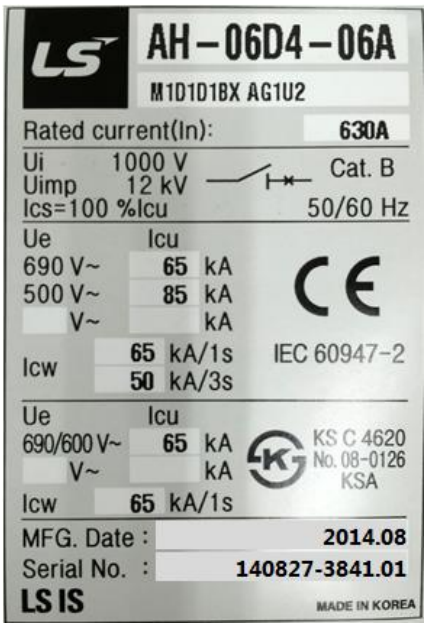
Copy of marking plate:



FRAME	"A"		"B"	"C"
	3P	4P		
2000AF	AN-06D3-□□	AN-06D4-□□	690V~ 50 500V~ 65	50
	AN-08D3-□□	AN-08D4-□□		
	AN-10D3-□□	AN-10D4-□□		
	AN-13D3-□□	AN-13D4-□□		
	AN-16D3-□□	AN-16D4-□□		
	AN-20D3-□□	AN-20D4-□□		
	AS-06D3-□□	AS-06D4-□□	690V~ 65 500V~ 70	65
	AS-08D3-□□	AS-08D4-□□		
	AS-10D3-□□	AS-10D4-□□		
	AS-13D3-□□	AS-13D4-□□		
	AS-16D3-□□	AS-16D4-□□		
	AS-20D3-□□	AS-20D4-□□		
	AH-06D3-□□	AH-06D4-□□	690V~ 65 500V~ 85	65
	AH-08D3-□□	AH-08D4-□□		
	AH-10D3-□□	AH-10D4-□□		
	AH-13D3-□□	AH-13D4-□□		
	AH-16D3-□□	AH-16D4-□□		
	AH-20D3-□□	AH-20D4-□□		

1) "□□" stands for the CT ratio and the shape of external adaptor of ACB.
2) "Y" stands for the specification of accessories of ACB.
3) "Z" descibe the rated current.

Examples of marking plate :



Test item particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B).....:	B
3.2. Interruption medium: (air, vacuum, gas Break) .....:	Air
3.3. Design: (open construction, moulded case) ....:	Open construction
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power).....:	Independent power operation
3.5. Suitability for insulation: (suitable, not -suitable) ... .:	Suitable
3.6. Provision for maintenance: (maintainable, non-maintainable).....:	Maintainable
3.7. Method of installation: (fixed, plug in, withdrawable .....:	withdrawable
3.8. Degree of protection: (IP code) .....:	IP30 (front cover)
4.7. Type of release (thermo-magnetic / electronic).....:	electronic
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD .....:	N/A
7.3 Electromagnetic compatibility (EMC) Environment A or B.....:	A
Circuit-breaker for use on phase-earthed systems .....:	P
Circuit-breaker for use in IT systems .....:	P
Rated and limiting values, main circuit ....:	
- rated operational voltage: Ue (V) .....:	220, 230, 380, 415, 440, 460, 480, 500, 550, 600, 690 V
- rated insulation voltage: Ui (V) .....:	1 000 V
- rated impulse withstand voltage: Uimp (kV) .....:	12 kV
- rated operational current: Ie (A) .....:	(200, 400), 630, 800, 1 000, 1 250, 1 600, 2 000 A
- kind of current .....:	AC
- conventional free air thermal current: Ith (A) .....:	(200, 400), 630, 800, 1 000, 1 250, 1 600, 2 000 A
- conventional enclosed thermal current: Ithe (A).....:	N/A
- current rating for four-pole circuit-breakers: (A) .....:	(200, 400), 630, 800, 1 000, 1 250, 1 600, 2 000 A
- number of poles.....:	3 and 4 poles
- rated frequency: (Hz).....:	50/60 Hz
- integral fuses (rated values).....:	N/A

Rated duty :	
- eight-hour duty.....:	N/A
- uninterrupted duty: Iu (A).....:	630, 800, 1 000, 1 250, 1 600, 2 000 A
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) .....:	AN type:143 kA-220~500 V, 105 kA-550~690 V AS type:154 kA-220~500 V, 143 kA-550~690 V AH type:187 kA-220~500 V, 143 kA-550~690 V
rated ultimate short-circuit breaking capacity: Icu (kA). .....:	AN type: 65 kA-220~500 V, 50 kA-550~690 V AS type: 70 kA-220~500 V, 65 kA-550~690 V AH type: 85 kA-220~500 V, 65 kA-550~690 V
rated service short-circuit breaking capacity: Ics (kA) .....:	Ics = 100% x Icu
rated short-time withstand current: Icw (kA/s) .....:	AN type: 50 kA, 1 s AS type & AH type: 65 kA, 1 s
Control circuits : Electrical control circuits :	
- kind of current: (AC, DC).....:	AC and DC
- rated frequency: (Hz).....:	50 / 60Hz
- rated control circuit voltage: Uc (nature, frequency, V) ...:	AC: 50 / 60 Hz , 48 V / 100~130 V / 200~250 V / 380~415 V / 440~480 V DC: 24~30 V / 48~60 V / 100~130 V / 200~250 V
- rated control supply voltage: Us (nature, frequency V) ...:	100% Uc
Air supply control circuits: (pneumatic or electro-pneumatic) :	N/A
- rated pressure and its limit .....:	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation .....:	N/A
Auxiliary circuits :	
Rated and limiting values, auxiliary circuits .....:	
- rated operational voltage Ue (V) .....:	AC: 50 / 60 Hz , 48 V / 100~130 V / 200~250 V / 380~415 V / 440~480 V DC: 24~30 V / 48~60 V / 100~130 V / 200~250 V
- rated insulation voltage: Ui (V).....:	1 000 V
- rated operational current: Ie (A) .....:	10 A-AC250 V, 10 A-DC30 V, 10 A-DC125 V, 3 A-DC250 V
- kind of current.....:	AC and DC
- rated frequency: (Hz).....:	50 / 60Hz
- number of circuits .....:	10
- number and kind of contact elements.....:	5a5b
- rated uninterrupted current: Iu (A).....:	10 A
- utilization category: (AC, DC, current and voltage) .....:	AC-15 , DC-13

Short-circuit characteristic :	
- Rated conditional short-circuit current (kA) .....:	1 kA
- kind of protective device.....:	MMS-32S 10A (auxiliary circuits : 1 kA)
Releases :	
1) shunt release .....:	P
2) Over-current release .....:	P
a) instantaneous .....:	P
b) definite time delay.....:	P
c) inverse time delay.....:	P
- independent of previous load.....:	P
- dependent on previous load; (for example thermal type release) .....:	P
3) Undervoltage release (for opening) .....:	P
4) Other releases .....:	Ground fault release
Characteristics :	
1) Shunt release and undervoltage release (for opening)...:	
- rated control circuit voltage: Uc (nature, frequency, V) ...:	AC: 50 / 60 Hz , 48 V, 100~130 V, 200~250 V, 380~415 V, 440~480 V DC: 24~30 V, 48~60 V, 100~130 V, 200~250 V
- kind of current .....:	AC / DC
- rated frequency: (if AC) .....:	50 / 60Hz
2) Over-current release .....:	
- rated current.....:	(200, 400) 630, 800,1 000, 1 250, 1 600, 2 000 A (adjustable)
- kind of current .....:	AC
- rated frequency: (if AC) .....:	50 / 60Hz
- current setting (or range of settings).....:	0,4~1,0 In (adjustable-54 settings)
- time settings (or range of settings).....:	0,5-1-2-4-8-12-16-20 (adjustable-8 settings)

Classification of installation and use..... :	
Supply Connection ..... :	
..... :	
..... :	

Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)

Testing .....:	
Date of receipt of test item .....:	February 27th, 2014
Date (s) of performance of tests .....:	March - July, 2014

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided..... :	☐ **Yes** ☒ **Not applicable**

When differences exist; they shall be identified in the General product information section.

Name and address of factory (ies)..... :	LSIS Co., Ltd. CheongJu Plant 95, Beakbong-ro, Heungdeok-gu Cheongju-si, Chungcheongbuk-do, Korea

General product information:

1.Organization of type and code

AS-10D3-00J	M1	D1	D1	AX	NG0	U1	AL	C
	Charging motor	Closing Coil	Trip Coil	Aux. s/w & charging type	OCR(refer to 13page)	UVT	OPTION	
	MA N/A	D0 N/A	D0 N/A	GX Standard 3a3b_OFF Charging		U0 N/A		
	M1 AC/DC 100V ~ 130V	D1 AC/DC 100V ~ 130V	D1 AC/DC 100V ~ 130V	GC Standard 3a3b_ON Charging		U1 AC/DC 100V ~ 130V		
	M2 AC/DC 200V ~ 250V	D2 AC/DC 200V ~ 250V	D2 AC/DC 200V ~ 250V	HX Hing Capa. 5a5b_OFF Charging		U2 AC/DC 200V ~ 250V		
	M3 DC 125V	D3 DC 125V	D3 DC 125V	HC Hing Capa. 5a5b_ON Charging		U3 DC 125V		
	M4 DC 24V ~ 30V	D4 DC 24V ~ 30V	D4 DC 24V ~ 30V	CC Standard 6a6b_ON Charging		U4 DC 24V ~ 30V		
	M5 DC 48V ~ 60V	D5 DC 48V ~ 60V	D5 DC 48V ~ 60V	JC Hing Capa. 6a6b_ON Charging		U5 DC 48V ~ 60V		
	M6 AC 380V ~ 415V	D6 AC 380V ~ 480V	D6 AC 380V ~ 480V	TX Hing Capa. 4a4b_OFF Charging (for TCS)		U6 AC 380V ~ 480V		
	M7 AC 440V ~ 480V	D7 AC 48V	D7 AC 48V	TC Hing Capa. 5a5b_ON Charging (for TCS)		U7 AC 48V		
	M8 AC 48V							

A N	-	10	D	3	-	10	J
Automatic circuit breaker		AMPARE FRAME	Size & Neutral position	Number of Poles		Rating Current (CT SPEC.)	Installation & Connection
		– –					Drawout type
		06 630AF	D : 630~1600AF 3/4P RST(N)	3 : 3poles(D) 4 : 4poles(D,W)		00 Without OCR & CT	J Manual Connection
						02 200A	A Automatical Connection
						04 400A	Fixed type
		08 800AF				06 630A	H Rear Connected Horizontal
			W : 630~1600AF 4P NRST			04 400A	V Rear Connected Vertical
		10 1000AF				06 630A	M Upper-Horizontal / Lower-Vertical
		13 1250AF				08 800A	N Upper-Vertical / Lower-Horizontal
		16 1600AF				10 1000A	P Front Connected Flat
						13 1250A	
						16 1600A	
		– –	E : 2000~3200AF 3/4P RST(N)	3 : 3poles(E) 4 : 4poles(E,X)		00 Without OCR & CT	
		20 2000AF				06 630	
						08 800	
			X : 2000~3200AF 4P NRST			10 1000	
						13 1250	
						16 1600	
		25 2500AF				20 2000	
		32 3200AF				25 2500A	
						32 3200A	

A S	-	10	D	3	-	10	J
Automatic circuit breaker		AMPARE FRAME	Size & Neutral position	Number of Poles		Rating Current (CT SPEC.)	Installation & Connection
		– –					Drawout type
		06 630AF	D : 630~2000AF 3/4P RST(N)	3 : 3poles(D) 4 : 4poles(D,W)		00 Without OCR & CT	J Manual Connection
						02 200A	A Automatical Connection
						04 400A	Fixed type
		08 800AF				06 630A	H Rear Connected Horizontal
			W : 630~2000AF 4P NRST			04 400A	V Rear Connected Vertical
		10 1000AF				06 630A	M Upper-Horizontal / Lower-Vertical
		13 1250AF				08 800A	N Upper-Vertical / Lower-Horizontal
		16 1600AF				10 1000A	P Front Connected Flat
		20 2000AF				13 1250A	
						16 1600A	
						20 2000A	
		– –	E : 2000~4000AF 3/4P RST(N)	3 : 3poles(E) 4 : 4poles(E,X)		00 Without OCR & CT	
		20 2000AF				06 630	
						08 800	
			X : 2000~4000AF 4P NRST			10 1000	
						13 1250	
						16 1600	
		25 2500AF				20 2000	
		32 3200AF				25 2500A	
		40 4000AF				32 3200A	
						40 4000A	
		– –	F : 5000AF 3/4P RST(N)	3 : 3poles(F) 4 : 4poles(F,Y)		00 Without OCR & CT	
		40 4000AF	Y : 5000AF 4P NRST			40 4000A	
		50 5000AF				50 5000A	
		– –	G : 4000/5000/6300AF 3/4P RST(N)	3 : 3poles(G) 4 : 4poles(G,Z)		00 Without OCR & CT	
		40 4000AF				40 4000A	
		50 5000AF	Z : 4000/5000/6300AF 4P NRST			50 5000A	
		63 6300AF				63 6300A	

A H	-	10	D	3	-	10	J
Automatic circuit breaker		AMPARE FRAME	Size & Neutral position	Number of Poles		Rating Current (CT SPEC.)	Installation & Connection
		– –					Drawout type
		06 630AF	D : 630~2000AF 3/4P RST(N)	3 : 3poles(D) 4 : 4poles(D,W)		00 Without OCR & CT	J Manual Connection
						02 200A	A Automatical Connection
						04 400A	Fixed type
		08 800AF				06 630A	H Rear Connected Horizontal
			W : 630~2000AF 4P NRST			04 400A	V Rear Connected Vertical
		10 1000AF				06 630A	M Upper-Horizontal / Lower-Vertical
		13 1250AF				08 800A	N Upper-Vertical / Lower-Horizontal
		16 1600AF				10 1000A	P Front Connected Flat
		20 2000AF				13 1250A	
						16 1600A	
						20 2000A	
		– –	E : 630~4000AF 3/4P RST(N)	3 : 3poles(E) 4 : 4poles(E,X)		00 Without OCR & CT	
		06 630AF				06 630	
		08 800AF				08 800	
		10 1000AF				10 1000	
		13 1250AF				13 1250	
		16 1600AF	X : 630~4000AF 4P NRST			16 1600	
		20 2000AF				20 2000	
		25 2500AF				25 2500A	
		32 3200AF				32 3200A	
		40 4000AF				40 4000A	
		– –	G : 4000/5000/6300AF 3/4P RST(N)	3 : 3poles(G) 4 : 4poles(G,Z)		00 Without OCR & CT	
		40 4000AF				40 4000A	
		50 5000AF	Z : 4000/5000/6300AF 4P NRST			50 5000A	
		63 6300AF				63 6300A	

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict

5.2	MARKING		
a)	The following data shall be marked on the circuit-breaker itself or on a name plate or nameplates attached to the circuit-breaker, and located in a place such that they are visible and legible when the circuit-breaker is installed.		
	- rated current:	(200 A, 400 A), 630 A, 800 A, 1000 A, 1250 A, 1600 A, 2000 A	P
	- suitability for isolation, if applicable, with the symbol 	Compliance	P
	- indication of the open and closed position: with ○ and I respectively, if symbols are used	Compliance	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	LS	P
	- type designation or serial number	AN-06/08/10/13/16/20D3-□□ AN-06/08/10/13/16/20D4-□□ AS-06/08/10/13/16/20D3-□□ AS-06/08/10/13/16/20D4-□□ AH-06/08/10/13/16/20D3-□□ AH-06/08/10/13/16/20D4-□□	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	IEC 60947-2	P
	- utilization category	Cat.B	P
	- rated operational voltage(s) Ue	690 V , 500 V	P
	- Circuit-breaker for use in IT systems: Circuit-breaker for which all values of rated voltage have not been tested according to annex H or are not covered by such testing, shall be identified by the symbol  which shall be marked on the circuit-breaker immediately following these values of rated voltage	Compliance	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50 / 60 Hz	P
	- rated service short-circuit breaking capacity. Ics	Ics = 100% Icu	P
	- rated ultimate short-circuit breaking capacity. Icu	AN type: 50 kA-690 V, 65 kA-500 V AS type: 65 kA-690 V, 70 kA-500 V AH type: 65 kA-690 V, 85 kA-500 V	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B	AN type: 50 kA, 1s AS type & AH type: 65 kA, 1 s	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- line and load terminals, unless their connection is immaterial	Line and load unmarked	P
	- neutral pole terminals, if applicable, by the letter N	Compliance	P
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1	Compliance	P
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P
	- range of the current setting (Ir) of adjustable overload release	0,4~1,0 In (adjustable-54 settings)	P
	- value / range of the rated instantaneous short-circuit current setting (Ii), fixed or adjustable	2-3-4-6-8-10-12-15 (adjustable-8 settings)	P
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)	AN type: 105 kA-690 V, 143 kA-500 V AS type: 143 kA-690 V, 154 kA-500 V AH type: 143 kA-690 V, 187 kA-500 V	P
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	1 000 V	P
	- rated impulse withstand voltage (Uimp), when declared.	12 kV	P
	- pollution degree if other than 3	3	P
	- conventional enclosed thermal current (Ithe) if different from the rated current:	-	N/A
	- IP Code, where applicable:	IP30	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:	-	N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	51 mm	P
	- r.m.s sensing if applicable, according to F.4.1.1	Compliance	P
	- suitability for environment A or B	A	P
	- minimum cable cross-section, if different from Table 9 of IEC 60947-1, for ratings ≤ 20 A according to rated ultimate short-circuit breaking capacity Icu;		
	- values of tightening torque for the circuit-breaker terminals.	46,6 Nm	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
d)	The following data concerning the opening and closing devices of the circuit-breaker shall be placed either on their own nameplates or on the nameplate of the circuit-breaker:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:	DC: 24/30 Vdc, 48/60 Vdc, 100~130 Vdc, 200~250 Vdc AC (50/60 Hz): 48/60 Vac, 100~130 Vac, 200~250 Vac 380~415 Vac, 440~480 Vac	P
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	DC: 24/30 Vdc, 48/60 Vdc, 100~130 Vdc, 200~250 Vdc AC (50/60 Hz): 48/60 Vac, 100~130 Vac, 200~250 Vac 380~415 Vac, 440~480 Vac	P
	- rated current of indirect over-current releases:	Compliance	P
	- number and type of auxiliary contacts and kind of current, rated frequency (if AC) and rated voltages of the auxiliary switches, if different from those of the main circuit.	5a5b 10 A/250 Vac (50/60 Hz) 10 A/125 Vdc, 3 A/250 Vdc	P
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	Line and load unmarked	P
	- load terminal	Line and load unmarked	P
	- neutral pole terminal ”N”	Compliance	P
	- protective earth terminal ⏚	Compliance	P
	- terminal of coils (A/B)	A1/A2	P
	- terminal of shunt release (B)	C1/C2	P
	- terminals of under-voltage release (D)	D1/D2	P
	- terminals of interlocking electromagnets (E)	-	N/A
	- terminals of indicated light devices (X)	-	N/A
	- terminals of contact elements for switching devices (no)	a contact : 11/12,21/22, 31/32,41/42, 51/52 b contact : 13/14,23/24, 31/32,41/42, 51/52	P

7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker	Compliance	P
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:	14 mm	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.	Compliance	P
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open	Compliance	P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.	Compliance	P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.	Compliance	P
	The isolating distances between the isolating contacts cannot be inadvertently reduced.	Compliance	P
7.1.2.1 part 1	Resistance to abnormal heat and fire	650 °C, 960 °C	P
7.1.3 part 1	Current-carrying parts and their connection	Compliance	P
7.1.4	Clearances and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:		
	- Uimp is given as:	12 kV	
	- max. value of rated operational voltage to earth	398,4 V	
	- nominal voltage of supply system:	690 V	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous	
	- minimum clearances (mm):	14 mm	
	- measured clearances (mm):	45,1 mm	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	1 000 V	
	- pollution degree	3	
	- comparative tracking index (V)	≥ 450 V	
	- material group	I , II	
	- minimum creepage distances (mm)	16 mm	
	- measured creepage distances (mm)	87 mm	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.1.5 part 1	Actuator		
7.1.5.1 part 1	Insulation		
	The actuator of the equipment shall be insulated from the live parts for the rated insulation voltage and, if applicable, the rated impulse withstand voltage	Compliance	P
	If it is made of metal, it shall be capable of being satisfactorily connected to a protective conductor unless it is provided with additional reliable insulation	-	N/A
	If it is made of or covered by insulating material, any internal metal part, which might become accessible in the event of insulation failure, shall also be insulated from live parts for the rated insulation voltage	Compliance	P
7.1.5.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.	Compliance	P
	Where devices cannot conform to these requirements, e.g. due to special applications or alternative mounting positions, they shall be clearly marked such that there is no doubt as to the ”I” and ”O” positions and the direction of operation	Compliance	P
7.1.6 part 1	Indication of contact position		
7.1.6.1 part 1	Indicating means		
	When an equipment is provided with means for indicating the closed and open positions, these positions shall be unambiguous and clearly indicated	Compliance	P
	This is done by means of a position indicating device (see 2.3.18)	Compliance	P
	If symbols are used, they shall indicate the closed and open position respectively, in accordance with IEC 60417-2:		
	- 60417-2-IEC-5007 **I** On (power)	Compliance	P
	- 60417-2-IEC-5007 **O** Off (power)	Compliance	P
	For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol ”O”	Compliance	P
	Red colour shall not be used for any other push-button	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073	Compliance	P
7.1.6.2 part 1	Indication by the actuator		
	When the actuator is used to indicate the position of the contacts, it shall automatically take up or stay, when released, in the position corresponding to that of the moving contacts; in this case, the actuator shall have two distinct rest positions corresponding to those of the moving contacts, but for automatic opening a third distinct position of the actuator may be provided	Compliance	P
7.1.7	Additional safety requirements for equipment suitable for isolation		
7.1.7.1	Additional constructional requirements for equipment suitable for isolation (Ue > 50 V):		
	Equipment suitable for isolation shall provide in the open position an isolation distance in acc. with the requirements necessary to satisfy the isolating function. Indication of the main contacts shall be provide by one or more of the following means:		
	- the position of the actuator	Compliance	P
	- a separate mechanical indicator	Compliance	P
	- visibility of the moving contacts	Compliance	P
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position	Compliance	P
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking	Compliance	P
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.	Compliance	P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :	14 mm	
	- measured clearances (mm) :	32,1 mm	P
	- test Uimp across gap (kV) :	18,5 kV (sea level)	P
7.1.7.2	Supplementary requirements for equipment with provision for electrical interlocking with contactors or circuit-breakers:		
	auxiliary switch shall be rated according to IEC 60947-5-1	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	If equipment suitable for isolation is provided with an auxiliary switch for the purpose of electrical interlocking with contactor (s) or circuit-breaker(s) and intended to be used in motor circuits, the following requirements shall apply unless the equipment is rated for AC-23 utilization category	Compliance	P
	The time interval between the opening of the contacts of the auxiliary switch and the contacts of the main poles shall be sufficient to ensure that the associated contactor or circuit-breaker interrupts the current before the main poles of the equipment open	Compliance	P
	Unless otherwise stated in the manufacturer's technical literature, the time interval shall be not less than 20 ms when the equipment is operated according to the manufacturer instructions	Compliance	P
	Compliance shall be verified by measuring the time interval between the instant of opening of the auxiliary switch and the instant of opening of the main poles under no-load conditions when the equipment is operated according to the manufacturer's instructions	Compliance	P
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles	Compliance	P
	A suitable opening time interval may also be provided by an intermediate position (between the ON and OFF position) at which the interlocking contact(s) is (are) open and the main poles remain closed	Compliance	P
7.1.7.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed	Compliance	P
	Alternatively, the design may provide padlockable means to prevent access to the actuator	Compliance	P
	test force F applied to the actuator in an attempt to operate to the closed position (N) :	27 N	P
	rated impulse withstand voltage (kV) :	12 kV	P
	test Uimp on open main contacts at the test force	18,5 kV (sea level)	P
7.1.8	Terminals		
7.1.8.1	All parts of terminals which maintain contact and carry current shall be of metal having adequate mechanical strength	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminal connections shall be such that necessary contact pressure is maintained	Compliance	P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal	Compliance	P
	Terminal shall not allow the conductor to be displaced or to be displaced themselves in a manner detrimental to the operator of equipment and the insulation voltage shall not be reduced below the rated value	Compliance	P
7.1.8.2	Connection capacity		
	type of conductors :	Bus-bar	P
	minimum cross-sectional area of conductor (mm²) :	40 x 5 mm^2 x 2 (In = 630 A)	P
	maximum cross-sectional area of conductor (mm²) :	100 x 5 mm^2 x 3 (In = 2 000 A)	P
	number of conductors simultaneously connectable to the terminal :	2 (In = 630A ~ 1 600A) 3 (In = 2 000A)	P
7.1.8.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation	Compliance	P
	clamping screws and nuts shall not serve to fix any other component	Compliance	P
7.1.8.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	Compliance	P
	protective earth terminal	Compliance	P
	other terminals	-	N/A
7.1.9 part 1	Additional requirements for equipment provided with a neutral pole		
	When equipment is provided with a pole intended only for connecting the neutral, this pole shall be clearly identified to that effect by the letter N (see 7.1.7.4.).	Compliance	P
	A switched neutral pole shall break not before and shall make not after the other poles	Compliance	P
	For equipment having a value of conventional thermal current (free air or enclosed, see 4.3.2.1 and 4.3.2.2) not exceeding 63 A, this value shall be identical for all poles	-	N/A
	For higher conventional thermal current values, the neutral pole may have a value of conventional thermal current different from that of the other poles, but not less than half that value or 63 A, whichever is the higher	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	if a pole with an appropriate making and breaking capacity is used as a neutral pole, then all poles, incl. the neutral pole, shall operate substantially together.	Compliance	P
7.1.10	Provisions for protective earthing		
7.1.10.1	The exposed conductive parts (e.g. chassis, framework and fixed parts of metal enclosures) other than those which cannot constitute a danger shall be electrically interconnected and connected to a protective earth terminal for connection to an earth electrode or to an external protective conductor	Compliance	P
part 1	This requirement can be met by the normal structural parts providing adequate electrical continuity and applies whether the equipment is used on its own or incorporated in an assembly	Compliance	P
	Exposed conductive parts are considered not to constitute a danger if they cannot be touched on large areas or grasped with the hand or if they are of small size (approximately 50 mm x 50 mm) or are so located as to exclude any contact with live parts	Compliance	P
7.1.10.2 part 1	Protective earth terminal		
	The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed	Compliance	P
	The protective earth terminal shall be suitably protected against corrosion	Compliance	P
	In the case of equipment with conductive structures, enclosures, etc., means shall be provided, if necessary, to ensure electrical continuity between the exposed conductive parts the equipment and the metal sheathing of connecting conductors	Compliance	P
	The protective earth terminal shall have no other function, except when it is intended to be connected to a PEN conductor (see 2.1.1.5 – Note). In this case, it shall also have the function of a neutral terminal in addition to meeting the requirements applicable to the protective earth terminal	Compliance	P
7.1.10.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The identification shall be achieved by colour (green-yellow mark) or by the notation PE, or PEN, as applicable, in accordance with IEC 60445, subclause 5.3, or, in the case of PEN, by a graphical symbol for use on equipment	Compliance	P
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2	Compliance	P
7.1.11	Enclosure for equipment		
7.1.11.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible	-	N/A
	Sufficient space shall be provided inside the enclosure	-	N/A
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor	-	N/A
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place	-	N/A
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations	-	N/A
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices	-	N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure	-	N/A
7.1.11.2	Insulation		
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure	-	N/A
7.1.12	Degree of protection of enclosed equipment		
	Degree of protection.	IP30	
	Test for first characteristic.	IP3X	

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Clause	Requirement + Test	Result - Remark	Verdict
	Test for first numeral .....:	3	P
	Test for second characteristic	IPX0	
	Test for second numeral .....:	0	N/A
7.1.13 part 1	Conduit pull-out, torque and bending with metallic conduits		
	Polymeric enclosures of equipment, whether integral or not, provided with threaded conduit entries, intended for the connection of extra heavy duty, rigid threaded metal conduits complying with IEC 60981, shall withstand the stresses occurring during its installation such as pull-out, torque, bending	Compliance	P
7.2	Performance requirements		
7.2.1	Operating condition		
7.2.1.1	Closing		
	For a circuit-breaker to be closed safely on to the making current corresponding to its rated short-circuit making capacity, it is essential that it should be operated with the same speed and the same firmness as during the type test for proving the short-circuit making capacity	Compliance	P
7.2.1.1.1	Dependent manual closing		
	For a circuit-breaker having a dependent manual closing mechanism, it is not possible to assign a short-circuit making capacity rating irrespective of the conditions of mechanical operation	-	N/A
	Such a circuit-breaker should not be used in circuits having a prospective peak making current exceeding 10 kA	-	N/A
	However, this does not apply in the case of a circuit-breaker having a dependent manual closing mechanism and incorporating an integral fast-acting opening release which causes the circuit-breaker to break safely, irrespective of the speed and firmness with which it is closed on to prospective peak currents exceeding 10 kA; in this case, a rated short-circuit making capacity can be assigned	-	N/A
7.2.1.1.2	Independent manual closing		
	A circuit-breaker having an independent manual closing mechanism can be assigned a short-circuit making capacity rating irrespective of the conditions of mechanical operation	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.1.3	Dependent power closing		
	At 110% of the rated control supply voltage, the closing operation performed on no-load shall not cause any damage to the circuit-breaker.	-	N/A
	At 85% of the rated control supply voltage, the closing operation shall be performed when the current established by the circuit-breaker is equal to its rated making capacity within the limits allowed by the operation of its relays or releases and, if a maximum time is stated for the closing operation, in a time not exceeding this maximum time limit.	-	N/A
7.2.1.1.4	Independent power closing		
	A circuit-breaker having an independent power closing operation can be assigned a rated short-circuit making capacity irrespective of the conditions of power closing	Compliance	P
	Means for charging the operating mechanism, as well as the closing control components, shall be capable of operating in accordance with the manufacturer's specification	Compliance	P
7.2.1.1.5	Stored energy closing		
	Capable ensuring closing of the circuit-breaker in any condition between no-load and its rated making capacity	Compliance	P
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.	Compliance	P
	- means for charging the operating mechanism and closing control components operates when auxiliary supply voltage is between 85% and 110% of the rated control supply voltage.	Compliance	P
	- not possible for the moving contacts to move from the open position, unless the charge is sufficient for satisfactory completion of the closing operation.	Compliance	P
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	-	N/A
	- For trip free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the release is in the position to trip the circuit-breaker.	Compliance	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.2	Opening		
7.2.1.2.1	Circuit-breakers which open automatically shall be trip-free and, unless otherwise agreed between manufacturer and user, shall have their energy for the tripping operation stored prior to the completion of the closing operation		
7.2.1.2.2	Opening by undervoltage releases		
7.2.1.3. a part 1	Operating voltage		
	An under-voltage relay or release, when associated with a switching device, shall operate to open the equipment even on a slowly falling voltage within the range between 70% and 35% of its rated voltage	Compliance	P
	An under-voltage relay or release shall prevent the closing of the equipment when the supply voltage is below 35% of the rated voltage of the relay or release; it shall permit closing of the equipment at supply voltages equal to or above 85% of its rated value	Compliance	P
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value	Compliance	P
7.2.1.3. b part 1	Operating time		
	For a time-delay under-voltage relay or release, the time-lag shall be measured from the instant when the voltage reaches the operating value until the instant when the relay or release actuates the tripping device of the equipment	-	N/A
7.2.1.2.3	Opening by shunt releases	Compliance	P
7.2.1.4 part 1	Limits of operation of shunt releases		
	A shunt release for opening shall cause tripping under all operating conditions of an equipment when the supply voltage of the shunt release measured during the tripping operation remains between 70% and 110% of the rated control supply voltage and, if a.c., at the rated frequency	Compliance	P
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	The short-circuit release shall cause tripping of the circuit-breaker with an accuracy of 20% of the tripping current value of the current setting for all values of the current setting of the short-circuit current release	Compliance	P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing	Compliance	P
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)	Compliance	P
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see note to 8.3.5)	Compliance	P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation	-	N/A
	The release shall cause tripping of the circuit-breaker with an accuracy of ± 10% of the tripping current value of the current setting for all values of current setting of the overload release	-	N/A
2)	Inverse time-delay operation		
	At the reference temperature and at 1,05 times the current setting with the conventional non-tripping current, the opening release being energized on all poles, tripping shall not occur in less than the conventional time from the cold state, i.e. with the circuit-breaker at the reference temperature	Compliance	P
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current, tripping shall then occur in less than the conventional time later	Compliance	P
	If a release is declared by the manufacturer as substantially independent of ambient temperature, the current values of table 6 shall apply within the temperature band declared by the manufacturer, within a tolerance of 0,3%/K	Compliance	P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.4.2	Operational performance capability		
7.2.4.2 part 1	The operational performance off-load for which the tests are made with the control circuits energized and the main circuit not energized, in order to demonstrate that the equipment meets the operating conditions specified at the upper and lower limits of supply voltage and/or pressure specified for the control circuit during closing and opening operations	Compliance	P
	The operational performance on-load during which the equipment shall make and break the specified current corresponding, where relevant, to its utilization category for the number of operations stated in the relevant product standard	Compliance	P
8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm²) :	1 500 mm^2 (In = 2 000 A)	
	diameter of thread (mm) :	M12	
	torque (Nm) :	46,6 Nm	
	5 times on 2 separate clamping units	Compliance	P
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm²) :	-	
	number of conductors of the smallest cross section :	-	
	diameter of bushing hole (mm) :	-	
	height between the equipment and the platen :	-	
	mass at the conductor(s) (kg) :	-	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest cross-sectional area (mm²) :	-	
	number of conductors of the largest cross section :	-	

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Clause	Requirement + Test	Result - Remark	Verdict
	diameter of bushing hole (mm) :	-	
	height between the equipment and the platen :	-	
	mass at the conductor(s) (kg) :	-	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	conductor of the largest and smallest cross-sectional area (mm²) :	-	
	number of conductors of the smallest cross section, number of conductors of the largest cross section :	-	
	diameter of bushing hole (mm) :	-	
	height between the equipment and the platen :	-	
	mass at the conductor(s) (kg) :	-	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
	Pull-out test		
	force (N) :	-	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	-	N/A
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	AH-20D4	
	Sample no:	#2-1	
	Rated operational voltage: Ue (V)	690 V	
	Rated current: In (A)	2 000 A	
	Ambient temperature 10-40 °C :	22 °C	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	4 000A (Min. –Inst.) 30 000A (Max. –Inst.) 3 000A (Min. –STD) 20 000A (Max. –STD)	P
	Range of adjustable setting current. (A)	Isd (short time delay tripping setting) 1,5 to 10 x Ir Ii (instantaneous tripping setting) 2 to 15 x In, OFF	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.	0,05 ~ 0,4s (STD)	P
	Electromagnetic over current releases		
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases:	-	N/A
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases:	-	N/A
	Test current: 80% of the **maximum** adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases	-	N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: tripping current declared for single pole operation (A)	-	N/A
	Operating time: < 0,2 s in case of instantaneous release	-	N/A
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases	-	N/A
	Electronic over current releases		
	For circuit-breakers with an electronic over current release, the operation of the short-circuit releases shall be verified by one test only on each pole individually.	Compliance	P
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	Ii: 0,8 x 2 x 2 000 A: L1: 3 200 A L2: 3 200 A L3: 3 200 A N: 3 200 A Isd: 0,8 x 1,5 x 0,4 x 2 000 A tsd: 50 ms : L1: 960 A L2: 960 A L3: 960 A N: 960 A	P
	Operating time: >0,2s in case of instantaneous releases: L1, L2, L3, N:	No tripping at 80%	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1, L2, L3, N	No tripping at 80%	P
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	Ii: 1,2 x 2 x 2 000 A : L1: 4 800 A L2: 4 800 A L3: 4 800 A N: 4 800 A Isd: 1,2 x 1,5 x 0,4 x 2 000 A tsd: 50 ms : L1: 1 440 A L2: 1 440 A L3: 1 440 A N: 1 440 A	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	 35 ms 37 ms 40 ms	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	51 ms 55 ms 53 ms	P
	Test current: 80% of the **maximum** adjustable setting current: (A)	Ii: 0,8 x 15 x 2 000 A : L1: 24 000 A L2: 24 000 A L3: 24 000 A N: 24 000 A Isd: 0,8 x 10 x 2 000 A tsd: 400 ms L1: 16 000 A L2: 16 000 A L3: 16 000 A N: 16 000 A	P
	Operating time: >0,2s in case of instantaneous releases: L1, L2, L3, N:	No tripping at 80%	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1, L2, L3,N:	No tripping at 80%	P
	Test current: 120% of the **maximum** adjustable setting current: (A)	Ii: 1,2 x 15 x 2 000 A : L1: 36 000 A L2: 36 000 A L3: 36 000 A N: 36 000 A Isd: 1,2 x 10 x 2 000 A tsd: 400 ms L1: 24 000 A L2: 24 000 A L3: 24 000 A N: 24 000 A	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	37 ms 35 ms 39 ms	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	 402 ms 400 ms 404 ms	P
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark	-	
	Type designation or serial number	-	
	Sample no:	-	
	Rated operational voltage: Ue (V)	-	
	Rated current: In (A)	-	
	Ambient temperature 10-40 °C :	-	N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	-	N/A
	Range of adjustable setting current. (A)	-	N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases:	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 90% of the maximum adjustable setting current: (A)	-	N/A
	Operating time: >0,2s in case of instantaneous releases	-	N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)	-	N/A
	Operating time: <0,2s in case of instantaneous releases	-	N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.	-	N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	LS	
	Type designation or serial number	AH-20D4	
	Sample no:	#2-1	
	Rated operational voltage: Ue (V)	690 V	
	Rated current: In (A)	2 000 A	
	For releases dependent of ambient air temperature: Reference temperature	-	N/A
	Test ambient temperature (°C)	-	N/A
	For releases dependent on ambient air temperature, the operating characteristics shall be verified at the reference temperature, the release being energized on all phase poles. If the test made at a different ambient temperature, a correction shall be made in accordance with the manufacturer's correction temperature/current data	-	N/A
	For thermal-magnetic releases independent of ambient temperature: Tests shall be made at 30°C and 20°C or 40°C, the release being energized on all phase poles	-	N/A
	For electronic releases, the operating characteristic shall be verified at the ambient temperature of the test room (see 6.1.1 of IEC 60947-1), the release being energised on all phase poles.	Compliance	P
	Test ambient air temperature:	22 °C	
	Range of adjustable setting current: (A)	0,4~1,0 x In	P
	Releases, dependent of ambient air temperature: Reference temperature (°C)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Thermal Magnetic releases, independent of ambient air temperature: at 30°C	-	N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	840 A (1,05 x 0,4 x In)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	>2 h	P
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	1 040 A (1,3 x 0,4 x In)	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.	1 248 A (1,2 x 1,3 x 0,4 x In)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	11 m 21 s	P
	Test current: 105% of the **maximum** adjustable setting current: (A)	2 100 A (1,05 x 1,0 x In)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	>2 h	P
	Test current: 130% of the **maximum** adjustable setting current: (A)	2 600 A (1,3 x 1,0 x In)	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.	3 120 A (1,2 x 1,3 x 1,0 x In)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	10 m 46 s	P
	Thermal Magnetic releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	-	N/A
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	Test current: 105% of the **maximum** adjustable setting current: (A)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	-	N/A
	Test current: 130% of the **maximum** adjustable setting current: (A)	-	N/A
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.	-	N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	-	N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	-	N/A
	Releases, independent of ambient air temperature: at 30°C	Compliance	P
	Test ambient air temperature:	22 °C	P
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	2 400 A (0,4 In X 300 %) 6 000 A (1,0 In X 300 %)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	2,0 s (tolerances: 1,57 s ~ 3,01 s) 84,6 s (tolerances: 62,7 s ~ 120,4 s)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	-	N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	-	N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting. If the test current overlaps with another tripping characteristic (e.g. an instantaneous tripping characteristic), the trip setting and the test current shall be reduced as necessary to prevent premature tripping.		
	overload releases: (all phase poles loaded)	-	N/A
	for circuit-breakers having an identified neutral pole provided with an overload release, the test current for this release shall be 1,5 times the current setting;	-	N/A
	short-circuit releases	-	N/A
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Electronic releases: on one pole chosen at random.	Compliance	P
	Test current: 1,5 times of the rated, or **minimum** adjustable setting current: (A)	1 800 A (1,5 x 1,5 x 0,4 x In)	P
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:	L1:0,048 s L2:0,050 s L3:0,051 s	P
	Time-delay: between the limits stated by the manufacturer:	L1: 0,073 s (tolerances: 0,02~0,08 s)	P
	Test current: 1,5 times of the **maximum** adjustable setting current: (A)	30 000 A (1,5 x 10 x 1,0 x In)	P
	Operating time, overload releases: (s)	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time, short-circuit releases (electromagnetic): (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Time-delay: between the limits stated by the manufacturer:	-	N/A
	Operating time, short-circuit releases (electronic): (s) L1: L2: L3:	L1:0,404 s L2:0,411 s L3:0,408 s	P
	Time-delay: between the limits stated by the manufacturer:	L1: 0,419 s (tolerances: 0,360~0,440 s)	P
b)	Non-tripping duration		
	Firstly, the test current equal to 1,5 times the current setting is maintained for a time interval equal to the non-tripping duration stated by the manufacturer.		
	Then, the current is reduced to the rated current and maintained at this value for twice the time-delay stated by the manufacturer. The circuit-breaker shall not trip.		
	overload releases: (all phase poles loaded)	-	N/A
	for circuit-breakers having an identified neutral pole provided with an overload release, the test current for this release shall be 1,5 times the current setting;	-	N/A
	short-circuit releases	-	N/A
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.	-	N/A
	Electronic releases: on one pole chosen at random.	Compliance	P
	Test current: 1,5 times of the **minimum** adjustable setting current: (A)	1 800 A (1,5 x 1,5 x 0,4 x In)	P
	non-tripping duration stated by the manufacturer for overload release: (s)	0,02 s	P
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)	0,02 s	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	0,1 s	P
	Rated current	800 A (Ir = 0,4 x In)	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:	L1: No trip	P
	Test current: 1,5 times of **maximum** adjustable setting current: (A)	30 000 A (1,5 x 10 x 1,0 x In)	P
	non-tripping duration stated by the manufacturer for overload release: (s)	0,360 s	P
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)	-	N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)	0,36 s	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	0,8 s	P
	Rated current	2 000 A (Ir=1,0XIn)	P
	Operating time, overload releases: the circuit-breaker does not trip:	-	N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:	-	N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:	L1: No trip	P
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	12 kV	P
	- sea level of the laboratory:	65 m	P
	- test Uimp main circuits (kV) :	14,8 kV	P
	- test Uimp auxiliary circuits (kV) :	-	N/A
	- test Uimp control circuits (kV) :	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	18,5 kV	P
a)	Application of test voltage	-	N/A
	i) Between all terminals of the main circuit connected together (incl. control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation.	Compliance	P
	ii) Between each pole of the main circuit and the other poles connected together and to the enclosure or mounting plate, with the contacts in all normal positions of operation.	Compliance	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and: - the main circuit	Compliance	P
	- other circuits	-	N/A
	- exposed conductive parts	Compliance	P
	- enclosure of mounting plate	Compliance	P
	iv) equipment suitable for isolation	Compliance	P
	equipment not suitable for isolation	-	N/A
	- no unintentional disruptive discharge during the test's	Compliance	P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	1 000 V	P
	- main circuits, test voltage for 1 min (V)	2 200 V	P
	- auxiliary circuits, test voltage for 1 min (V)	2 200 V	P
	- control circuits, test voltage for 1 min (V)	2 200 V	P
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	Compliance	P
	- between each pole and all the other poles connected to the frame of the circuit-breaker	Compliance	P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	-	N/A
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- between the terminals of one side connected together and the terminals of the other side connected together.	Compliance	P
b)	Control and auxiliary circuits		
1)	- between all the control and auxiliary circuits which are not normally connected to the main circuit, connected together, and the frame of the circuit-breaker.	Compliance	P
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.	Compliance	P
	No unintentional disruptive discharge during the tests	Compliance	P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 0,5mA.	0,03 mA / 759 V	P
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1	Compliance	P
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.5, regarding the charge indicator and the direction of operation of manual energy storing	Compliance	P
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3	-	N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer	-	N/A
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.	Compliance	P
	It shall also be verified that the moving contacts cannot be moved from the open position when the operating mechanism is charged to slightly below the full charge as evidenced by the indicating device	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuit-breaker	Compliance	P
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values	Closing time: 62,4 ms Opening time: 33,8 ms	P
c)	Undervoltage releases		
	Undervoltage releases shall comply with the requirements of 7.2.1.3 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum current rating for which the release is suitable	Compliance	P
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified	Upper and lower limits: 130 ~ 100 V	P
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s	Compliance	P
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil	Compliance	P
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range	Compliance	P
	The test for the upper limit is made starting from a constant temperature corresponding to the application of rated control supply voltage to the release and rated current in the main poles of the circuit-breaker	Compliance	P
	This test may be combined with the temperature-rise test of 8.3.3.6	Compliance	P
	In the case of a release with a range of rated voltages, this test is made at both the minimum and maximum rated control supply voltages	45,5 ~ 91 V (130 V) : 59 V 35 ~ 70 V (100 V) : 57 V	P
ii)	Test for limits of operation		
	Starting with the circuit-breaker open, at the temperature of the test room, and with the supply voltage at 30% rated maximum control supply voltage, it shall be verified that the circuit-breaker cannot be closed by the operation of the actuator	30% of the maximum control supply voltage: 39 V	P
	When the supply voltage is raised to 85% of the minimum control supply voltage, it shall be verified that the circuit-breaker can be closed by the operation of the actuator	85% of the minimum control supply voltage: 85 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
iii)	Performance under overvoltage conditions		
	With the circuit-breaker closed and without current in the main circuit, it shall be verified that the undervoltage release will withstand the application of 110% rated control supply voltage for 4 h without impairing its functions	Compliance	P
d)	Shunt releases		
	Shunt releases shall comply with the requirements of 7.2.1.4 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum rated current for which the release is suitable	Compliance	P
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of + 55 °C ± 2 °C without current in the main poles of the circuit-breaker	Compliance	P
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage	-	N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	AH-20D4	
	Sample no:	#2-1	
	Rated current In (A)	2 000 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 Vdc	
	Rated control supply voltage of shunt releases: Uc (V)	220 Vdc	
	Rated control supply voltage undervoltage releases: Uc (V)	220 Vdc	
	Ambient temperature 10-40 °C :	22 °C	P
	Number of operating cycles per hour	60 Cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	2 500	P
	Number of cycles without current (without releases)	2 500	P
	Applied voltage: closing mechanism (V)	220 Vdc	P

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Clause	Requirement + Test	Result - Remark	Verdict
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	250	P
	Applied voltage: shunt releases (V)	220 Vdc	P
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc	250	P
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)	Compliance	P
	Applied voltage: undervoltage releases (V)	220 Vdc	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	2 000 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm^2) :	240 mm^2 X 6	P
	Number of operating cycles per hour	20	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	500	P
	Applied voltage: closing mechanism (V)	220 Vdc	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Compliance	P
	Conditions, make/break operations:	Compliance	P
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	705,2 V 727,1 V 733,5 V	P
	- test current I/Ie = 1,0 (A).....L1: .....L2: L3:	2 006 A 2 020 A 2 006 A	P
	- power factor/time constant:	0,73	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- off-time (s):	89 s	P
	Electrical components do not exceed the value indicated in tab. 7.	Compliance	P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100	Compliance	P
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.	Compliance	P
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number	-	
	Sample no:	-	
	Rated current In (A)	-	
	Rated operational voltage: Ue (V)	-	
	Rated control supply voltage of closing mechanism: Uc (V)	-	
	Rated control supply voltage of shunt releases: Uc (V)	-	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	-	N/A
	Number of operating cycles per hour	-	N/A
	Maximum rated operational voltage: Ue (V)	-	N/A
	Number of operating cycles per hour	-	N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	-	N/A
	Applied voltage: closing mechanism (V)	-	N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.	-	N/A
	Conditions, overload operations:	-	N/A
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	-	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test current AC/DC: I/Ie = 6,0/2.5 (A) .....L1: .....L2: L3:	-	N/A
	- power factor/time constant:	-	N/A
	- Number of cycles manually opened: 9	-	N/A
	- Number of cycles automatically opened by an overload release: 3	-	N/A
	- frequency: (Hz)	-	N/A
	- on-time max 2s:	-	N/A
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1 380 V the leakage current (0,03 / 0,03 / 0,03) mA	P
	- no breakdown or flashover	Compliance	P
	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 2 mA.	0,06 mA /759 V	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	≤ 61,3 K	P
	conductor cross-sectional area (mm²) :	1 500 mm²	P
	test current Ie (A) :	2 000 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2 900 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	486 s	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -	Compliance	P
	and shall operate at 35% of the maximum control supply voltage.	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.	Compliance	P
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		
	actuating force for opening (N) .....:	-	—
	test force with blocked main contacts for 10 s (N) .:	-	—
	Dependent power operation	-	N/A
	Supply voltage of 110% of rated voltage (V)…….:	-	N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.	-	N/A
	Independent power operation	Compliance	P
	Three attempts to operate the equipment by the stored energy.	Compliance	P
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts .....:	Compliance	P
	Position indicator does not show OFF-position after capture of test force at blocked main contacts	Compliance	P
8.3.4	TEST SEQUENCE II (Ics):		N/A
8.3.4	TEST SEQUENCE II/III (Ics=Icu): 65kA		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	AH-20D4	
	Sample no:	#2-2	
	Rated current: In (A)	2 000 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated service short-circuit breaking capacity: (kA)	65 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	220 Vdc	
	Rated control supply voltage of shunt release: Uc (V)	220 Vdc	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	187 Vdc	P
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P
	Distances of the metallic screen's: (all sides)	519(W) X 434(H) X 394(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	< 30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	1 000 mm^2	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening torques: (Nm)	46,6 Nm	P
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	178,5~241,5 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	L1: 222 s L2: 223 s L3: 221 s	P
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: L3:	L1: 726,2 V L2: 726,8 V L3: 725,1 V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: L3:	 L1: 65,8 kA L2: 65,3 kA L3: 66,6 kA	P
	power factor/time constant :	0,19	P
	- Factor ”n”	2,17	P
	- peak test current (A) :	143,4 kA	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 140,0 kApeak L2: 111,6 kApeak L3: 117,8 kApeak	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 122,0 MA^2s L2: 94,2 MA^2s L3: 88,0 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 124,1 kA L2: 128,5 kA L3: 83,1 kA	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 72,9 MA^2s L2: 86,7 MA^2s L3: 47,7 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) .....L1: .....L2: L3:	L1: 137,0 kApeak L2: 115,1 kApeak L3: 109,2 kApeak	P
	- Joule integral I^2dt (A^2s) .....L1: .....L2: L3:	L1: 100,4 MA^2s L2: 72,8 MA^2s L3: 58,2 MA^2s	P
	Melting of the fusible element	Compliance	P
	Damage to insulation on conductors	Compliance	P
	Holes in the PE-sheet for test sequence ”O”	-	N/A
	Cracks observed	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	2 000 A	
	Maximum rated operational voltage: Ue (V)	690 V	
	Conductor cross-sectional area (mm²) :	250 mm^2	
	Number of operating cycles per hour	20 cycles per hour	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	25 cycles	P
	Applied voltage: closing mechanism (V)	220 Vdc	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Compliance	P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: L3:	L1: 738,3 V L2: 738,1 V L3: 738,6 V	P
	- test current I/Ie = 1,0 (A).....L1: .....L2: L3:	L1: 2 100 A L2: 2 100 A L3: 2 100 A	P
	- power factor/time constant:	0,84	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	80 ms	P
	- off-time (s):	180 s	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 380 V	P
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	0,71 mA / 759 V	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 67,1 K	P
	conductor cross-sectional area (mm²) :	1 500 mm²	P
	test current Ie (A) :	2 000 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4.5	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	2 900 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	492 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	106,2~143,7 s	P
	- Operation time: (s) .....L1: .....L2: .....L3: ..... N :	L1:126 s L2:123 s L3:125 s	P
8.3.5	TEST SEQUENCE III (Icu)		N/A
8.3.6	TEST SEQUENCE IV		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	AH-20D	
	Sample no:	#2-3	
	Rated current: In (A)	2 000 A	
	Rated operational voltage: Ue (V)	398 V	
	Rated short-time withstand current: (kA/s)	39 kA/1 s	
	Rated frequency: (Hz)	60 Hz	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	178,5~241,5 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	L1: 224 s L2: 226 s L3: 220 s	P
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	60 Hz	P
	- duration of the test: (s)	1,01 s	P
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,26	P
	- factor ”n”	2,16	P
	- test voltage: (V) ..... L1: ..... L2: L3:	L1: 436,7 V	P
	- r.m.s. test current: (kA) ..... L1: ..... L2: L3:	L1: 38,9 kA	P
	- highest peak current: (kA)	84,2 kA	P
8.3.6.3	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 62,2 K	P
	conductor cross-sectional area (mm²) :	1 500 mm²	P
	test current Ie (A) :	2 000 A	P
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t – CO		
	max. available time setting of the short–time delay short-circuit release. (s)	0,4 s	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 436,7 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	L1:39,3 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,26	P
	- factor ”n”	2,08	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 59,4 kApeak	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	L1: 635,8 MA²s	P
	Pause, t: (min)	4 min	P
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	Compliance	P
	- the instantaneous override, if any, shall not operate.	Compliance	P
	-pause: t (s)	-	N/A
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 71,0 kApeak	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	L1: 25,6 MA²s	P
	Pause, t: (min)	4 min	P
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short–time delay short-circuit release and -	Compliance	P
	- the instantaneous override, if any, shall not operate.	Compliance	P
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.	Compliance	P
8.3.6.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 380 V	
	- no breakdown or flashover	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 2 mA.	0,84 mA / 759 V	P
8.3.6.6	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the maximum value stated by the manufacturer for twice the value of the current setting, at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	106,2~143,7 s	
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	L1: 128 s L2: 125 s L3: 124 s	P
8.3.7	TEST SEQUENCE V		N/A
8.3.8	TEST SEQUENCE VI: Combined test sequence		
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number	AH-20D3	P
	Sample no:	#2-4	P
	Rated current: In (A)	2 000 A	P
	Rated operational voltage: Ue (V)	690 V	P
	Rated short-time withstand current: (kA/s)	65 kA/1 s	P
	Rated frequency: (Hz)	50 / 60 Hz	P
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	178,5~241,5 s	
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	L1: 203 s L2: 205 s L3: 206 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- test frequency: (Hz)	60 Hz	P
	- duration of the test: (s)	1,0 s	P
	- test frequency: (Hz)	60 Hz	P
	- power factor / time constant (ms):	0,19	P
	- factor ”n”	2,26	P
	- test voltage: (V) .....L1: .....L2: L3:	L1: 727,6 V L2: 727,5 V L3: 727,3 V	P
	- r.m.s. test current: (kA) .....L1: .....L2: L3:	 L1: 65,6 kA L2: 65,4 kA L3: 66,1 kA	P
	- highest peak current: (kA)	148,8 kA	P
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	AH-20D3	
	Sample no:	#2-4	
	Rated current: In (A)	2 000 A	
	Rated operational voltage: Ue (V)	690 V	
	Rated service short-circuit breaking capacity: (kA)	65 kA	
	Rated control supply voltage of closing mechanism: Uc (V)	220 Vdc	
	Rated control supply voltage of shunt release: Uc (V)	220 Vdc	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Compliance	
	closing mechanism energized with 85% at the rated Uc: (V)	187 V	P
	The circuit-breaker is mounted complete on its own support or an equivalent support.	Compliance	P
	Test made in free air:	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Distances of the metallic screen's: (all sides)	434(W) X 434(H) X 394(D)	P
	The characteristics of the metallic screen:		
	- woven wire mesh	-	N/A
	- perforated metal	Compliance	P
	- expanded metal	-	N/A
	- ratio hole area/total area: 0,45-0,65	0,5	P
	- size of hole: <30mm^2	<30 mm^2	P
	- finish: bare or conductive plating	Compliance	P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:	-	N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long	Compliance	P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star point	P
	Conductor cross-sectional area (mm²) :	1 000 mm²	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening torques: (Nm)	46,6 Nm	P
	Test sequence of operation: O – t – CO – t – CO	Compliance	P
	The highest voltage applicable to the rated short-time current.	Compliance	P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: L3:	L1: 727,6 V L2: 727,5 V L3: 727,3 V	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 L1: 65,8 kA L2: 65,3 kA L3: 66,6 kA	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,17	P
	- peak test current (A) :	143,4 kA	P
	Test sequence "O"		
	- max. let-through current: (kApeak ..... L1: ..... L2: L3:	L1: 139,1 kApeak L2: 111,3 kApeak L3: 118,3 kApeak	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	L1: 1 741,0 MA²s L2: 1 679,9 MA²s L3: 1 721,1 MA²s	P
	Pause, t: (min)	5 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 130,7 kA L2: 122,8 kA L3: 91,6 kA	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	L1: 82,6 MA²s L2: 75,7 MA²s L3: 41,8 MA²s	P
	Pause, t: (min)	3 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	L1: 132,4 kApeak L2: 84,8 kApeak L3: 129,1 kApeak	P
	- Joule integral I²dt (A²s) ..... L1: ..... L2: L3:	L1: 94,2 MA²s L2: 52,0 MA²s L3: 78,0 MA²s	P
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.	Compliance	P
	During this test the instantaneous override shall not operate	Compliance	P
	- and the making current release shall operate	Compliance	P
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)	2 000A	P
	Maximum rated operational voltage: Ue (V)	690V	P
	Conductor cross-sectional area (mm²) :	240 mm² X 6	P
	Number of operating cycles per hour	20 Cycle / h	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	25	P
	Applied voltage: closing mechanism (V)	220 Vdc	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Compliance	P
	Conditions, make/break operations:	Compliance	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: L3:	713,4V 708,0V 717,0V	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	2 005A 2 050A 2 004A	P
	- power factor/time constant:	0,8	P
	- frequency: (Hz)	60 Hz	P
	- on-time (ms):	1 s	P
	- off-time (s):	89 s	P
8.3.8.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1 380 V	
	- no breakdown or flashover	Compliance	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	0,54 mA / 759 V	P
8.3.8.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	Compliance	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	≤ 63,2 K	P
	conductor cross-sectional area (mm²) :	1 500 mm^2	P
	test current Ie (A) :	2 000 A	P
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	2 900 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	489 s	P
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	106,2~143,7 s	
	- Operation time: (s) ..... L1: ..... L2: ..... L3: ..... N :	L1: 131 s L2: 138 s L3: 126 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
Annex B	Circuit-breakers incorporating residual current protection		N/A
Annex C	Individual pole short-circuit test sequence		N/A
Annex F	Additional tests for circuit-breakers with electronic over-current protection		
F4 and F5	Verification of electromagnetic compatibility (EMC)		
	See report: R414-1119	Compliance	P
F6	Suitability for multiple frequencies		N/A
F.7.	Dry heat test		N/A
F.8.	Damp heat test		N/A
F.9.	Temperature variation cycles at a specified rate of change		N/A
Annex H	Individual pole short-circuit test sequence		N/A
Annex J	Electromagnetic compatibility (EMC) – Requirements and test methods for circuit-breakers		N/A
Annex L	Circuit-breakers not fulfilling the requirements for overcurrent protection		N/A
Annex M	Modular residual current devices (without integral current breaking device)		N/A
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M		N/A
Annex O	Instantaneous trip circuit-breakers (ICB)		N/A

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	TABLE: Heating Test		#2-1 (4P)
	Test voltage (V):		—
	Ambient (°C):	27,9 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	47,5	80
LINE L2	61,3	80
LINE L3	55,9	80
LOAD L1	45,2	80
LOAD L2	50,8	80
LOAD L3	58,5	80
Manual operating means: non-metallic	7,2	35
Parts intended to be touched but not handheld:non-metallic	3,9	50
Parts which need not be touched during normal operation	3,6	60

	TABLE: Heating Test		#2-2 (4P)
	Test voltage (V):		—
	Ambient (°C):	28,7 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	51,2	80
LINE L2	67,1	80
LINE L3	59,7	80
LOAD L1	47,3	80
LOAD L2	53,8	80
LOAD L3	61,3	80
Manual operating means: non-metallic	6,9	35
Parts intended to be touched but not handheld:non-metallic	2,9	50
Parts which need not be touched during normal operation	3,5	60

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	TABLE: Heating Test		#2-3 (4P)
	Test voltage (V):		—
	Ambient (°C):	22,6 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L2	50,6	80
LINE L3	62,2	80
LINE L4	57,4	80
LOAD L2	44,4	80
LOAD L3	58,7	80
LOAD L4	57,0	80
Manual operating means: non-metallic	8,2	35
Parts intended to be touched but not handheld:non-metallic	4,4	50
Parts which need not be touched during normal operation	5,3	60

	TABLE: Heating Test		#2-4 (3P)
	Test voltage (V):		—
	Ambient (°C):	24,8 °C	—

Thermocouple Locations	max. temperature measured, (°C)	max. temperature limit, (°C)
LINE L1	50,7	80
LINE L2	63,2	80
LINE L3	56,2	80
LOAD L1	52,3	80
LOAD L2	61,2	80
LOAD L3	52,4	80
Manual operating means: non-metallic	12,9	35
Parts intended to be touched but not handheld:non-metallic	6,8	50
Parts which need not be touched during normal operation	6,3	60

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	TABLE: clearance and creepage distance measurements					
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Pole to Pole		1 000	14	70	14	87
Live part to accessible part		1 000	14	51	14	67
Across open contacts		1 000	14	32,1	14	71,7
supplementary information: Uimp=12 kV, Ui=1 000 V						

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Attachment showing test equipment used for TMP and WMT projects

List of test equipment used at the TMP/WMT Laboratory

Clause	Measurement / testing	Testing / measuring equipment / material used (Equipment ID)	Range used	Last Calibration date	Calibration due date
8.3.3.1	Tripping limits and characteristic	Impulse (86-21) Dielectric withstand (31-150)	~ 400 kV	2014.08.26	2015.08.26
8.3.3.2	Dielectric properties	Impulse (86-21) Dielectric withstand (31-150)	~ 400 kV	2014.08.26	2015.08.26
8.3.3.3	Mechanical operation and operational performance	Operating tester (86-26)		2013.10.16	2013.10.16
8.3.3.4	Overload performance				
8.3.3.5	Verification of temperature-rise	Recoder (70-254) CT (68-174, 175, 176) Control PNL (86-96)	60 CH ~ 10000 A ~ 10000 A	2014.02.28 2010.05.31 2014.03.18	2015.02.28 2015.05.31 2015.03.18
8.3.3.7	Verification of overload release	CT (68-102) V-A Meter (24-38)	~ 5000 A 7,5 A	2013.06.13 2013.11.23	2016.06.13 2014.11.23
8.3.4.1	Rated service short-circuit breaking capacity	Low Voltage Divider (33-0126)	~ 1000 Vrms	2013.06.26	2015.06.26
		Isolation Amplifier (46-0033)	62.5 mV, 125 mV 250 mV, 500 mV 1 V	2014.05.14	2015.05.14
		Isolation Amplifier (46-0034)	62.5 mV, 125 mV 250 mV, 500 mV 1 V	2014.04.30	2015.04.30
		Isolation Amplifier (46-0049)	62.5 mV, 125 mV 250 mV, 500 mV 1 V	2013.10.22	2014.10.22
		Recorder (55-0028)	1 S/s ~ 10 MS/s	2014.05.27	2015.05.27
		Rogowski Coil & Integrator (62-0117)	2.5 kA/V, 5 kA/V 10 kA/V, 25 kA/V 50 kA/V	2013.01.16	2019.01.16
		Potential Transformer (68-0194)	660 V/5 V	2012.08.28	2014.08.28
		Potential Transformer (68-0195)	660 V/5 V	2012.08.28	2014.08.28
		Potential Transformer (68-0196)	660 V/5 V	2012.08.28	2014.08.28
8.3.4.2	Verification of operational	Low Voltage Divider (33-0126)	~ 1000 Vrms	2013.06.26	2015.06.26

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	performance	Isolation Amplifier (46-0033)	62.5 mV, 125 mV 250 mV, 500 mV 1 V	2014.05.14	2015.05.14
		Isolation Amplifier (46-0034)	62.5 mV, 125 mV 250 mV, 500 mV 1 V	2014.04.30	2015.04.30
		Isolation Amplifier (46-0049)	62.5 mV, 125 mV 250 mV, 500 mV 1 V	2013.10.22	2014.10.22
		Recorder (55-0028)	1 S/s ~ 10 MS/s	2014.05.27	2015.05.27
		Rogowski Coil & Integrator (62-0117)	2.5 kA/V, 5 kA/V 10 kA/V, 25 kA/V 50 kA/V	2013.01.16	2019.01.16
		Potential Transformer (68-0194)	660 V/5 V	2012.08.28	2014.08.28
		Potential Transformer (68-0195)	660 V/5 V	2012.08.28	2014.08.28
		Potential Transformer (68-0196)	660 V/5 V	2012.08.28	2014.08.28
8.3.4.3	Verification of dielectric withstand	Refer to Clause.8.3.3.5			
8.3.4.4	Verification of temperature-rise	Refer to Clause.8.3.3.6			
8.3.4.5	Verification of overload release	Refer to Clause.8.3.3.7			
8.3.5.1	Verification of overload release	Refer to Clause.8.3.3.7			
8.3.5.2	Rated ultimate short-circuit breaking capacity	Refer to Clause.8.3.4.1			
8.3.5.3	Verification of dielectric withstand	Refer to Clause.8.3.3.5			
8.3.5.4	Verification of overload release	Refer to Clause.8.3.3.7			
8.3.6.1	Verification of overload release	Refer to Clause.8.3.3.7			
8.3.6.2	Rated short-time withstand current	Refer to Clause.8.3.4.1			
8.3.6.3	Verification of temperature-rise	Refer to Clause.8.3.3.6			
8.3.6.4	Short-circuit breaking capacity at maximum short-time withstand current	Refer to Clause.8.3.4.1			
8.3.6.5	Verification of dielectric withstand	Refer to Clause.8.3.3.5			
8.3.6.6	Verification of overload release	Refer to Clause.8.3.3.7			

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Note 3: *If the TMP/WMT procedure was used, the above list of test equipment is required.*

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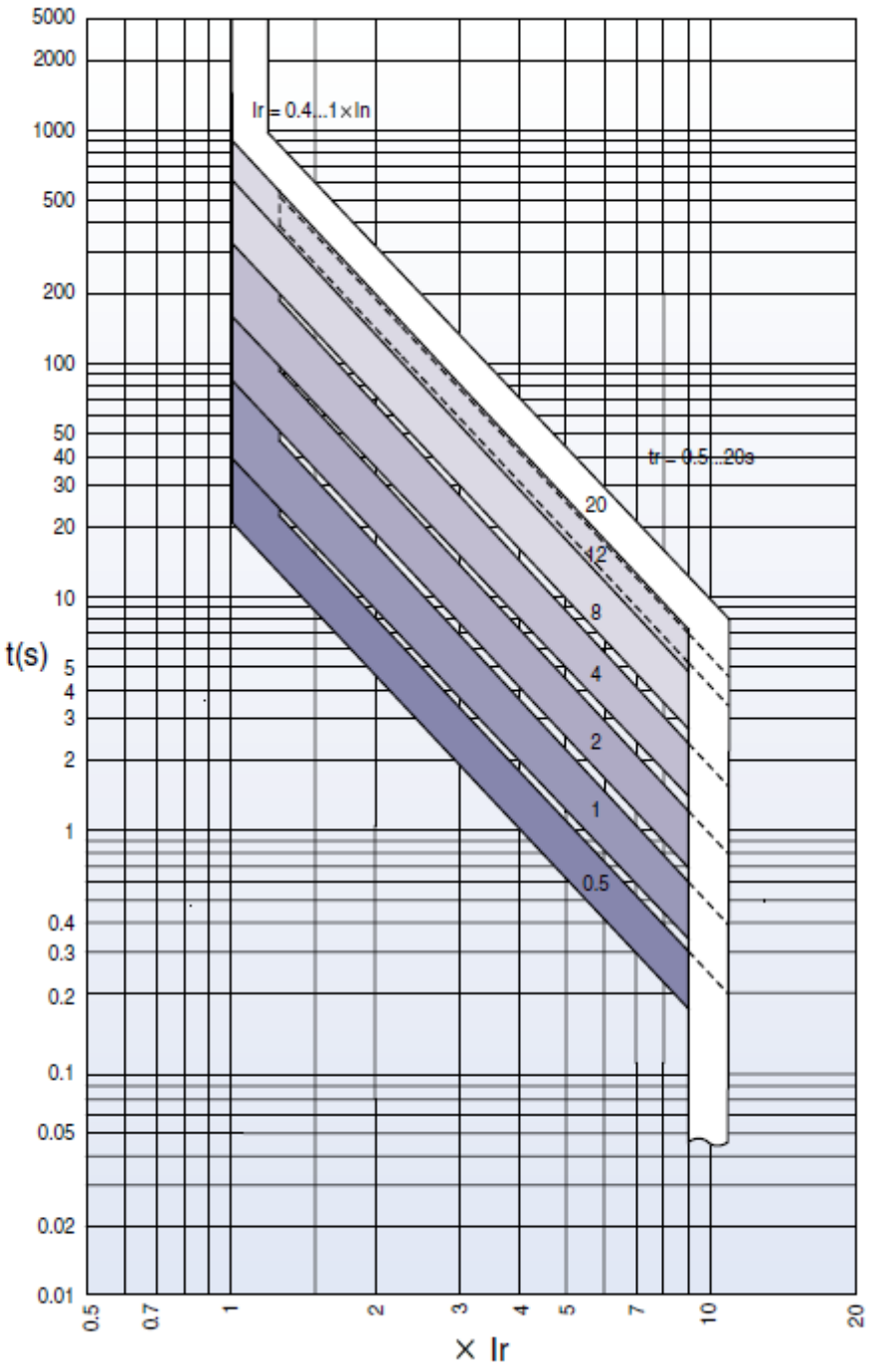
Time current characteristics

Long-time delay (L)



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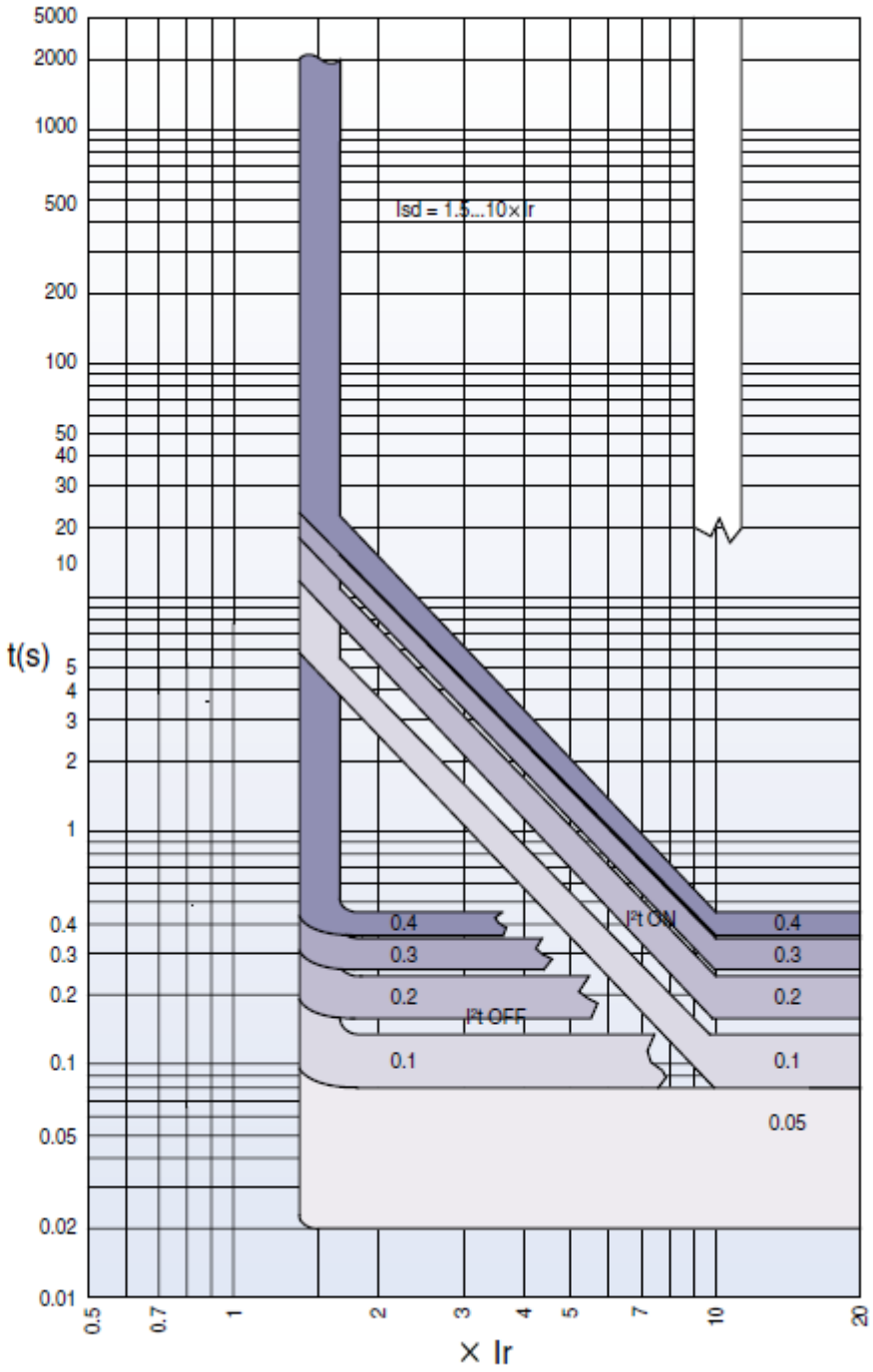
Short-time delay (S)



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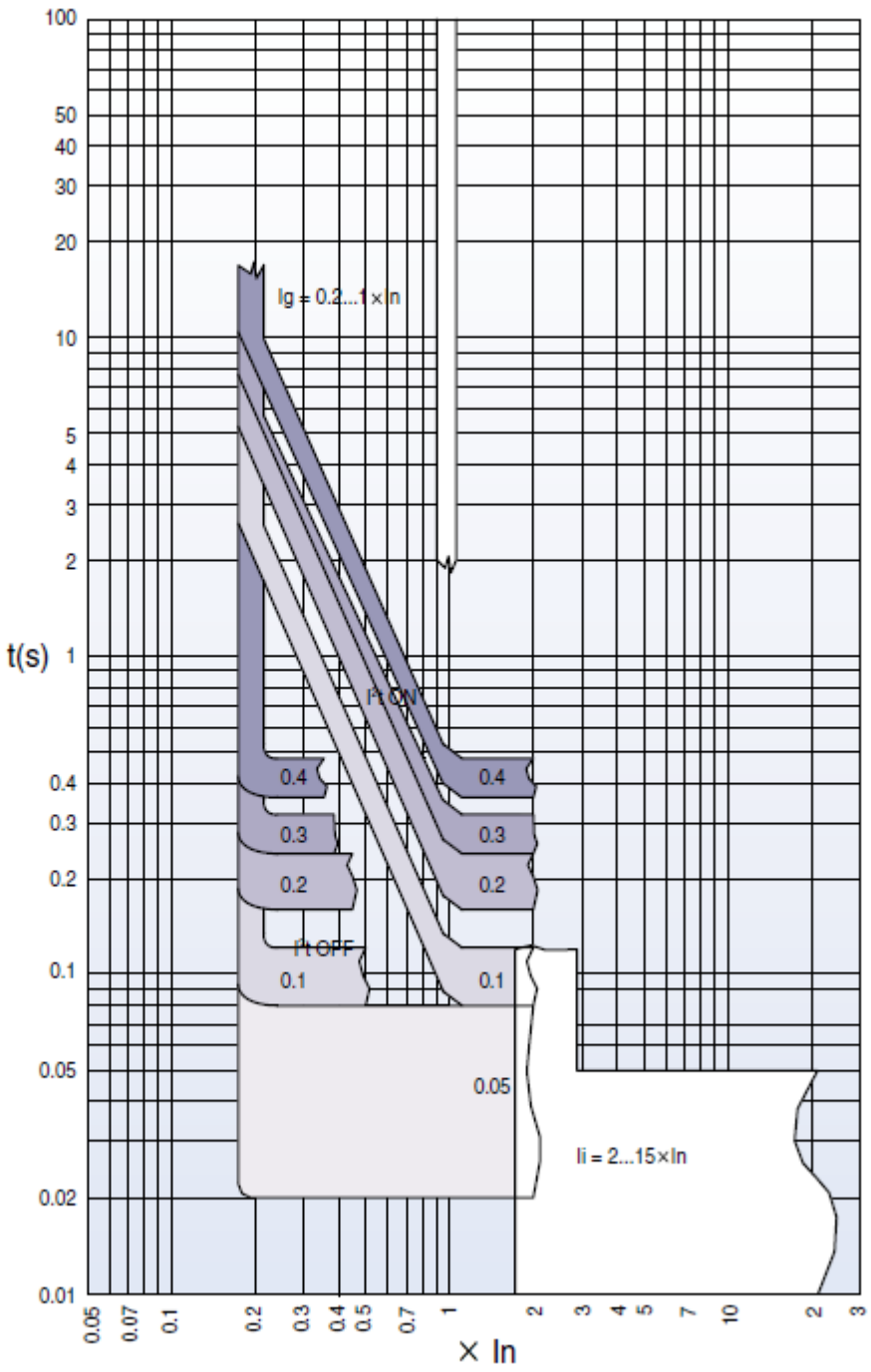
Instantaneous (I)
Ground fault (G)



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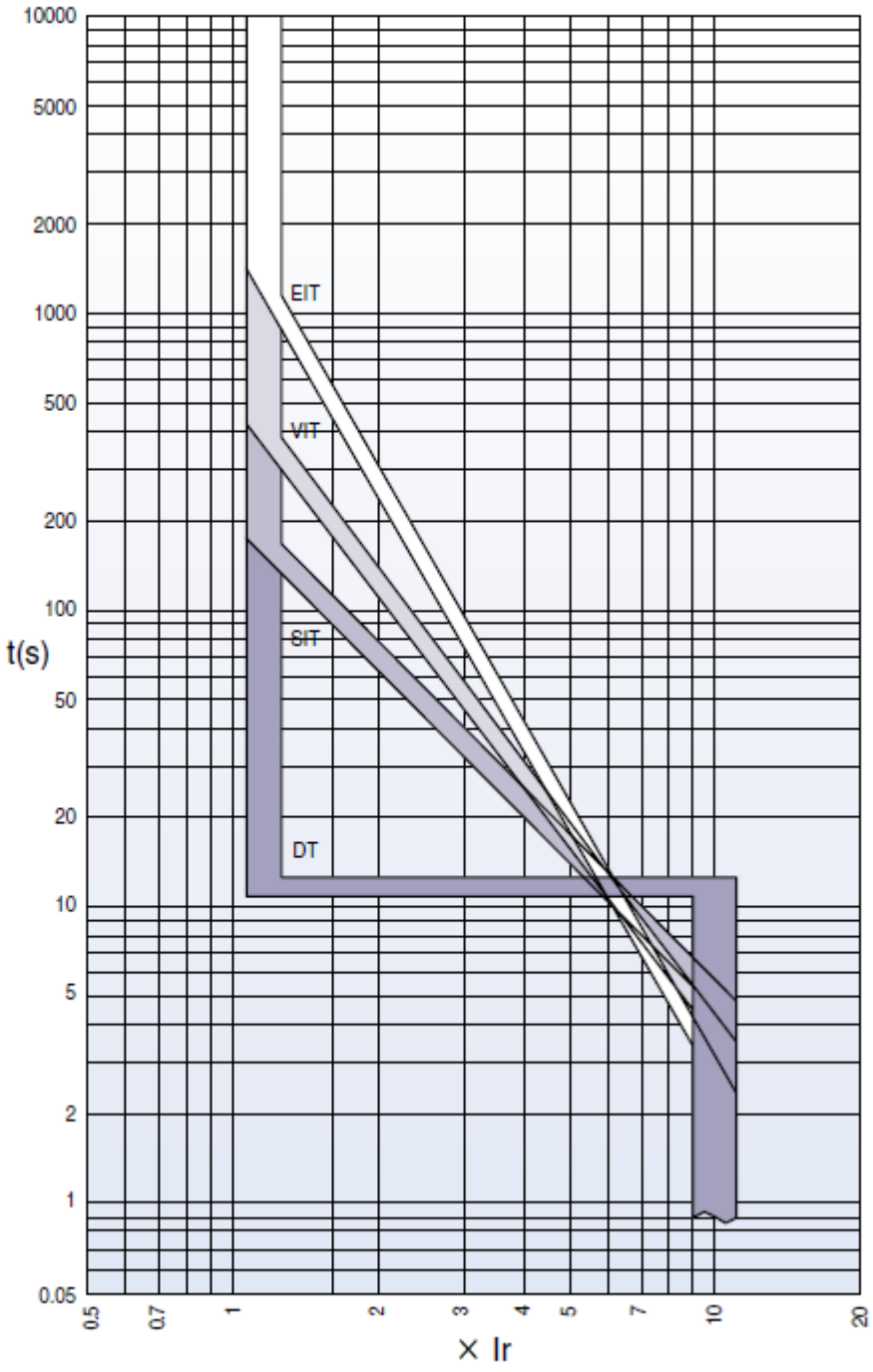
IDMTL



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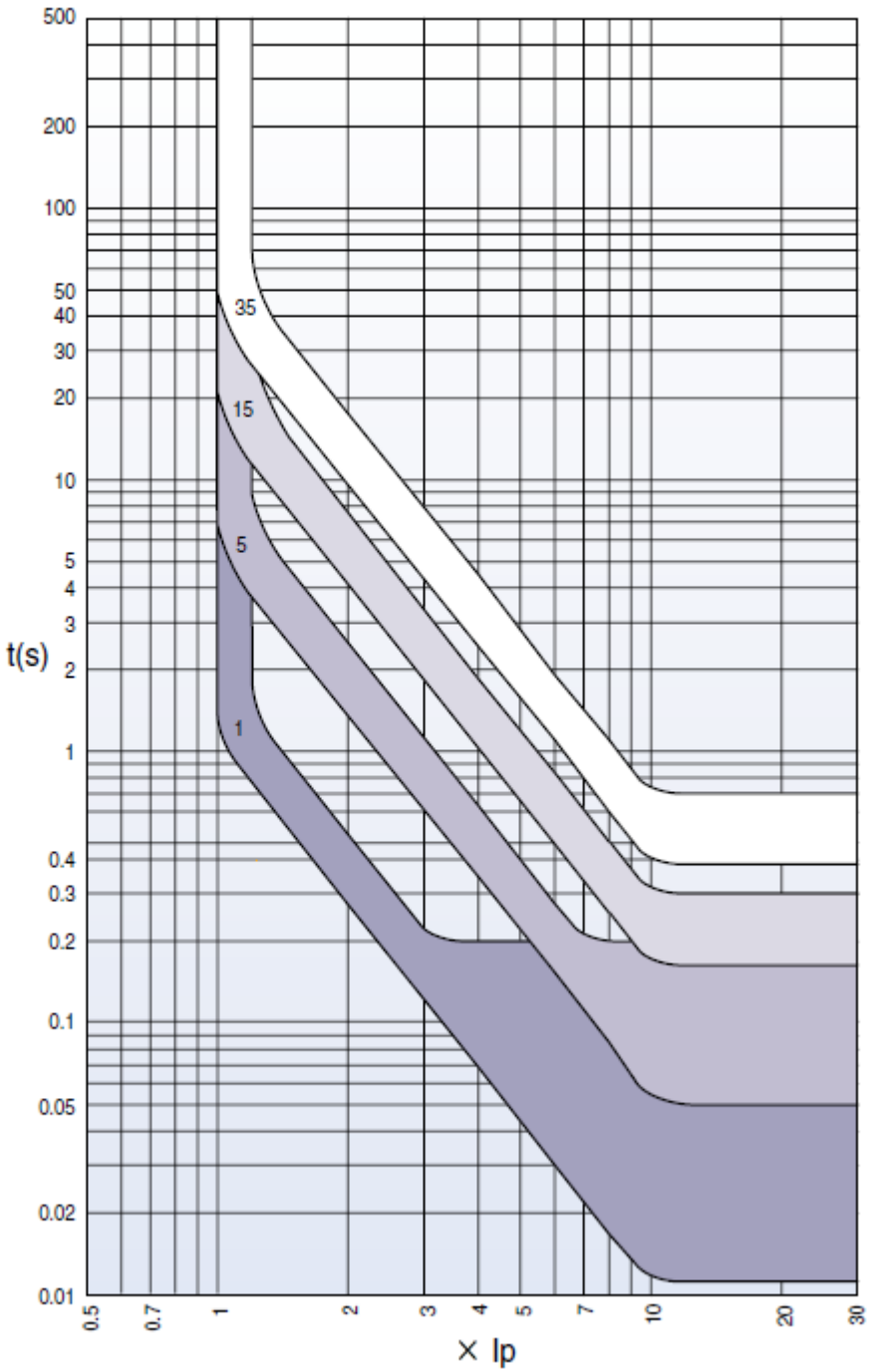
Pre Trip Alarm



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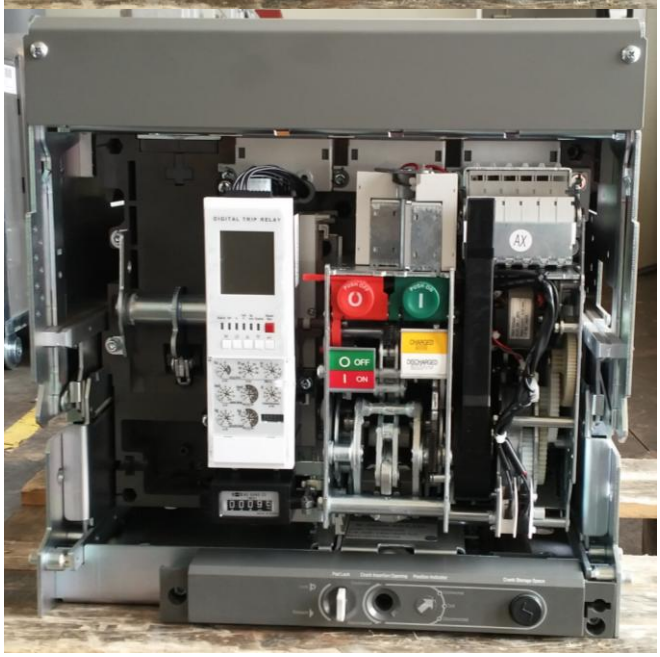
Photographs



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