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TEST REPORT

IEC 60947-2

Low-voltage switchgear and controlgear—

Part 2: Circuit - breakers

Report Reference No.: Y231116E

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Standard : IEC 60947-2:2016+A1:2019

Test conclusion : Refer to the content of the report.

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Applicant's Name : MAJE DO NE IND E COM DE MATERIAIS ELETRICOS LTDA

Address : ROD PE 05 LOTE 1 QUADRA A LOT 01ST. IND SANTOS DUMONT. TIUMA, SAO LOURENCO DA MATA. 54737-200, BRAZIL

Test item description

Trademark : **Eletromar**

Model and/or type reference : JTW140, JTW240, JTW340, JTW440, JTW163, JTW263, JTW363, JTW463, JTW180, JTW280, JTW380, JTW480, JTW1100, JTW2100, JTW3100, JTW4100, JTW1125, JTW2125, JTW3125, JTW4125

Value of rated operational voltage(V) : 230/400V~

Value of rated current(A) : 40A;63A;80A;100A;125A

General remarks

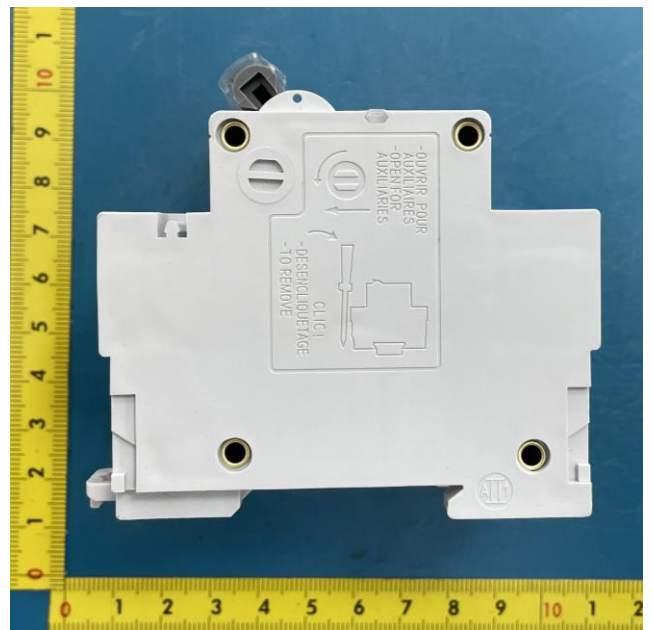
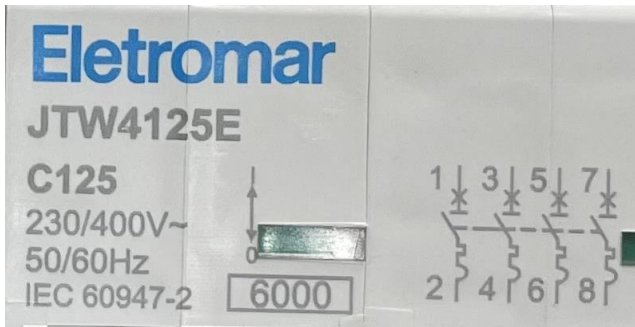
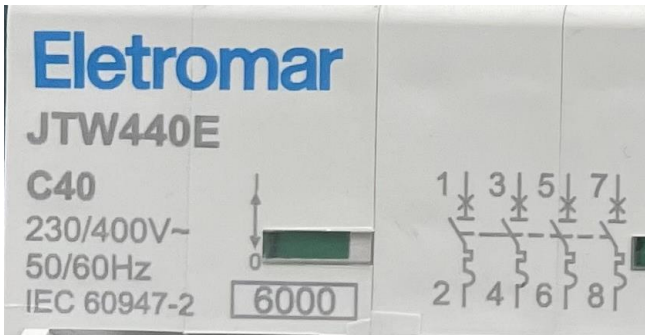
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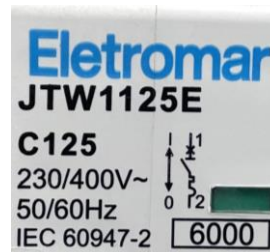
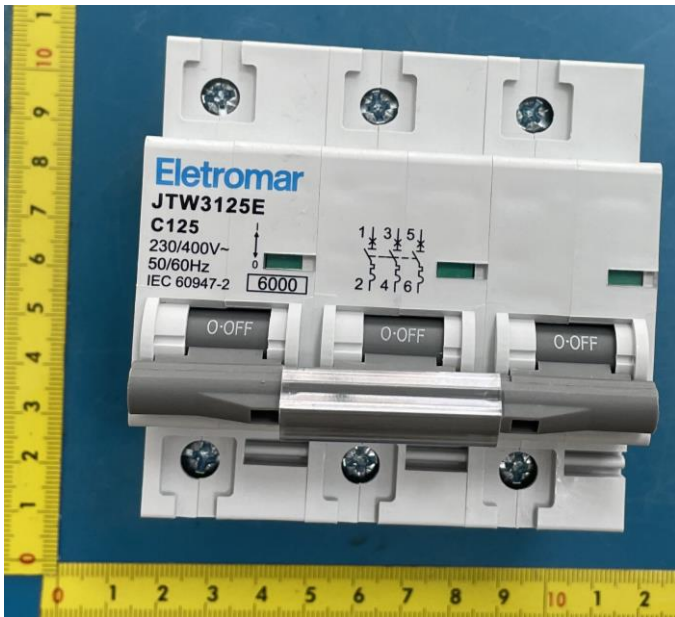
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Photos:



Photos:








Test item particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B)..... :	A
3.2. Interruption medium: (air, vacuum, gas Break)..... :	Air
3.3. Design: (open construction, moulded case) :	moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power)..... :	independent manual
3.5. Suitability for insulation: (suitable, not -suitable) :	Not-suitable
3.6. Provision for maintenance: (maintainable, non maintainable)..... :	non maintainable
3.7. Method of installation: (fixed, plug in, withdrawable) :	Fixed
3.8. Degree of protection: (IP code) :	IP20
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD..... :	Thermo-magnetic
4.9. Switching overvoltages: (when Uimp. is declared) :	N/A
7.3 Electromagnetic compatibility (EMC) Environment A or B :	N/A
Circuit-breaker for use on phase-earthed systems..... :	N/A
Circuit-breaker for use in IT systems :	N/A
Rated and limiting values, main circuit :	
- rated operational voltage: Ue (V)..... :	230V/ 400V~
- rated insulation voltage: Ui (V) :	500V
- rated impulse withstand voltage: Uimp (kV) :	4kV
- rated operational current: Ie (A) :	40A;63A;80A;100A;125A
- kind of current..... :	AC
- conventional free air thermal current: Ith (A)..... :	40A;63A;80A;100A;125A
- conventional enclosed thermal current: Ithe (A) :	N/A
- current rating for four-pole circuit-breakers: (A) :	40A;63A;80A;100A;125A
- number of poles..... :	1P;2P;3P;4P
- rated frequency: (Hz) :	50/60Hz
- integral fuses (rated values)..... :	N/A
Rated duty :	
- eight-hour duty :	N/A
- uninterrupted duty: Iu (A)..... :	Same as In
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA) :	N/A
rated ultimate short-circuit breaking capacity: Icu (kA) :	6,0kA

rated service short-circuit breaking capacity: I_{cs} (kA)	6,0kA
rated short-time withstand current: I_{cw} (kA/s).....	N/A
Control circuits :	
Electrical control circuits :	
- kind of current: (AC, DC).....	N/A
- rated frequency: (Hz)	N/A
- rated control circuit voltage: U_c (nature, frequency, V) ..	N/A
- rated control supply voltage: U_s (nature, frequency V) ..	N/A
Air supply control circuits: (pneumatic or electro-pneumatic) :	
- 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 U_e (V).....	N/A
- rated insulation voltage: U_i (V)	N/A
- rated operational current: I_e (A).....	N/A
- kind of current.....	N/A
- rated frequency: (Hz)	N/A
- number of circuits	N/A
- number and kind of contact elements	N/A
- rated uninterrupted current: I_u (A).....	N/A
- utilization category: (AC, DC, current and voltage)	N/A
Short-circuit characteristic :	
- Rated conditional short-circuit current (kA).....	N/A
- Co-ordination of short-circuit protective devices.....	N/A
- kind of protective device.....	N/A

Releases :	
1) shunt release	N/A
2) Over-current release	Yes
a) instantaneous	Yes
b) definite time delay	N/A
c) inverse time delay	Yes
- independent of previous load	N/A
- dependent on previous load; (for example thermal type release).....	Yes
3) Undervoltage release (for opening).....	N/A
4) Other releases	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening).. :	N/A
- rated control circuit voltage: U_c (nature, frequency, V) .. :	N/A
- kind of current.....	N/A
- rated frequency: (if AC)	N/A
2) Over-current release	Yes
- rated current	40A;63A;80A;100A;125A
- kind of current.....	AC
- rated frequency: (if AC)	50/60Hz
- current setting (or range of settings).....	Inverse time delay(Ir): I_n Instantaneous tripping(Ii): $8I_n$
- time settings (or range of settings)	N/A

Test item particulars												
Classification of installation and use.....		Installed by rail										
Supply Connection		N/A										
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		Oct. 20, 2023										
Date (s) of performance of tests		Oct. 20, 2023 to Jan. 05, 2024										
General product information:												
Ue: 230/400V~												
Ics: 6,0 kA												
Icu: 6,0 kA												
Ie: 40A;63A;80A;100A;125A												
Utilization category : A												
Ui :500V												
Uimp: 4kV												
Tests performed (name of test and test clause):												
Back:0mm Front:0mm; Top:80mm Botton:80mm; Left: 80mm Right: 80mm values declared by client)												
No. of poles	Type	Test sequences										
		I	II	III	III (N)	IV	V	VI	Annex C	Annex F	Annex H	8.2 Compliance with constructional requirements.
4P	125A	1	1	-	1***	-	-	-	-	-	-	1
	40A	-	1**	-	1***	-	-	-	-	-	-	-
3P	125A	1*	-	1	-	-	-	-	-	-	-	-
	40A	-	-	-	-	-	-	-	-	-	-	-
2P	125A	1*	-	1	-	-	-	-	-	-	-	-
	40A	-	-	-	-	-	-	-	-	-	-	-
1P	125A	1	-	1	-	-	-	-	-	-	-	-
	40A	-	-	-	-	-	-	-	-	-	-	-
* nly clause 8.3.3.3 clause 8.3.3.4.3, clause 8.3.3.4.4, clause 8.3.3.5, clause 8.3.3.6, clause 8.3.3.7 and clause 8.3.3.10 are required.												
**Only clause 8.3.4.2, clause 8.3.4.4, clause 8.3.3.4.6, clause 8.3.3.5.5 are required.												
*** Additional sequence of operations on four-pole circuit-breakers.												

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
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:	In 125A	P
	- suitability for isolation, if applicable, with the symbol 		N/A
	- indication of the open and closed position: with  and  respectively, if symbols are used	I ON O OFF	P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	Eletromar	P
	- type designation or serial number	JTW4125	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	IEC60947-2	P
	- utilization category	CAT A	P
	- rated operational voltage(s) Ue	230/ 400V~	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		P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50/60Hz	P
	- rated service short-circuit breaking capacity. Ics	Ics=Icu=6kA	P
	- rated ultimate short-circuit breaking capacity. Icu	Ics=Icu=6kA	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B		N/A
	- line and load terminals, unless their connection is immaterial		P
	- neutral pole terminals, if applicable, by the letter N		N/A
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1		N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
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 (I _{cm}) (if higher than specified in 4.3.5.1)		N/A
	- rated insulation voltage. (U _i) if higher than the maximum rated operational voltage)	230/ 400V~	P
	- rated impulse withstand voltage (U _{imp}), when declared.	4kV	P
	- pollution degree if other than 3		N/A
	- conventional enclosed thermal current (I _{the}) if different from the rated current:		N/A
	- IP Code, where applicable:	IP20	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:	Back:0mm Front:0mm Top:80mm Bottom:80mm Left:80mm Right:80mm	P
	- r.m.s sensing if applicable, according to F.4.1.1		N/A
	- suitability for environment A or B		N/A
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:		N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:		N/A
	- rated current of indirect over-current releases:		N/A
	- 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.		N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal		P
	- load terminal		P
	- neutral pole terminal "N"		N/A
	- protective earth terminal 		N/A
	- terminal of coils (A/B)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	- terminal of shunt release (B)		N/A
	- terminals of under-voltage release (D)		N/A
	- terminals of interlocking electromagnets (E)		N/A
	- terminals of indicated light devices (X)		N/A
	- terminals of contact elements for switching devices (no)		N/A
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker		N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:		N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.		N/A
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open		N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.		N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.		N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.		N/A
7.1.2.1 part 1	Resistance to abnormal heat and fire		P
7.1.3 part 1	Current-carrying parts and their connection		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:	4kV	
	- max. value of rated operational voltage to earth .	300V	
	- nominal voltage of supply system:	230/400V	
	- overvoltage category:	III	
	- pollution degree:	3	
	- field-in or homogeneous:	field-in	


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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	- minimum clearances (mm):	3mm	
	- measured clearances (mm):	See TABLE : Clearance And Creepage Distance Measurements	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	500V	
	- pollution degree	3	
	- comparative tracking index (V)	175V	
	- material group	IIIa	
	- minimum creepage distances (mm)	8mm	
	- measured creepage distances (mm)	See TABLE : Clearance And Creepage Distance Measurements	P
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		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		N/A
7.1.5.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.		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		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		P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	This is done by means of a position indicating device (see 2.3.18)		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)		P
	- 60417-2-IEC-5007 O Off (power)		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"		N/A
	Red colour shall not be used for any other push-button		N/A
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073		N/A
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		P
7.1.7	Additional safety requirements for equipment suitable for isolation		
7.1.7.1	Additional constructional requirements for equipment suitable for isolation (U _e > 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		P
	- a separate mechanical indicator		N/A
	- visibility of the moving contacts		N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position		N/A
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking		P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	The indicated open position is the only position in which the specified isolation distances between the contacts is ensured.		P
	- minimum clearances across open contacts (see Table XIII, Part 1) (mm) :		
	- measured clearances (mm) :	8mm	P
	- test Uimp across gap (kV) :	6,2kV	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 60 947-5-1		N/A
	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		N/A
	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		N/A
	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		N/A
	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		N/A
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles		N/A
	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		N/A
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		N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	test force F applied to the actuator in an attempt to operate to the closed position (N) :		N/A
	rated impulse withstand voltage (kV) :		N/A
	test Uimp on open main contacts at the test force		N/A
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		P
	Terminal connections shall be such that necessary contact pressure is maintained		P
	Terminals shall be so constructed that the conductor is clamped between suitable surfaces without damage to the conductor and terminal		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		P
7.1.8.2	Connection capacity		
	type of conductors :	Rigid or flexible	P
	minimum cross-sectional area of conductor (mm ²) :	10mm ²	P
	maximum cross-sectional area of conductor (mm ²) :	50mm ²	P
	number of conductors simultaneously connectable to the terminal :	1 for 10mm ² 1 for 50mm ²	P
7.1.8.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
7.1.8.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor		N/A
	protective earth terminal		N/A
	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.).		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	A switched neutral pole shall break not before and shall make not after the other poles		N/A
	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
	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.		N/A
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		N/A
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		N/A
	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		N/A
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		N/A
	The protective earth terminal shall be suitably protected against corrosion		N/A
	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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	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		N/A
7.1.10.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking		N/A
	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		N/A
	Graphical symbol to be used: 60417-2-IEC-5019  Protective earth (ground) in accordance with IEC 60417-2		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
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.	IP20	
	Test for first characteristic.	IP2X	
	Test for first numeral:	1 <u>2</u> 3 4 5 6	P
	Test for second characteristic	IPX0	
	Test for second numeral:	1 2 3 4 5 6 7 8	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		N/A
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		P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
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		P
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		N/A
	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		N/A
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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.		N/A
	- 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.		N/A
	- not possible for the moving contacts to move from the open position, unless the charge is sufficient for satisfactory completion of the closing operation.		N/A
	- 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.		N/A
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		N/A
	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		N/A
	Unless otherwise stated in the relevant product standard, the upper limit of the supply voltage shall be 110% of its rated value		N/A
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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
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		N/A
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		N/A
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		P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing		N/A
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)		N/A
	- 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)		N/A
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation		P
	The release shall cause tripping of the circuit-breaker with an accuracy of $\pm 10\%$ of the tripping current value of the current setting for all values of current setting of the overload release		P
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		P

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	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		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		N/A
	The width of the temperature band shall be at least 10 K on either side of the reference temperature		N/A
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		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		P
8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm ²) :	50mm ²	
	diameter of thread (mm) :	6,84mm	
	torque (Nm) :	3,5Nm	
	5 times on 2 separate clamping units		P
	Testing for damage to and accidental loosening of conductor (flexion test)		
	conductor of the smallest cross-sectional area (mm ²) :	10mm ²	
	number of conductors of the smallest cross section :	1	
	diameter of bushing hole (mm) :	9,5mm	
	height between the equipment and the platen :	280mm	
	mass at the conductor(s) (kg) :	2,0kg	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit	135 continuous revolutions	P

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Clause	Requirement + Test	Result - Remark	Verdict
		#12 (4P/125A)	
	Pull-out test		
	force (N) :	90N	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	1min	P
	conductor of the largest cross-sectional area (mm ²) :	50mm ²	
	number of conductors of the largest cross section :	1	
	diameter of bushing hole (mm) :	15,9mm	
	height between the equipment and the platen :	343mm	
	mass at the conductor(s) (kg) :	9,5kg	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit	135 continuous revolutions	P
	Pull-out test		
	force (N) :	236N	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	1min	P
	conductor of the largest and smallest cross-sectional area (mm ²) :	10mm ² / 50mm ²	
	number of conductors of the smallest cross section, number of conductors of the largest cross section :	1 / 1	
	diameter of bushing hole (mm) :	9,5mm / 15,9mm	
	height between the equipment and the platen :	280mm/ 343mm	
	mass at the conductor(s) (kg) :	2,0kg / 9,5kg	
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit	135 continuous revolutions	P
	Pull-out test		
	force (N) :	90N / 236N	
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit	1min	P

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Clause	Requirement + Test	Result - Remark		Verdict
		#1 (4P/125A)	#4 (1P/125A)	
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS			
8.3.3.2	Test of tripping limits and characteristic			
8.3.3.2.2	Short circuit releases			
	Rated operational voltage: Ue (V)	230/ 400V~		
	Rated current: In (A)	125A		
	Ambient temperature 10-40 °C:	30°C		P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	8In		P
	Range of adjustable setting current. (A)			N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.			N/A
	Electromagnetic over current releases			
	Test current: 80% of the rated, or minimum adjustable setting current: (A)	800A	800A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: 0,2s L1-L3: 0,2s L1-L4: 0,2s L2-L3: 0,2s L2-L4: 0,2s L3-L4: 0,2s L1: -	0,2s 0,2s 0,2s 0,2s 0,2s 0,2s -	0,2s - - - - - -	P
		non -tripping		
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:			N/A
	Test current: 120% of the rated, or minimum adjustable setting current: (A)	1200A	1200A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: 16ms L1-L3: 19ms L1-L4: 14ms L2-L3: 14ms L2-L4: 19ms L3-L4: 15ms L1: -	16ms 19ms 14ms 14ms 19ms 15ms -	19ms - - - - - -	P

IEC 60947-2				
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: L1- L3: L2- L3: N-Lx:			N/A
	Test current: 80% of the maximum adjustable setting current: (A)			N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Test current: 120% of the maximum adjustable setting current: (A)			N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Test current: tripping current declared for single pole operation (A)	1200A	-	P

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Clause	Requirement + Test	Result - Remark		Verdict
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: L4N:	13ms 18ms 17ms 18ms	- - - -	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3: N:			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.			N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)			N/A
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:			N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:			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: L1: L2: L3: N:			N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:			N/A
	Test current: 80% of the maximum adjustable setting current: (A)			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A
	Test current: 120% of the maximum adjustable setting current: (A)		N/A
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A
8.3.3.2.3	Overload releases		
a)	Instantaneous or definite time-delay releases		
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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		
	Rated operational voltage: Ue (V)	230/ 400V~	
	Rated current: In (A)	125A	
	For releases dependent of ambient air temperature: Reference temperature	40°C	P
	Test ambient temperature (°C)	40°C	P
	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.		N/A
	Test ambient air temperature:	40°C	P
	Range of adjustable setting current: (A)		N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Releases, dependent of ambient air temperature: Reference temperature (°C)	30°C		P
	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) :	131,3A	131,3A	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2h	2h	P
		non-tripping		
	Test current: 130% of the rated, or minimum adjustable setting current: (A)	162,5A	162,5A	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.			N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	116s	97s	P
	Test current: 105% of the maximum 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 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
	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 $I_n < 63A$, 2h when $I_n > 63 A$			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 $I_n < 63A$, <2h when $I_n > 63 A$			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)	40°C		N/A
	Releases, independent of ambient air temperature: at 30°C			N/A
	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)	2I _r		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	L1: L2: L3: -	L1: L2: L3: -	N/A
		(0s ≤ tripping time ≤ 180s declared by the manufacturer)		
	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
8.3.3.2.4	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.		
	<u>overload releases</u> : (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
	<u>short-circuit releases</u>		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.		N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time, <u>overload releases</u> : (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electromagnetic)</u> : (s) L1-L2: .....L1-L3; .....L2-L3;		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electronic)</u> : (s) .....L2; .....L3;		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)		N/A
	Operating time, <u>overload releases</u> : (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electromagnetic)</u> : (s) L1-L2:L1-L3;L2-L3;		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, <u>short-circuit releases (electronic)</u> : (s)L2:L3:		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
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.		
	<u>overload releases</u> : (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
	<u>short-circuit releases</u>		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.		N/A
	Test current: 1,5 times of the minimum adjustable setting current: (A)		N/A
	non-tripping duration stated by the manufacturer for overload release: (s)		N/A
	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)		N/A
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)		N/A
	Rated current		N/A
	Operating time, <u>overload releases</u> : the circuit-breaker does not trip:		N/A
	Operating time, <u>short-circuit releases (electromagnetic)</u> , shall not trip: (s) L1-L2: .....L1-L3: .....L2-L3:		N/A
	Operating time, <u>short-circuit releases (electronic)</u> , shall not trip: (s) L1:L2:L3:		N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Test current: 1,5 times of maximum adjustable setting current: (A)			N/A
	non-tripping duration stated by the manufacturer for overload release: (s)			N/A
	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)			N/A
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)			N/A
	Rated current			N/A
	Operating time, <u>overload releases</u> : the circuit-breaker does not trip:			N/A
	Operating time, <u>short-circuit releases</u> (electromagnetic), shall not trip: (s) L1-L2: .....L1-L3; .....L2-L3;			N/A
	Operating time, <u>short-circuit releases (electronic)</u> , shall not trip: (s) L1: .....L2; .....L3;			N/A
8.3.3.3	Test of dielectric properties, impulse withstand voltage:			
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) :	4kV		P
	- sea level of the laboratory:	Sea level		P
	- test Uimp main circuits (kV) :	4,8kV		P
	- test Uimp auxiliary circuits (kV) :			N/A
	- test Uimp control circuits (kV) :			N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	6,2kV	6,2kV	P
a)	Application of test voltage			P
	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.	4,8kV	4,8kV	P

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Clause	Requirement + Test	Result - Remark		Verdict
	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.	4,8kV	4,8kV	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and:			N/A
	- the main circuit			N/A
	- other circuits			N/A
	- exposed conductive parts			N/A
	- enclosure of mounting plate			N/A
	iv) equipment suitable for isolation	6,2kV		P
	equipment not suitable for isolation			N/A
	- no unintentional disruptive discharge during the test's			P
	Test of dielectric properties, power frequency withstand voltage:			
	- rated insulation voltage (V) :	500V		P
	- main circuits, test voltage for 1 min (V)	1890V		P
	- auxiliary circuits, test voltage for 1 min (V)			N/A
	- control circuits, test voltage for 1 min (V)			N/A
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 .			P
	- between each pole and all the other poles connected to the frame of the circuit-breaker			P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.			P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.			P
	- between the terminals of one side connected together and the terminals of the other side connected together.			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.			N/A

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Clause	Requirement + Test	Result - Remark		Verdict
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.			N/A
	No unintentional disruptive discharge during the tests			N/A
(i)	the normal positions of operation include the tripped position, if any;			P
(ii)	circuits incorporating solid-state devices connected to the main circuit shall be disconnected for the test;			N/A
(iii)	circuit-breakers not declared as suitable for isolation shall be tested with the test voltage applied across the poles of the main circuit, the line terminals being connected together and the load terminals being connected together.			N/A
(iv)	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 $1,1 U_e$, and shall not exceed 0,5mA.	440V, 0,001mA	440V, 0,001mA	P
(v)	circuit-breakers having a rated insulation voltage greater than 1 000 V a.c. shall be tested at a voltage of $U_i + 1\ 200$ V a.c. r.m.s. or $2 U_i$ whichever is t			N/A
(vi)	withdrawable circuit-breakers shall be subject to verification of impulse withstand voltage and shall be applied between the withdrawable unit's main contacts and their associated fixed contacts, in the disconnected position.			N/A
8.3.3.4	Mechanical operation and operational performance capability			
8.3.3.4.2	Construction and mechanical operation			
8.3.3.4.2.1	Construction			
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.2			N/A
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.6, regarding the charge indicator and the direction of operation of manual energy storing			N/A
8.3.3.4.2.2	Mechanical operation			
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.4			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

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Clause	Requirement + Test	Result - Remark	Verdict
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.6 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		N/A
	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		N/A
	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		N/A
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values		N/A
8.3.3.4.2.3	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		N/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified		N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil		N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range		N/A
	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		N/A
	This test may be combined with the temperature-rise test of 8.3.3.7		N/A
	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		N/A

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Clause	Requirement + Test	Result - Remark		Verdict
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			N/A
	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			N/A
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			N/A
8.3.3.4.2.4	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			N/A
	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 \pm 2 °C without current in the main poles of the circuit-breaker			N/A
	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
8.3.3.4.3	Operational performance capability without current.			
	Type designation or serial number catalogue reference			
	Sample no:	#1	#4	
	Rated current I _n (A)	4P/125A	1P/125A	
	Rated operational voltage: U _e (V)	400V~	230 V~	
	Rated control supply voltage of closing releases: U _c (V)			
	Rated control supply voltage of shunt releases: U _c (V)			
	Rated control supply voltage undervoltage releases: U _c (V)			
	Ambient temperature 10-40 °C:	23°C		P
	Number of operating cycles per hour	120cycles		P

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Clause	Requirement + Test	Result - Remark		Verdict
	Number of cycles without current (total) (closing releases energized at the rated U_c)			N/A
	Number of cycles without current (without releases)	8500 cycles		P
	Applied voltage of closing releases (V)			N/A
	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 U_c			N/A
	Applied voltage: shunt releases (V)			N/A
	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 U_c			N/A
	10 attempts to close the breaker without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)			N/A
	Applied voltage: undervoltage releases (V)			N/A
	In the case of circuit-breakers fitted with electrical or pneumatic closing devices, these devices shall be supplied at their rated control supply voltage or at their rated pressure.			N/A
	Precautions shall be taken to ensure that the temperature rises of the electrical components do not exceed the value indicated in tab. 7.			P
8.3.3.4.4	Operational performance capability with current.			
	Rated current: I_n (A)	125A		
	Maximum rated operational voltage: U_e (V)	400V~	230 V~	
	Conductor cross-sectional area (mm^2) :	50 mm^2		P
	Number of operating cycles per hour	120 cycles		P
	Number of cycles with current (total) (closing releases energized at the rated U_c)	1500 cycles		P
	Applied voltage: closing releases (V)			N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.			N/A
	Conditions, make/break operations:			P
	- test voltage $U/U_e = 1,0$ (V)	L1: 402V	232V	P
L2:	402V	-	
L3:	403V	-	
	- test current $I/I_e = 1,0$ (A)	L1: 125,3A	125,7A	P
L2:	125,4A	-	
L3:	126,1A	-	

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Clause	Requirement + Test	Result - Remark		Verdict
	- power factor/time constant:	0,81	0,81	P
	- frequency: (Hz)	50Hz		P
	- on-time (ms):	1700ms		P
	- off-time (s):	28,3s		P
	In the case of circuit-breakers fitted with electrical or pneumatic closing devices, these devices shall be supplied at their rated control supply voltage or at their rated pressure.			N/A
	Precautions shall be taken to ensure that the temperature rises of the electrical components do not exceed the value indicated in tab. 7.			P
8.3.3.4.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.			
	Number of operations cycles : 100			N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.			N/A
8.3.3.5	Overload performance			
	this test applies to circuit-breaker of rated current up to and including 630 A			
	Type designation or serial number catalogue reference			
	Sample no:	#1	#4	
	Rated current In (A)	3P/125A	1P/125A	
	Rated operational voltage: Ue (V)	400V~	230V~	
	Rated control supply voltage of closing releases: Uc (V)			
	Rated control supply voltage of shunt releases: Uc (V)			
	Rated control supply voltage undervoltage releases: Uc (V)			
	Ambient temperature 10-40 °C:	23°C		P
	Maximum rated operational voltage: Ue (V)	400V~	230 V~	P
	Number of operating cycles per hour	120 cycles		P
	Number of cycles with current (total) (closing releases energized at the rated Uc)	9+3 cycles		P
	Applied voltage: closing releases (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:			P

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Clause	Requirement + Test	Result - Remark		Verdict
	- test voltage $U/U_e = 1,05$ (V)L1:L2:L3:	435V 435V 435V	254V - -	P
	- test current AC/DC: $I/I_e = 6,0/2,5$ (A) .....L1: .....L2: .....L3:	535,5A 552,4A 522,6A	490,7A - -	P
	- power factor/time constant:	0,48	0,47	P
	- Number of cycles manually opened: 9			P
	- Number of cycles automatically opened by an overload release: 3			P
	for circuit-breakers having a short-circuit release of a maximum setting less than the test current			
	all 12 operations automatic			N/A
	If the testing means do not withstand the let-through energy occurring during the automatic operation			
	- 12 manual operations - three additional operations with automatic opening, made at any convenient voltage			P
	- frequency: (Hz)	50Hz		P
	- on-time max 2s:			P
	Operating rate if different from Table 8			N/A
8.3.3.6	Verification of dielectric withstand			
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000V/5s		P
	- no breakdown or flashover			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 $1,1 U_e$, and shall not exceed 2 mA.	440V, 0.001mA	440V, 0.001mA	P
8.3.3.7	Verification of temperature-rise			
	- the values of temperature-rise do not exceed those specified in tab. 7.			P
	Temperature rise of main circuit terminals ≤ 80 K (K):	Max. 61,7K	Max. 48,3K	P
	conductor cross-sectional area (mm ²) :	50mm ²		P
	test current I_e (A) :	3P/125A	1P/125A	P
8.3.3.8	Verification of overload releases			
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	181,3A	-	P

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Clause	Requirement + Test	Result - Remark		Verdict
	Conventional tripping time: <1h when $I_n < 63A$, <2h when $I_n > 63 A$	85s	-	P
8.3.3.9	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 -			N/A
	and shall operate at 35% of the maximum control supply voltage.			N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.			N/A
8.3.3.10	Verification of the main contact position for circuit-breakers for isolation			P
	actuating force for opening (N)	31N	8N	P
	test force with blocked main contacts for 10 s (N) :	93N	50N	P
	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			N/A
	Three attempts to operate the equipment by the stored energy.			N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts			N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts			P

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Clause	Requirement + Test	Result - Remark		Verdict
		#2 (3P/125A)	#3 (2P/125A)	
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS			
8.3.3.2	Test of tripping limits and characteristic			
8.3.3.2.2	Short circuit releases			
	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
	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: L1-L2: L1-L3: L1-L4: L2-L3: L2-L4: L3-L4: L1:			N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:			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: L1-L2: L1-L3: L1-L4: L2-L3: L2-L4: L3-L4: L1:			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: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Test current: 80% of the maximum adjustable setting current: (A)			N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Test current: 120% of the maximum adjustable setting current: (A)			N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1- L3: L2- L3: N-Lx:			N/A
	Test current: tripping current declared for single pole operation (A)			N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: L4N:			N/A
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3: N:			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.			N/A
	Test current: 80% of the rated, or minimum adjustable setting current: (A)			N/A
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:			N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:			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: L1: L2: L3: N:			N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:			N/A
	Test current: 80% of the maximum adjustable setting current: (A)			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A
	Test current: 120% of the maximum adjustable setting current: (A)		N/A
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A
8.3.3.2.3	Overload releases		
a)	Instantaneous or definite time-delay releases		
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	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		
	Rated operational voltage: U_e (V)		
	Rated current: I_n (A)		
	For releases dependent of ambient air temperature: Reference temperature		N/A
	Test ambient temperature ($^{\circ}\text{C}$)		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.		N/A
	Test ambient air temperature:		N/A
	Range of adjustable setting current: (A)		N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Releases, dependent of ambient air temperature: Reference temperature (°C)			N/A
	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) :			N/A
	Conventional non-tripping time: 1h when $I_n < 63A$, 2h when $I_n > 63 A$			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 $I_n < 63A$, <2h when $I_n > 63 A$			N/A
	Test current: 105% of the maximum adjustable setting current: (A)			N/A
	Conventional non-tripping time: 1h when $I_n < 63A$, 2h when $I_n > 63 A$			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 $I_n < 63A$, <2h when $I_n > 63 A$			N/A
	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 $I_n < 63A$, 2h when $I_n > 63 A$			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 $I_n < 63A$, <2h when $I_n > 63 A$			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 $I_n < 63A$, 2h when $I_n > 63 A$		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 $I_n < 63A$, <2h when $I_n > 63 A$		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 ($^{\circ}C$)		N/A
	Releases, independent of ambient air temperature: at $30^{\circ}C$		N/A
	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
		($0s \leq \text{tripping time} \leq 180s$ declared by the manufacturer)	
	Releases, independent of ambient air temperature: at $20^{\circ}C$ or $40^{\circ}C$		
	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
8.3.3.2.4	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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
	<u>short-circuit releases</u>		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.		N/A
	Test current: 1,5 times of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time, <u>overload releases</u> : (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electromagnetic)</u> : (s) L1-L2: .....L1-L3; .....L2-L3;		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electronic)</u> : (s) .....L2; .....L3;		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Test current: 1,5 times of the maximum adjustable setting current: (A)		N/A
	Operating time, <u>overload releases</u> : (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electromagnetic)</u> : (s) L1-L2: .....L1-L3; .....L2-L3;		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A
	Operating time, <u>short-circuit releases (electronic)</u> : (s)L2;L3;		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
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.		
	<u>overload releases</u> : (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
	<u>short-circuit releases</u>		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.		N/A
	Test current: 1,5 times of the minimum adjustable setting current: (A)		N/A
	non-tripping duration stated by the manufacturer for overload release: (s)		N/A
	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)		N/A
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)		N/A
	Rated current		N/A
	Operating time, <u>overload releases</u> : the circuit-breaker does not trip:		N/A
	Operating time, <u>short-circuit releases</u> (electromagnetic), shall not trip: (s) L1-L2: .....L1-L3; .....L2-L3;		N/A
	Operating time, <u>short-circuit releases</u> (electronic), shall not trip: (s) L1: .....L2; .....L3;		N/A
	Test current: 1,5 times of maximum adjustable setting current: (A)		N/A
	non-tripping duration stated by the manufacturer for overload release: (s)		N/A
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)		N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)			N/A
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)			N/A
	Rated current			N/A
	Operating time, <u>overload releases</u> : the circuit-breaker does not trip:			N/A
	Operating time, <u>short-circuit releases (electromagnetic), shall not trip</u> : (s) L1-L2: .....L1-L3: .....L2-L3:			N/A
	Operating time, <u>short-circuit releases (electronic), shall not trip</u> : (s) L1: .....L2: .....L3:			N/A
8.3.3.3	Test of dielectric properties, impulse withstand voltage:			
8.3.3.4 part1	The 1,2/50 μ s impulse voltage shall be applied five times for each polarity at intervals of 1s minimum			
	- rated impulse withstand voltage (kV) :	4kV		P
	- sea level of the laboratory:	Sea level		P
	- test Uimp main circuits (kV) :	4,8kV		P
	- test Uimp auxiliary circuits (kV) :			N/A
	- test Uimp control circuits (kV) :			N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	6,2kV	6,2kV	P
a)	Application of test voltage			P
	ii) 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.	4,8kV	4,8kV	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.	4,8kV	4,8kV	P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and:			N/A
	- the main circuit			
	- other circuits			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	iv) equipment suitable for isolation	6,2kV	P
	equipment not suitable for isolation		N/A
	- no unintentional disruptive discharge during the test's		P
	Test of dielectric properties, power frequency withstand voltage:		
	- rated insulation voltage (V) :	500V	P
	- main circuits, test voltage for 1 min (V)	1890V	P
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
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 .		P
	- between each pole and all the other poles connected to the frame of the circuit-breaker		P
	2) with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.		P
	- between the terminals of one side connected together and the terminals of the other side connected together.		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.		N/A
	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.		N/A
	No unintentional disruptive discharge during the tests		N/A
	(i) the normal positions of operation include the tripped position, if any;		P
	(ii) circuits incorporating solid-state devices connected to the main circuit shall be disconnected for the test;		N/A

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Clause	Requirement + Test	Result - Remark		Verdict
(iii)	circuit-breakers not declared as suitable for isolation shall be tested with the test voltage applied across the poles of the main circuit, the line terminals being connected together and the load terminals being connected together.			N/A
(iv)	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 $1,1 U_e$, and shall not exceed 0,5mA.	440V, 0,002mA	440V, 0,001mA	P
(v)	circuit-breakers having a rated insulation voltage greater than 1 000 V a.c. shall be tested at a voltage of $U_i + 1\ 200$ V a.c. r.m.s. or $2 U_i$ whichever is the greater			N/A
(vi)	withdrawable circuit-breakers shall be subject to verification of impulse withstand voltage and shall be applied between the withdrawable unit's main contacts and their associated fixed contacts, in the disconnected position.			N/A
8.3.3.4	Mechanical operation and operational performance capability			
8.3.3.4.2	Construction and mechanical operation			
8.3.3.4.2.1	Construction			
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.2			N/A
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.6, regarding the charge indicator and the direction of operation of manual energy storing			N/A
8.3.3.4.2.2	Mechanical operation			
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.4			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 7.2.1.6 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.			N/A
	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			N/A
	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			N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	If the closing and opening times of a circuit-breaker are stated by the manufacturer, such times shall comply with the stated values		N/A
8.3.3.4.2.3	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		N/A
i)	Drop out voltage		
	It shall be verified that the release operates to open the circuit-breaker between the voltage limits specified		N/A
	The voltage shall be reduced from rated voltage at a rate to reach 0 V in approximately 30 s		N/A
	The test for the lower limit is made without current in the main circuit and without previous heating of the release coil		N/A
	In the case of a release with a range of rated voltages, this test applies to the maximum voltage of the range		N/A
	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		N/A
	This test may be combined with the temperature-rise test of 8.3.3.7		N/A
	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		N/A
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		N/A
	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		N/A

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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			N/A
8.3.3.4.2.4	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			N/A
	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 \pm 2 °C without current in the main poles of the circuit-breaker			N/A
	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
8.3.3.4.3	Operational performance capability without current.			
	Type designation or serial number catalogue reference			
	Sample no:	#2	#3	
	Rated current In (A)	3P/125A	2P/125A	
	Rated operational voltage: Ue (V)	400V~	230 V~	
	Rated control supply voltage of closing releases: Uc (V)			
	Rated control supply voltage of shunt releases: Uc (V)			
	Rated control supply voltage undervoltage releases: Uc (V)			
	Ambient temperature 10-40 °C:	23°C		P
	Number of operating cycles per hour	120cycles		P
	Number of cycles without current (total) (closing releases energized at the rated Uc)			N/A
	Number of cycles without current (without releases)	8500 cycles		P
	Applied voltage of closing releases (V)			N/A
	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			N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Applied voltage: shunt releases (V)			N/A
	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			N/A
	10 attempts to close the breaker without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)			N/A
	Applied voltage: undervoltage releases (V)			N/A
	In the case of circuit-breakers fitted with electrical or pneumatic closing devices, these devices shall be supplied at their rated control supply voltage or at their rated pressure.			N/A
	Precautions shall be taken to ensure that the temperature rises of the electrical components do not exceed the value indicated in tab. 7.			P
8.3.3.4.4	Operational performance capability with current.			
	Rated current: In (A)	125A		
	Maximum rated operational voltage: Ue (V)	400V~	230 V~	
	Conductor cross-sectional area (mm ²) :	50mm ²		P
	Number of operating cycles per hour	120 cycles		P
	Number of cycles with current (total) (closing releases energized at the rated Uc)	1500 cycles		P
	Applied voltage: closing releases (V)			N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.			N/A
	Conditions, make/break operations:			P
	- test voltage U/Ue = 1,0 (V) .....L1: .....L2: .....L3:	402V 402V 403V	403V - -	P
	- test current I/Ie = 1,0 (A).....L1: .....L2: .....L3:	125,3A 125,4A 126,1A	125,8A - -	P
	- power factor/time constant:	0,81	0,81	P
	- frequency: (Hz)	50Hz		P
	- on-time (ms):	1700ms		P
	- off-time (s):	28,3s		P
	In the case of circuit-breakers fitted with electrical or pneumatic closing devices, these devices shall be supplied at their rated control supply voltage or at their rated pressure.			N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Precautions shall be taken to ensure that the temperature rises of the electrical components do not exceed the value indicated in tab. 7.			P
8.3.3.4.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.			
	Number of operations cycles : 100			N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.			N/A
8.3.3.5	Overload performance			
	this test applies to circuit-breaker of rated current up to and including 630 A			
	Type designation or serial number catalogue reference			
	Sample no:	#2	#3	
	Rated current I _n (A)	3P/125A	1P/125A	
	Rated operational voltage: U _e (V)	400V~	230V~	
	Rated control supply voltage of closing releases: U _c (V)			
	Rated control supply voltage of shunt releases: U _c (V)			
	Rated control supply voltage undervoltage releases: U _c (V)			
	Ambient temperature 10-40 °C:	23°C		P
	Maximum rated operational voltage: U _e (V)	400V~	400 V~	P
	Number of operating cycles per hour	120cycles		P
	Number of cycles with current (total) (closing releases energized at the rated U _c)	9+3 cycles		P
	Applied voltage: closing releases (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:			P
	- test voltage U/U _e = 1,05 (V)			
	.....L1:	435V	435V	P
	.....L2:	435V	-	
	.....L3:	435V	-	
	- test current AC/DC: I/I _e = 6,0/2.5 (A)			
	.....L1:	534,3A	537,7A	P
	.....L2:	554,0A	527,5A	
	.....L3:	525,9A	-	
	- power factor/time constant:	0,48	0,45	P
	- Number of cycles manually opened: 9			P

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Clause	Requirement + Test	Result - Remark		Verdict
	- Number of cycles automatically opened by an overload release: 3			P
	for circuit-breakers having a short-circuit release of a maximum setting less than the test current			
	all 12 operations automatic			N/A
	If the testing means do not withstand the let-through energy occurring during the automatic operation			
	- 12 manual operations - three additional operations with automatic opening, made at any convenient voltage			P
	- frequency: (Hz)	50Hz		P
	- on-time max 2s:			P
	Operating rate if different from Table 8			N/A
8.3.3.6	Verification of dielectric withstand			
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000V/5s		P
	- no breakdown or flashover			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 $1,1 U_e$, and shall not exceed 2 mA.	440V, 0.002mA	440V, 0.001mA	P
8.3.3.7	Verification of temperature-rise			
	- the values of temperature-rise do not exceed those specified in tab. 7.			P
	Temperature rise of main circuit terminals ≤ 80 K (K):	Max. 59,0K	Max. 53,4K	P
	conductor cross-sectional area (mm ²) :	50mm ²		P
	test current I_e (A) :	3P/125A	2P/125A	P
8.3.3.8	Verification of overload releases			
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	-	-	P
	Conventional tripping time: <1h when $I_n < 63A$, <2h when $I_n > 63 A$	-	-	P
8.3.3.9	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 -			N/A
	and shall operate at 35% of the maximum control supply voltage.			N/A

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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.			N/A
8.3.3.10	Verification of the main contact position for circuit-breakers for isolation			P
	actuating force for opening (N)	24N	17N	P
	test force with blocked main contacts for 10 s (N) :	72N	50N	P
	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			N/A
	Three attempts to operate the equipment by the stored energy.			N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts			N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts			P

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Clause	Requirement + Test	Result - Remark		Verdict
8.3.4	TEST SEQUENCE II/III (Ics=Icu):			
8.3.4.2	Test of rated service short-circuit breaking capacity			
	Test sequence of operation: O – t – CO – t – CO			
	Type designation or catalogue reference			
	Sample no:	#5	#6	
	Rated current: In (A)	4P/125A	4P/40A	
	Corresponding rated voltage: Ue (V)	400V~		
	Rated service short-circuit breaking capacity: (kA)	6,0kA		
	Rated control supply voltage of closing releases: Uc (V)			
	Rated control supply voltage of shunt release: Uc (V)			
	Rated control supply voltage of undervoltage releases: Uc (V)			
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.			N/A
	Closing releases energized with 85% at the rated Uc: (V)			N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.			P
	Test made in free air:			P
	Distances of the metallic screen's: (all sides)	Back:0mm Front:0mm Top:80mm Bottom:80mm Left:80mm Right:80mm		P
	The characteristics of the metallic screen:			
	- woven wire mesh			N/A
	- perforated metal			P
	- expanded metal			N/A
	- ratio hole area/total area: 0,45-0,65			P
	- size of hole: <30mm ²			P
	- finish: bare or conductive plating			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	Diameter 0,8 mm 50 mm long		P

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Clause	Requirement + Test	Result - Remark		Verdict
	Circuit is earthed at: (load-star- or supply-star point)	Supply-star point		P
	Conductor cross-sectional area (mm ²) :	10mm ²	50mm ²	P
	If terminals unmarked: line connected at: (underside/upside)			N/A
	Tightening torques: (Nm)	3,5 Nm		P
8.3.5.2	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:	0s ≤ stripping time ≤ 600s		P
	- Operation time: (s) .....L1: .....L2: .....L3: N :	68s 61s 70s 64s	59s 65s 62s 66s	P
8.3.4.2	Test of rated service short-circuit breaking capacity			P
	Test sequence of operation: O – t – CO – t – CO			P
	- test voltage U/UE = 1,05 (V) .....L1: .....L2: .....L3:	432,7V 432,0V 432,2V	432,7V 432,0V 432,2V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3:	6,11kA 6,35kA 6,22kA	6,11kA 6,35kA 6,22kA	P
	power factor/time constant :	0,66		P
	- Factor "n"	1,53		P
	- peak test current (A) :	9,38kA	9,38kA	P
	Test sequence "O"			
	- max. let-through current: (kA _{peak}) .....L1: .....L2: .....L3:	6,89kA - -	5,23kA - -	P
	- Joule integral I ² dt (A ² s) .....L1: .....L2: .....L3:	112,1kA 14,0,9kA 48,6kA	46,7kA 86,0kA 24,8kA	P
	Pause, t: (min)	3min		P
	Test sequence "CO"			
	- max. let-through current: (kA _{peak})L1:L2:L3:	5,93kA - -	1,97kA - -	P
	- Joule integral I ² dt (A ² s)L1:L2:L3:	111,3kA 29,2kA 110,2kA	1,55kA 6,35kA 6,35kA	P

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Clause	Requirement + Test	Result - Remark		Verdict
	Pause, t: (min)	3min		P
	Test sequence "CO"			
	- max. let-through current: (kA _{peak}) .....L1: .....L2: .....L3:	5,74kA - -	3,04kA - -	P
	- Joule integral I ² dt (A ² s) .....L1: .....L2: .....L3:	4,24kA 57,8kA 122,0kA	14,7kA 0,01kA 5,16kA	P
	Melting of the fusible element	No melting		P
	Damage to insulation on conductors	No damage		P
	Holes in the PE-sheet for test sequence "O"	No holes		P
	Cracks observed	No		P
8.3.4.3	Operational performance capability with current.			
	Rated current: I _n (A)	125A	125A	
	Maximum rated operational voltage: U _e (V)	4.0V~		
	Conductor cross-sectional area (mm ²) :	50mm ²	50mm ²	
	Number of operating cycles per hour	120cycles		P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing releases energized at the rated U _c)	75cycles		P
	Applied voltage: closing releases (V)			N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.			N/A
	Conditions, make/break operations:			
	- test voltage U/U _e = 1,0 (V) .....L1: .....L2: .....L3:	402V 402V 403V	- - -	P
	- test current I/I _e = 1,0 (A).....L1: .....L2: .....L3:	125,3A 125,2A 126,0A	- - -	P
	- power factor/time constant:	0,81	-	P
	- frequency: (Hz)	50Hz		P
	- on-time (ms):	1700ms		P
	- off-time (s):	28,3s		P
8.3.4.4	Verification of dielectric withstand			
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000V; 5s		P
	- no breakdown or flashover			P

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Clause	Requirement + Test	Result - Remark		Verdict
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue)	0,002mA	0,002mA	P
8.3.4.5	Verification of temperature-rise			
	- the values of temperature-rise do not exceed those specified in tab. 7.			P
	Temperature rise of main circuit terminals ≤ 80 K (K):	Max.61,5K	-	P
	conductor cross-sectional area (mm ²) :	50mm ²	-	P
	test current Ie (A) :	125A	-	P
8.3.4.6	Verification of overload releases			
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	181,3A	58,0A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	92s	89s	P
8.3.5.5	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:	0s≤tripping time≤600s		P
	- Operation time: (s)			P
L1:	35s	35s	
L2:	41s	31s	
L3:	38s	37s	
 N :	36s	34s	

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Clause	Requirement + Test	Result - Remark			Verdict
8.3.5	TEST SEQUENCE III (Icu): Rated ultimate short-circuit breaking capacity				
	Rated ultimate short-circuit breaking				
	Except where the combined test sequence applies, this test sequence applies to circuit-breaker of utilization category A and to circuit-breaker of utilization B having a rated ultimate short-circuit breaking capacity higher than the rated short-time withstand current.				
	For circuit-breakers of utilization B having a rated short-time withstand current equal to their rated ultimate short-circuit breaking capacity, this test sequence need not be made, since, in this case, the ultimate short-circuit breaking capacity, is verified when carrying out test sequence IV.				
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.				
	Type designation or catalogue reference				
	Sample no:	#7	#8	#9	
	Rated current: In (A)	3P/125A	2P/125A	1P/125A	
	Corresponding rated voltage: Ue (V)	400V~	400V~	230V~	
	Rated ultimate short-circuit breaking capacity: (kA)	6,0kA			
	Rated control supply voltage of closing releases: Uc (V)				
	Rated control supply voltage of shunt release: Uc (V)				
	Rated control supply voltage of undervoltage releases: Uc (V)				
	This test sequence need not be made when Icu = Ics				
8.3.5.2	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:	(tripping time ≤ 600s declared by the manufacturer)			N/A
	- Operation time: (s) .....L1: .....L2: .....L3: .....N :				N/A
8.3.5.3	Test of rated ultimate short-circuit breaking capacity				
	The test sequence of operations is O – t – CO				
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.				N/A

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Clause	Requirement + Test	Result - Remark			Verdict
	Closing releases energized with 85% at the rated Uc: (V)				N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.				P
	Test made in free air:				P
	Distances of the metallic screen's: (all sides)	Back:0mm Front:0mm Top:80mm Bottom:80mm Left:80mm Right:80mm			P
	The characteristics of the metallic screen:				
	- woven wire mesh				N/A
	- perforated metal				P
	- expanded metal				N/A
	- ratio hole area/total area: 0,45-0,65				P
	- size of hole: <math><30\text{mm}^2</math>				P
	- finish: bare or conductive plating				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	Diameter 0,8 mm 50 mm long			P
	Circuit is earthed at: (load-star- or supply-star point)	Supply-star point			P
	Conductor cross-sectional area (mm ²) :	35mm ²			P
	If terminals unmarked: line connected at: (underside/upside)				N/A
	Tightening, torques: (Nm)	3,5 Nm			P
	Test sequence of operation: O – t – CO				P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: .....L3:	432,7V 432,0V 432,2V	438V 438V -	253V - -	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3:	6,11kA 6,35kA 6,22kA	6,12kA 6,12kA -	3,07kA - -	P
	power factor/time constant :	0,66	0,69	0,89	P
	- Factor "n"	1,53			P
	- peak test current (Amax) :	6,23kA	9,52kA	5,32kA	P

IEC 60947-2					
Clause	Requirement + Test	Result - Remark			Verdict
	Test sequence "O"				
	- max. let-through current: (kA _{peak}) .....L1: .....L2: .....L3:	5,77kA 6,77kA 2,92kA	6,35kA 6,36kA -	5,86kA - -	P
	- Joule integral I ² dt (A ² s) .....L1: .....L2: .....L3:	124kA 135kA 38,9kA	129kA 127kA -	116kA - -	P
	Pause, t: (min)	3min			P
	Test sequence "CO"				
	- max. let-through current: (kA _{peak}) .....L1: .....L2: .....L3:	4,27kA 5,19kA 6,61kA	6,59kA 6,58kA -	5,80kA - -	P
	- Joule integral I ² dt (A ² s) .....L1: .....L2: .....L3:	46,1kA 74,4kA 158kA	129kA 128kA -	119kA - -	P
	Melting of the fusible element	No			P
	Damage to insulation on conductors	No			P
	Holes in the PE-sheet for test sequence "O"	No			P
	Cracks observed	No			P
8.3.5.4	Verification of dielectric withstand				
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000V			P
	- no breakdown or flashover				P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U _e)	440V 0,001mA	440V 0,001mA	440V 0,002mA	P
8.3.5.5	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:	(tripping time ≤ 600s declared by the manufacturer)			P
	- Operation time: (s) .....L1: .....L2: .....L3: N :	34s 38s 41s -	36s 42s - -	37s - - -	P

IEC 60947-2				
Clause	Requirement + Test	Result - Remark		Verdict
8.3.5	TEST SEQUENCE III (Icu): Rated ultimate short-circuit breaking capacity			
	Rated ultimate short-circuit breaking			
	Except where the combined test sequence applies, this test sequence applies to circuit-breaker of utilization category A and to circuit-breaker of utilization B having a rated ultimate short-circuit breaking capacity higher than the rated short-time withstand current.			
	For circuit-breakers of utilization B having a rated short-time withstand current equal to their rated ultimate short-circuit breaking capacity, this test sequence need not be made, since, in this case, the ultimate short-circuit breaking capacity, is verified when carrying out test sequence IV.			
	For integrally fused circuit-breakers, test sequence V applies in place of this sequence.			
	Type designation or catalogue reference			
	Sample no:	#10	#11	
	Rated current: In (A)	4P/125A	4P/40A	
	Corresponding rated voltage: Ue (V)	400V~		
	Rated ultimate short-circuit breaking capacity: (kA)	3,6kA		
	Rated control supply voltage of closing releases: Uc (V)			
	Rated control supply voltage of shunt release: Uc (V)			
	Rated control supply voltage of undervoltage releases: Uc (V)			
	This test sequence need not be made when Icu = Ics			
8.3.5.2	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:	(tripping time ≤ 600s declared by the manufacturer)		P
	- Operation time: (s)	-	-	P
	.....L1:	-	-	
	.....L2:	74s	68s	
	.....L3:	71s	65s	
	.....N :			
8.3.5.3	Test of rated ultimate short-circuit breaking capacity			
	The test sequence of operations is O – t – CO			
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.			N/A

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Clause	Requirement + Test	Result - Remark		Verdict
	Closing releases energized with 85% at the rated Uc: (V)			N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.			P
	Test made in free air:			P
	Distances of the metallic screen's: (all sides)	Back:0mm Front:0mm Top:80mm Bottom:80mm Left:80mm Right:80mm		P
	The characteristics of the metallic screen:			
	- woven wire mesh			N/A
	- perforated metal			P
	- expanded metal			N/A
	- ratio hole area/total area: 0,45-0,65			P
	- size of hole: <math><30\text{mm}^2</math>			P
	- finish: bare or conductive plating			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	Diameter 0,8 mm 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Supply-star point		P
	Conductor cross-sectional area (mm ²) :	35mm ²		P
	If terminals unmarked: line connected at: (underside/upside)			N/A
	Tightening, torques: (Nm)	3,5 Nm		P
	Test sequence of operation: O – t – CO			P
	- test voltage U/Ue = 1,05 (V) .....L1: .....L2: .....L3:	253,8V 254,2V 253,3V	253,8V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3:	3,07kA 3,02kA 3,12kA	3,07kA - -	P
	power factor/time constant :	0,89	0,89	P
	- Factor "n"	1,42		P
	- peak test current (Amax) :	5,32kA	5,32kA	P

IEC 60947-2				
Clause	Requirement + Test	Result - Remark		Verdict
	Test sequence "O"			
	- max. let-through current: (kA _{peak}) .....L1: .....L2: .....L3:	3,38kA - -	3,55kA - -	P
	- Joule integral I ² dt (A ² s) .....L1: .....L2: .....L3:	89,5kA - -	28,0kA - -	P
	Pause, t: (min)	3min		P
	Test sequence "CO"			
	- max. let-through current: (kA _{peak}) .....L1: .....L2: .....L3:	3,23kA - -	4,03kA - -	P
	- Joule integral I ² dt (A ² s) .....L1: .....L2: .....L3:	79,0kA - -	39,4kA - -	P
	Melting of the fusible element	No		P
	Damage to insulation on conductors	No		P
	Holes in the PE-sheet for test sequence "O"	No		P
	Cracks observed	No		P
8.3.5.4	Verification of dielectric withstand			
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000V		P
	- no breakdown or flashover			P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U _e)	440V 0,002mA	440V 0,001mA	P
8.3.5.5	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:	(tripping time ≤ 600s declared by the manufacturer)		P
	- Operation time: (s) .....L1: .....L2: .....L3: N :	- - 36s 34s	- - 35s 33s	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.6	TEST SEQUENCE IV (Icw): Rated short-time withstand current		N/A

8.3.7	TEST SEQUENCE V: Performance of integrally fused circuit-breakers		N/A
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8.3.8	TEST SEQUENCE VI: Combined test sequence		N/A
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8.3.9	Critical d.c. load current test		N/A
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Annex B	Circuit-breakers incorporating residual current protection		N/A
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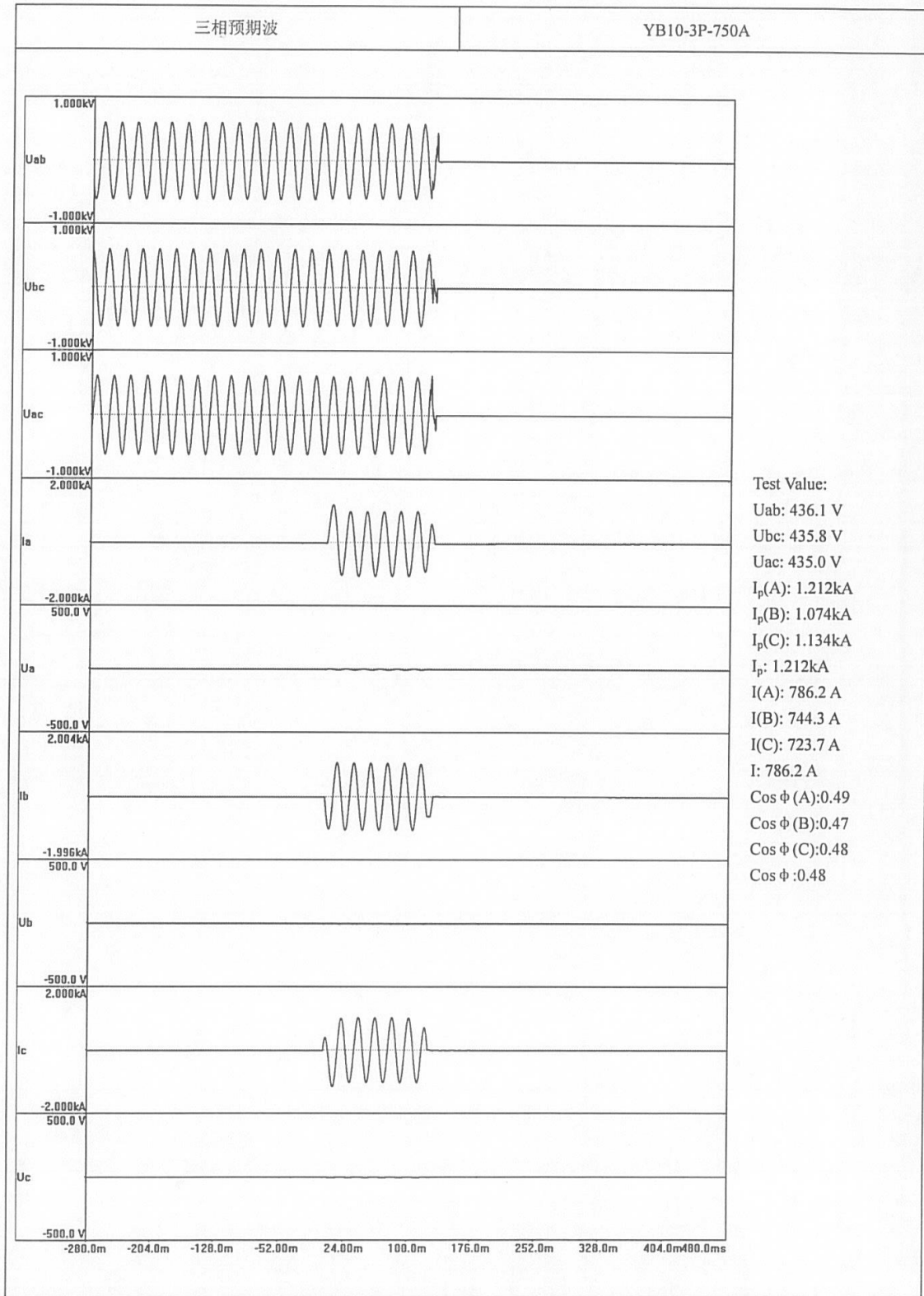
Annex C	Individual pole short-circuit test sequence		N/A
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Annex D	Additional requirements for circuit-breakers intended for connection of aluminium conductors		N/A
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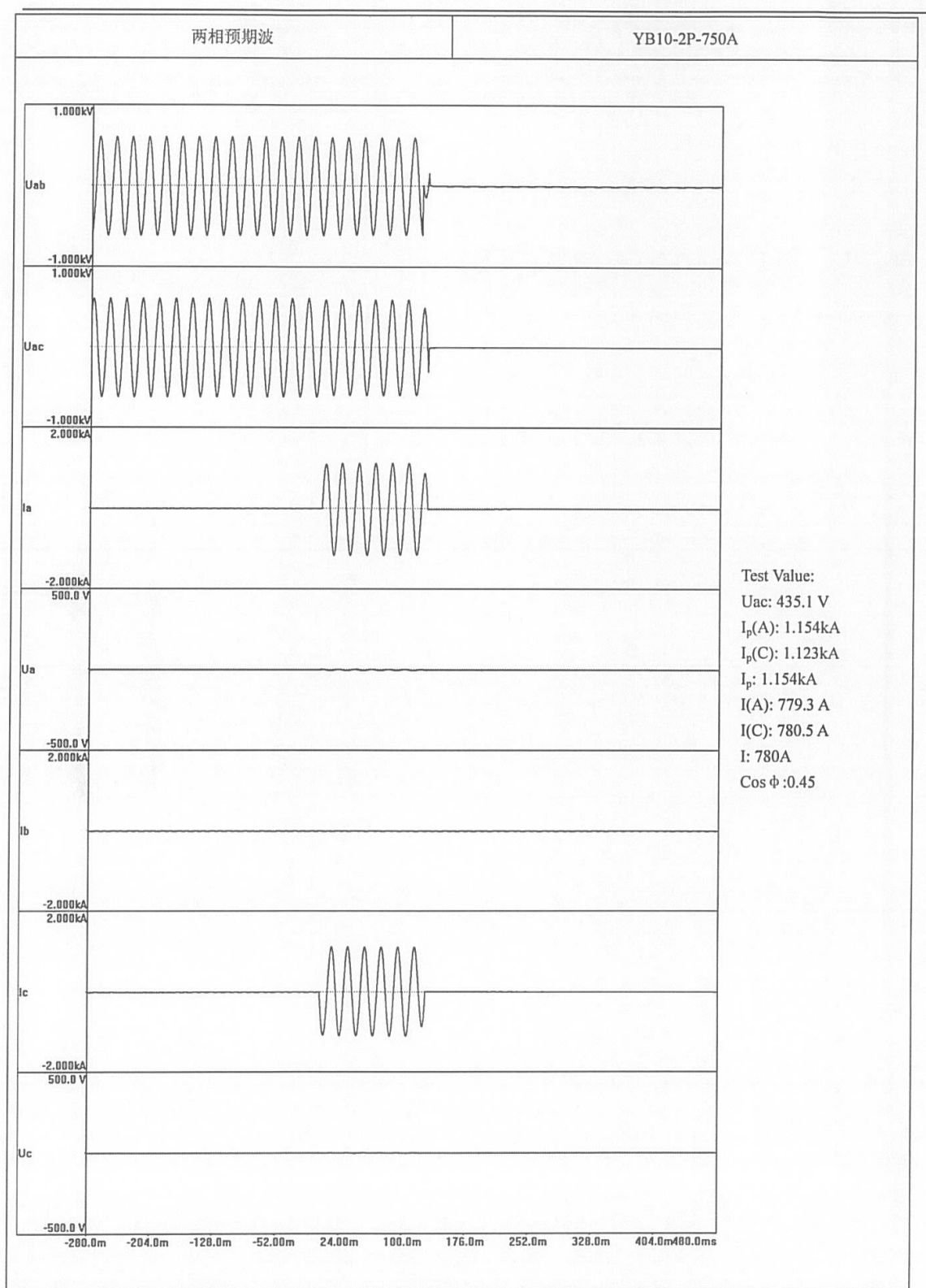
Annex F	Additional tests for circuit-breakers with electronic over-current protection		N/A
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Annex H	Individual pole short-circuit test sequence		N/A
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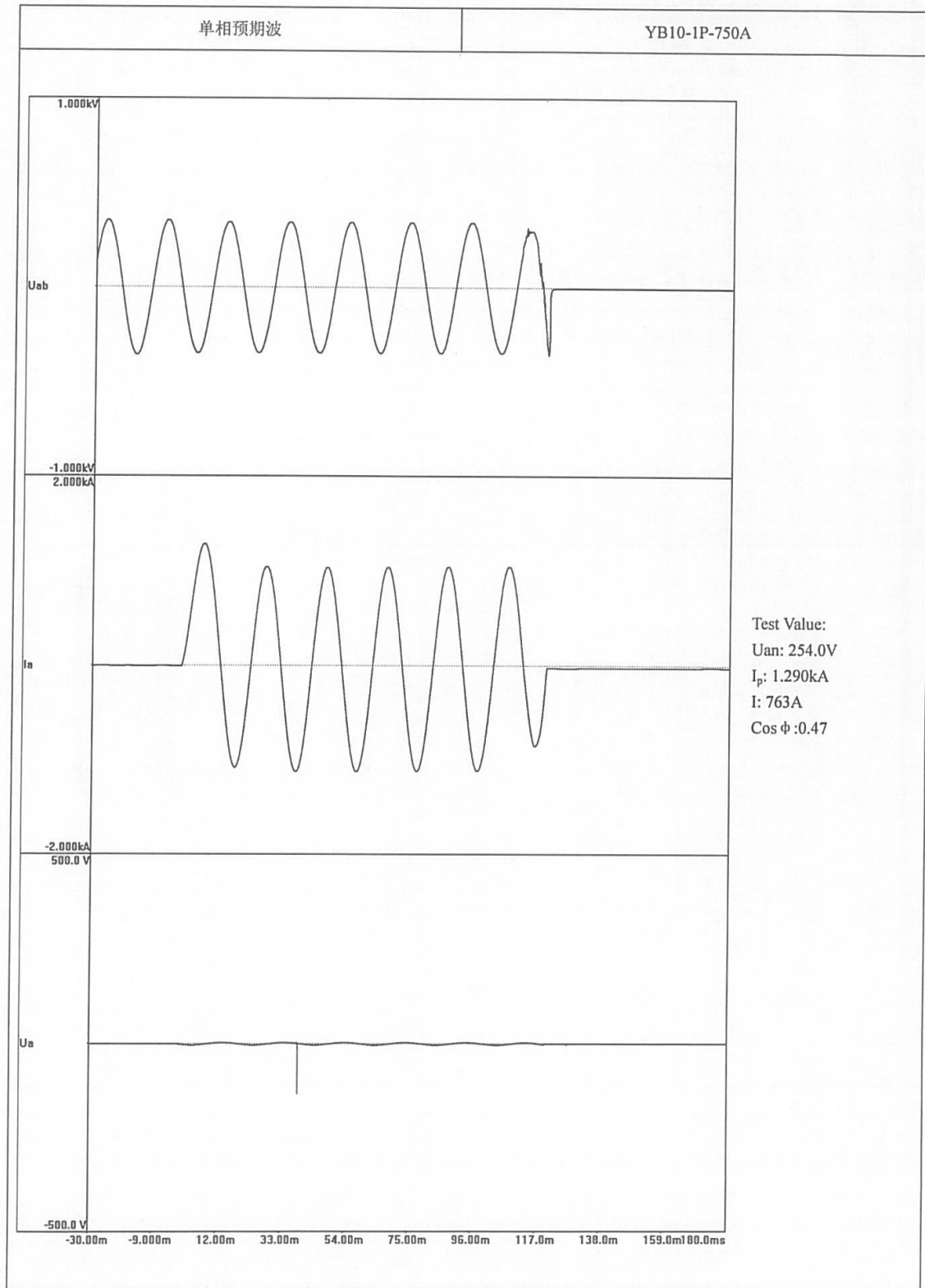
TABLE 15: Clearance And Creepage Distance Measurements #12 (4P/125A)							P
clearance cl and creepage distance dcr at/of:	Up (V)	U r.m.s. (V)	Required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)	
between live parts which are separated when the main contacts are in the open position	/	/	3,0	3,53	8,0	17,25	
between live parts of different polarity	/	/	3,0	23,46	8,0	23,46	
between live parts and other accessible metal parts	/	/	3,0	3,42	8,0	20,38	
between live parts metal frames supporting flush-type circuit-breakers	/	/	3,0	8,64	8,0	8,64	
Supplementary information:N/A							



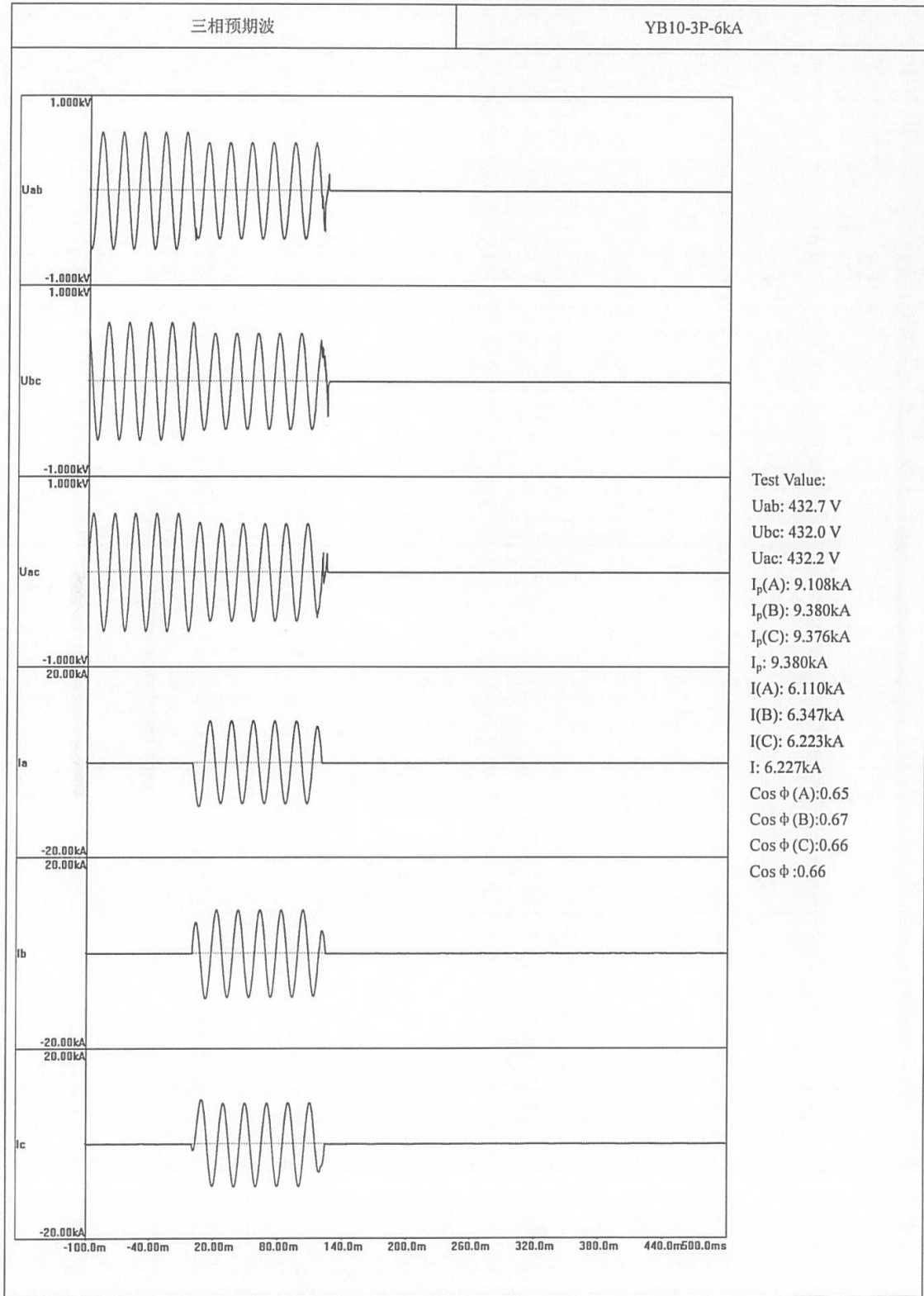
I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)



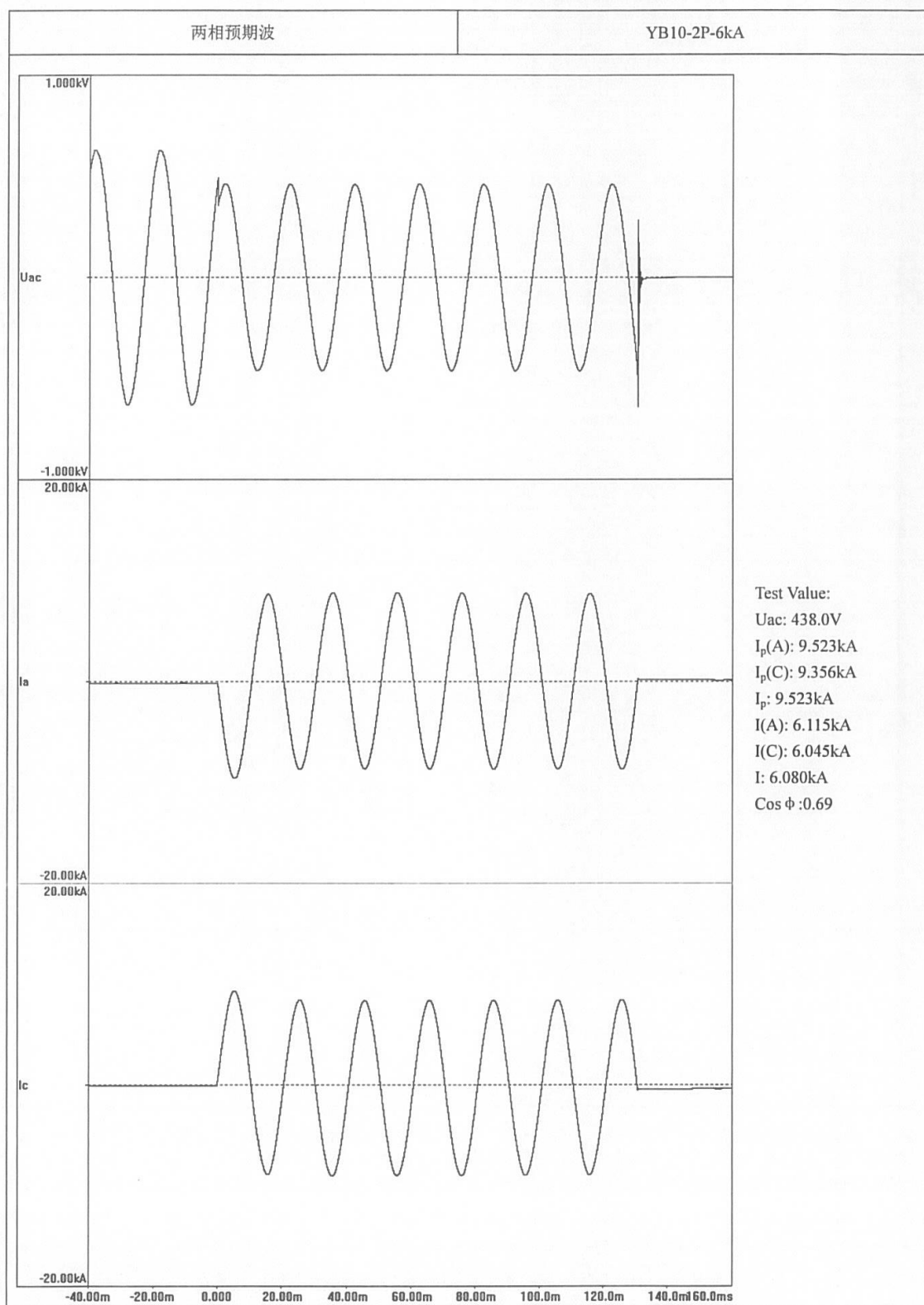
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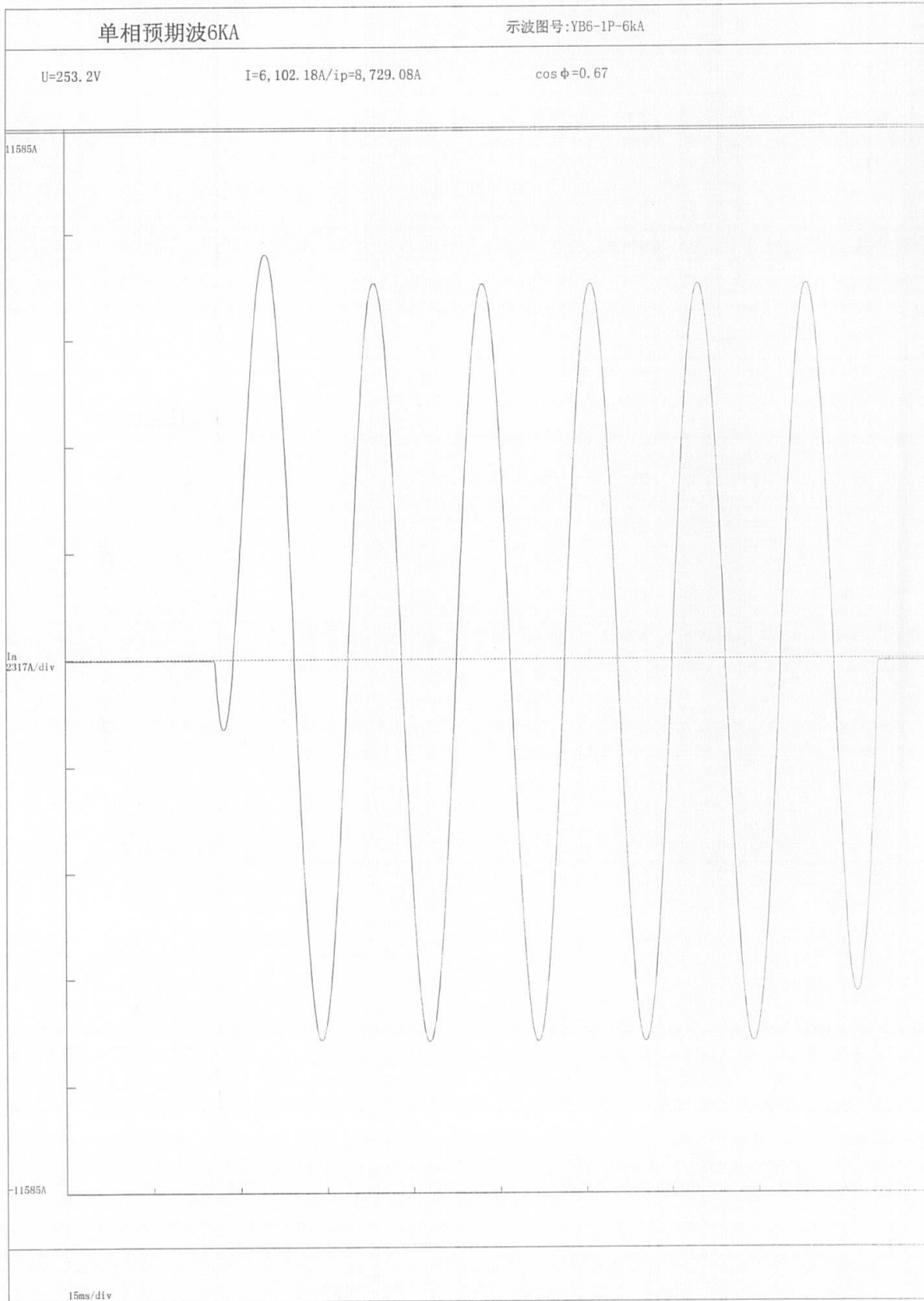
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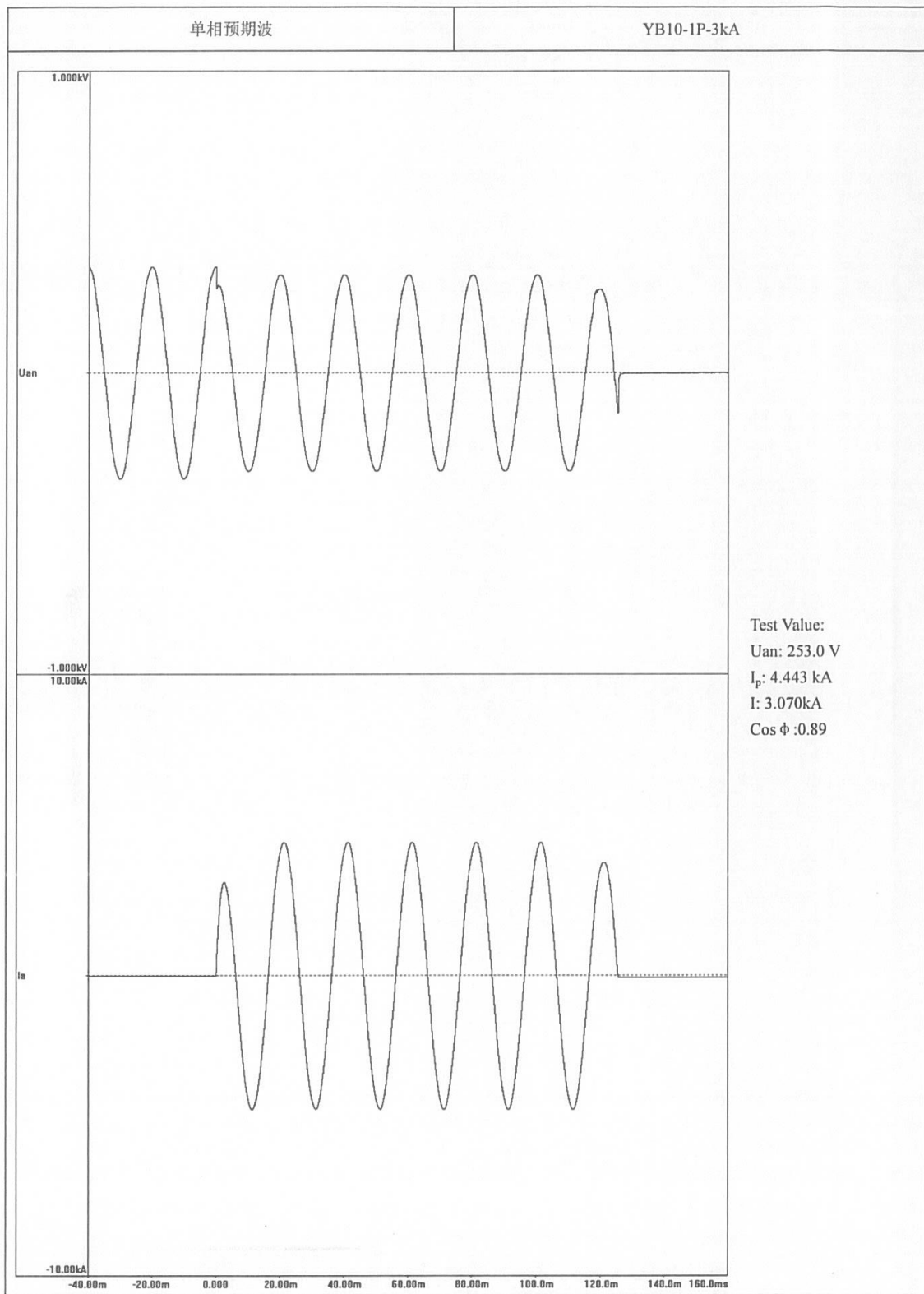


I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)

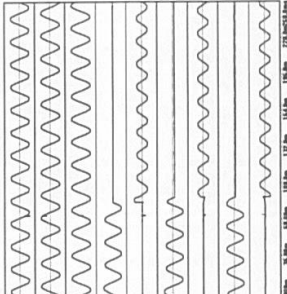
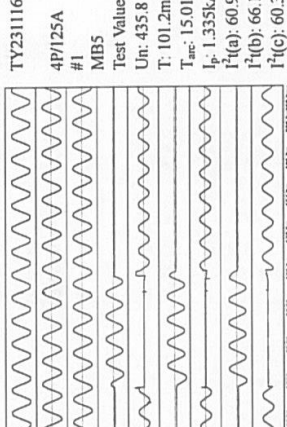
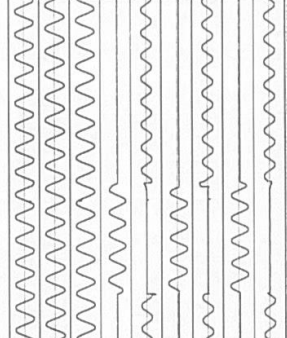
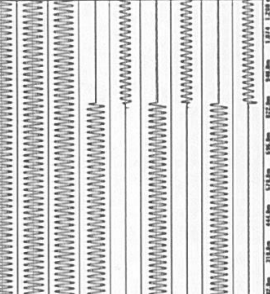
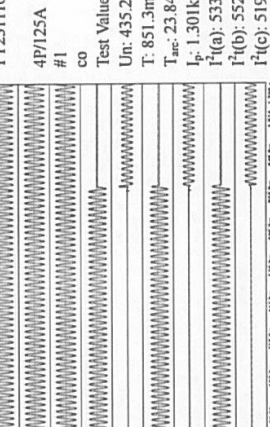
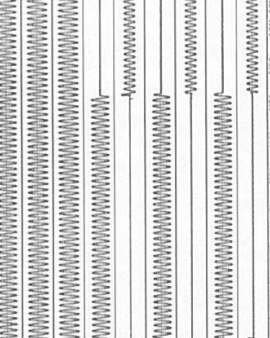


I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)

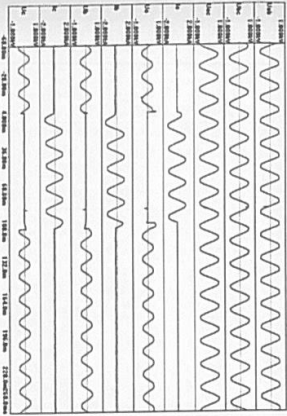
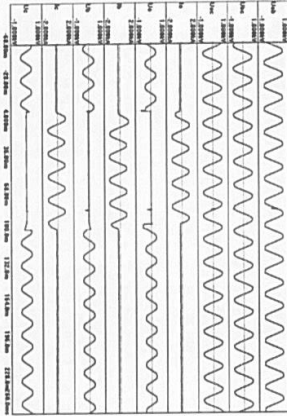
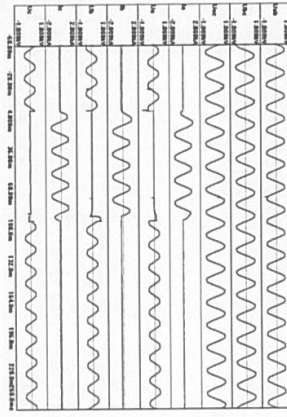
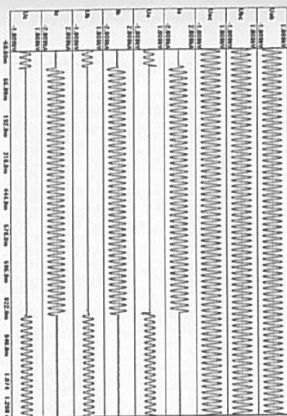
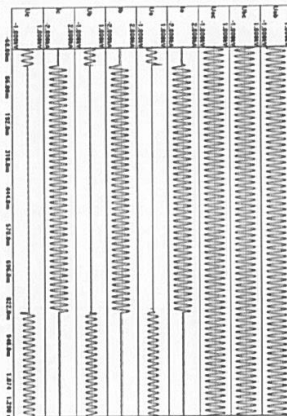
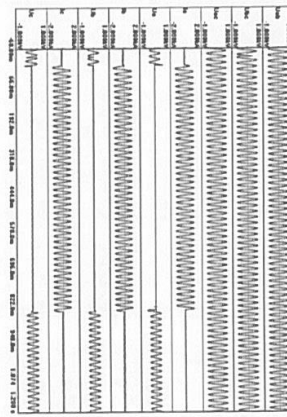




I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)

过载性能			Prospective current: U: 435V I: 786A cosφ: 0.48		
<p>TY231116-#1-1</p>  <p>4P/125A #1 MB1 Test Value: Un: 435.9 V T: 98.28ms T_{arc}: 12.28ms I_p: 1.308kA I²t(a): 59.14kAAs I²t(b): 59.05kAAs I²t(c): 58.88kAAs</p>	<p>TY231116-#1-2</p>  <p>4P/125A #1 MB5 Test Value: Un: 435.8 V T: 101.2ms T_{arc}: 15.01ms I_p: 1.335kA I²t(a): 60.95kAAs I²t(b): 66.10kAAs I²t(c): 60.35kAAs</p>	<p>TY231116-#1-3</p>  <p>4P/125A #1 MB9 Test Value: Un: 436.6 V T: 90.82ms T_{arc}: 16.45ms I_p: 1.321kA I²t(a): 53.64kAAs I²t(b): 57.48kAAs I²t(c): 52.54kAAs</p>			
<p>TY231116-#1-4</p>  <p>4P/125A #1 co Test Value: Un: 435.8 V T: 853.0ms T_{arc}: 25.51ms I_p: 1.273kA I²t(a): 535.5kAAs I²t(b): 549.4kAAs I²t(c): 522.6kAAs</p>	<p>TY231116-#1-5</p>  <p>4P/125A #1 co Test Value: Un: 435.2 V T: 851.3ms T_{arc}: 23.84ms I_p: 1.301kA I²t(a): 533.2kAAs I²t(b): 552.4kAAs I²t(c): 519.1kAAs</p>	<p>TY231116-#1-6</p>  <p>4P/125A #1 co Test Value: Un: 435.2 V T: 843.6ms T_{arc}: 16.42ms I_p: 1.344kA I²t(a): 528.7kAAs I²t(b): 549.0kAAs I²t(c): 513.6kAAs</p>			
<p>Test Value: Un: V T: S T_{arc}: S I_p: A I²t(a): AAs I²t(b): AAs I²t(c): AAs</p>	<p>Test Value: Un: V T: S T_{arc}: S I_p: A I²t(a): AAs I²t(b): AAs I²t(c): AAs</p>	<p>Test Value: Un: V T: S T_{arc}: S I_p: A I²t(a): AAs I²t(b): AAs I²t(c): AAs</p>			

I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)

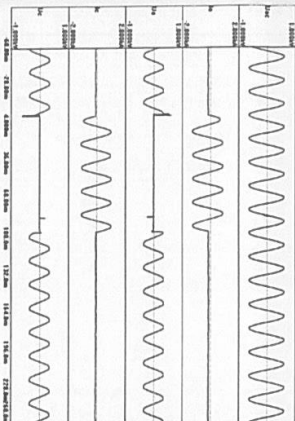
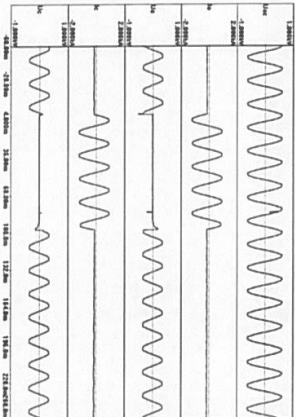
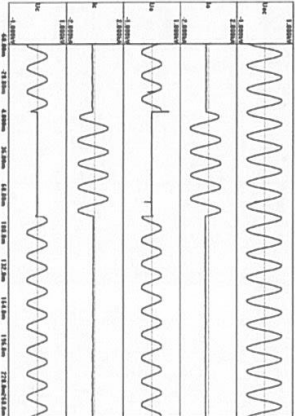
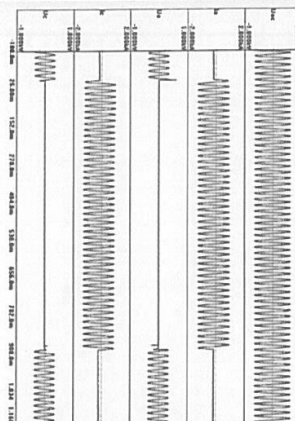
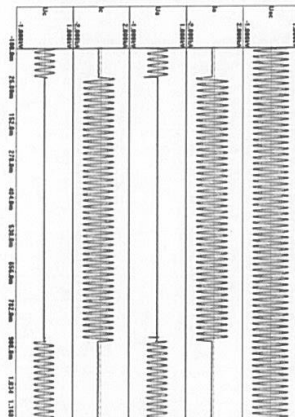
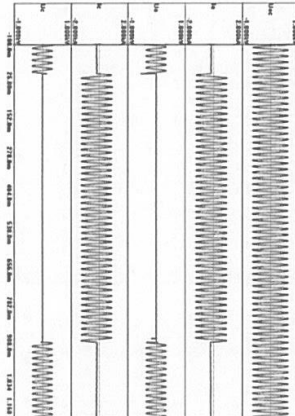
过载性能			Prospective current: U: 435V I: 786A cosφ: 0.48		
 <p>TY231116-#2-1 3P/125A #2 MB1 Test Value: Un: 435.0 V T: 1.01.8ms T_{arc}: 9.223ms I_p: 1.307kA I²(a): 61.82kAAs I²(b): 65.83kAAs I²(c): 62.44kAAs</p>	 <p>TY231116-#2-2 3P/125A #2 MB5 Test Value: Un: 435.1 V T: 1.01.7ms T_{arc}: 9.266ms I_p: 1.319kA I²(a): 58.72kAAs I²(b): 64.37kAAs I²(c): 62.23kAAs</p>	 <p>TY231116-#2-2 3P/125A #2 MB9 Test Value: Un: 435.6 V T: 96.64ms T_{arc}: 8.764ms I_p: 1.344kA I²(a): 56.54kAAs I²(b): 59.11kAAs I²(c): 54.98kAAs</p>			
 <p>TY231116-#2-4 3P/125A #2 CO Test Value: Un: 435.2 V T: 853.1ms T_{arc}: 25.04ms I_p: 1.289kA I²(a): 532.6kAAs I²(b): 551.8kAAs I²(c): 525.9kAAs</p>	 <p>TY231116-#2-5 3P/125A #2 CO Test Value: Un: 435.7 V T: 845.3ms T_{arc}: 17.96ms I_p: 1.355kA I²(a): 528.8kAAs I²(b): 551.0kAAs I²(c): 517.0kAAs</p>	 <p>TY231116-#2-6 3P/125A #2 CO Test Value: Un: 435.7 V T: 853.0ms T_{arc}: 24.86ms I_p: 1.293kA I²(a): 534.3kAAs I²(b): 554.1kAAs I²(c): 524.8kAAs</p>			

I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)

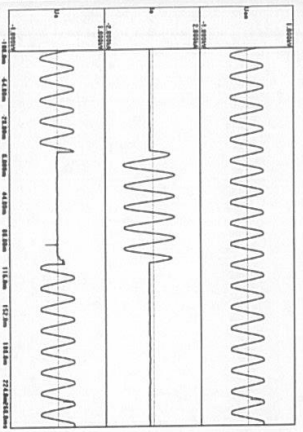
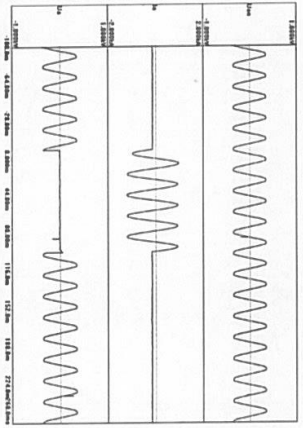
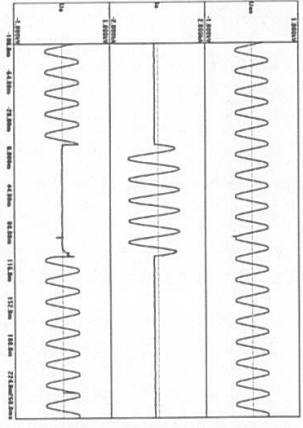
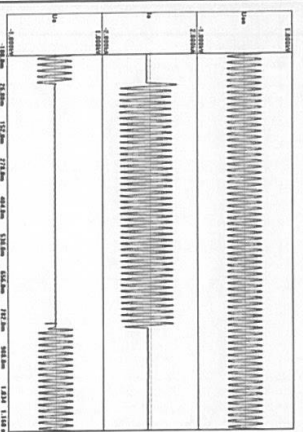
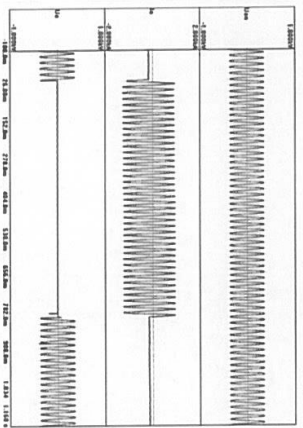
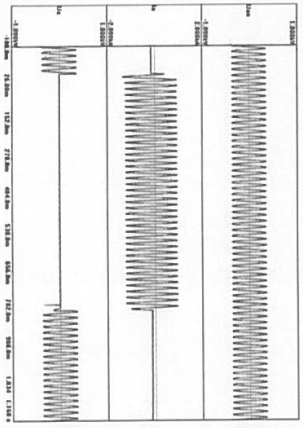
Test Value:
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T: s
T_{arc}: s
I_p: A
I²(a): AAs
I²(b): AAs
I²(c): AAs

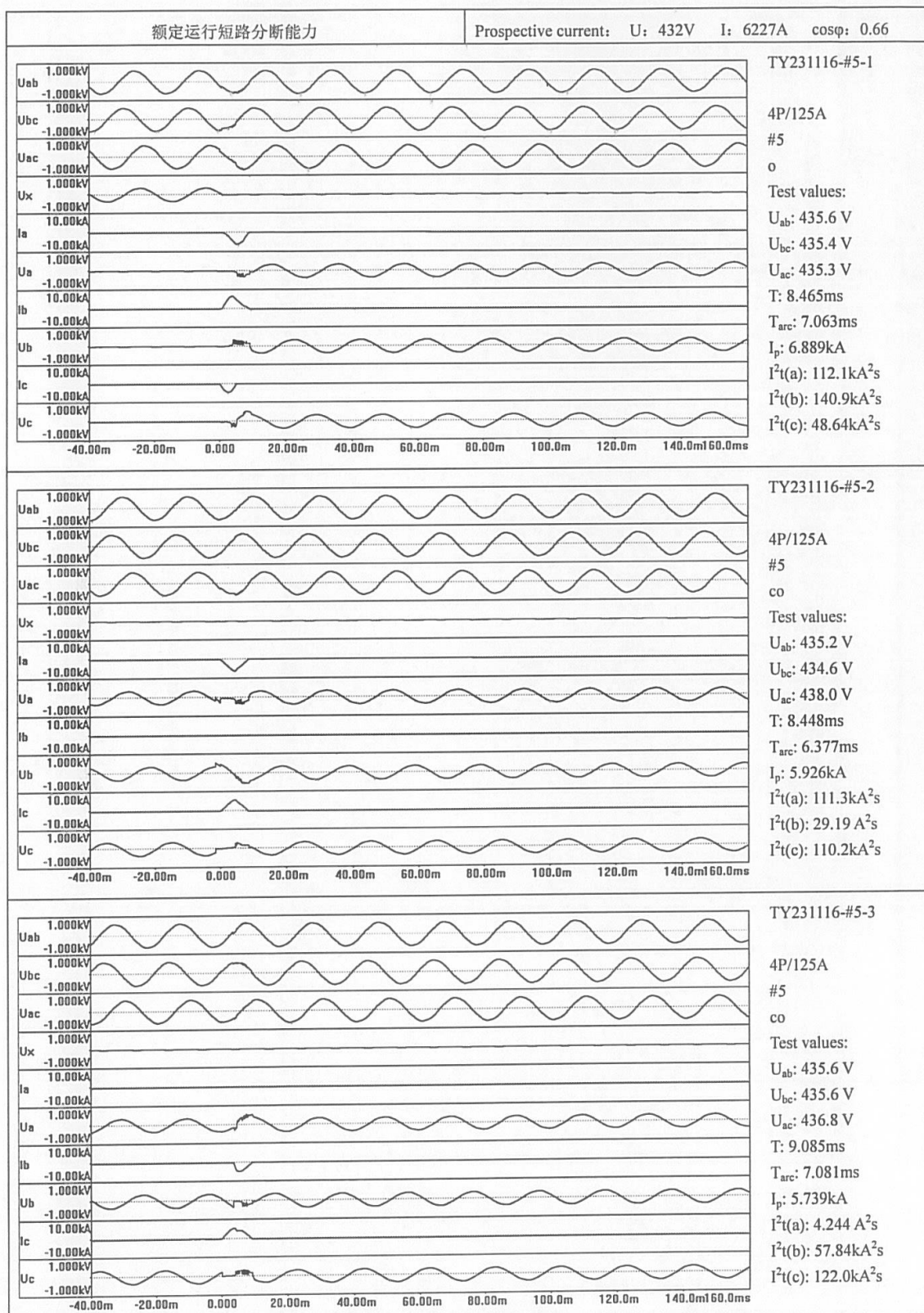
Test Value:
Un: V
T: s
T_{arc}: s
I_p: A
I²(a): AAs
I²(b): AAs
I²(c): AAs

Test Value:
Un: V
T: s
T_{arc}: s
I_p: A
I²(a): AAs
I²(b): AAs
I²(c): AAs

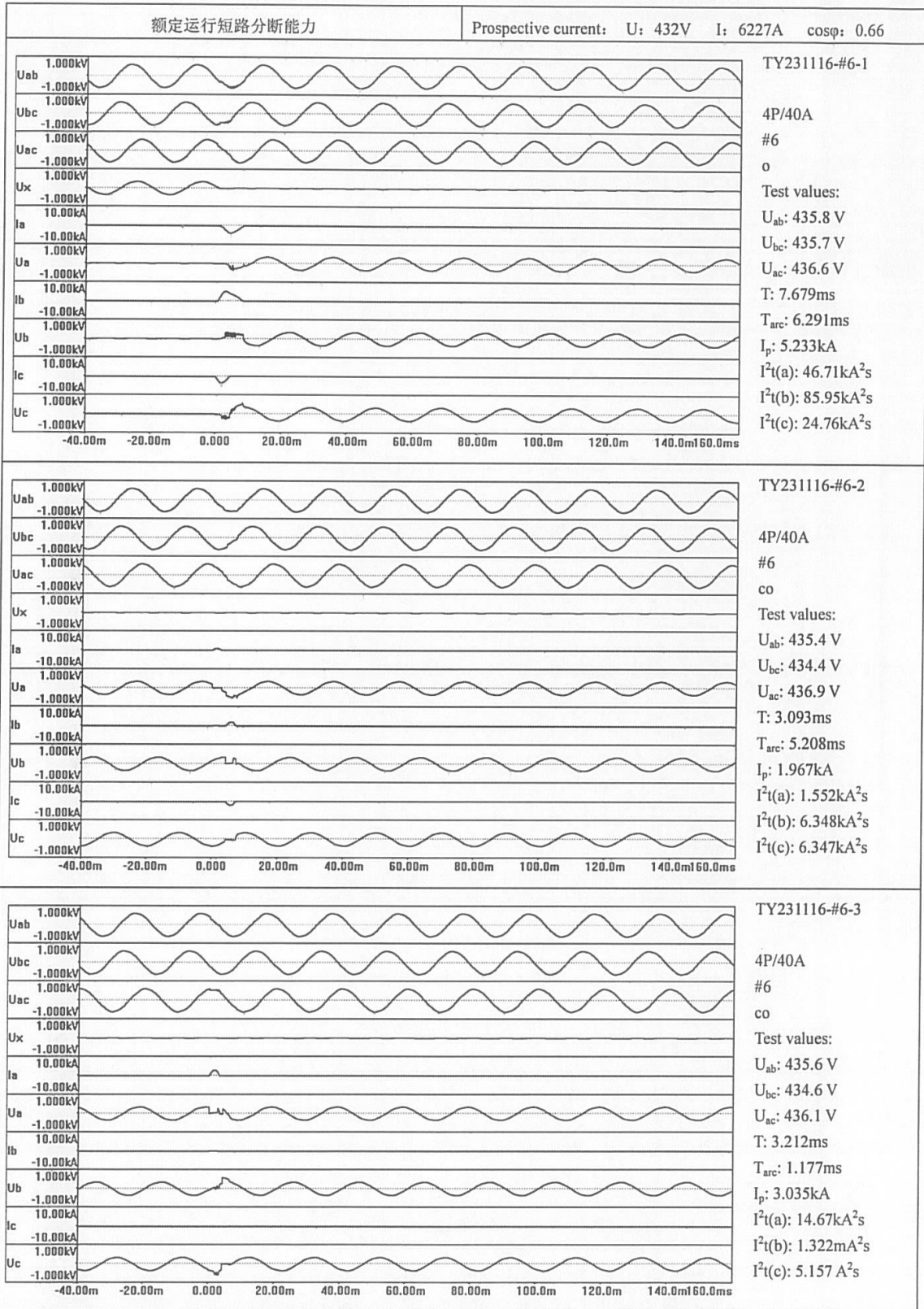
过载性能		Prospective current: U: 435V I: 780A cosφ: 0.45			
 <p>TY231116-#3-1 2P/125A #3 MB1 Test Value: Un: 434.3 V T: 95.18ms T_{arc}: 15.75ms I²(a): 58.32kAAs I²(c): 57.35kAAs I_p: 1.108kA</p>	 <p>TY231116-#3-2 2P/125A #3 MB4 Test Value: Un: 434.5 V T: 98.96ms T_{arc}: 16.33ms I²(a): 58.07kAAs I²(c): 56.45kAAs I_p: 1.102kA</p>	 <p>TY231116-#3-3 2P/125A #3 MB9 Test Value: Un: 434.7 V T: 88.91ms T_{arc}: 6.256ms I²(a): 50.54kAAs I²(c): 50.49kAAs I_p: 1.148kA</p>	 <p>TY231116-#3-4 2P/125A #3 CO Test Value: Un: 435.1 V T: 892.2ms T_{arc}: 25.27ms I²(a): 536.4kAAs I²(c): 527.5kAAs I_p: 1.149kA</p>	 <p>TY231116-#3-5 2P/125A #3 CO Test Value: Un: 435.1 V T: 890.7ms T_{arc}: 51.07ms I²(a): 533.0kAAs I²(c): 515.1kAAs I_p: 1.116kA</p>	 <p>TY231116-#3-6 2P/125A #3 CO Test Value: Un: 435.2 V T: 901.5ms T_{arc}: 60.86ms I²(a): 537.7kAAs I²(c): 521.8kAAs I_p: 1.111kA</p>
<p>Test Value: Un: V T: s T_{arc}: s I²(a): AAs I²(c): AAs I_p: A</p>		<p>Test Value: Un: V T: s T_{arc}: s I²(a): AAs I²(c): AAs I_p: A</p>		<p>Test Value: Un: V T: s T_{arc}: s I²(a): AAs I²(c): AAs I_p: A</p>	

I_p: 电流峰值 (Peak current) I²: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arching time)

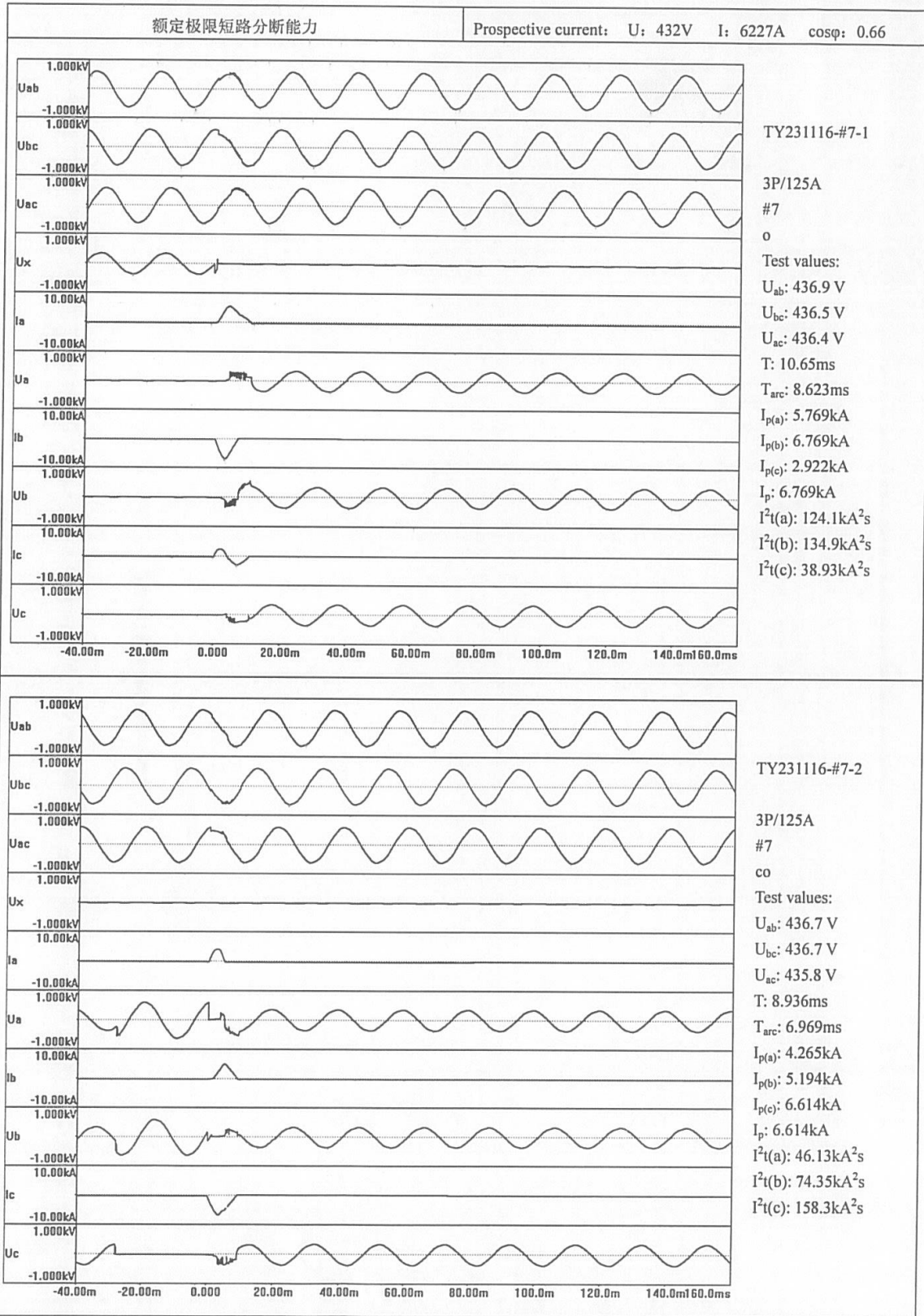
过载性能		
Prospective current: U: 254V I: 763A cosφ:0.47		
 <p>TY231116-#4-1 IP/125A #4 MB1 Test Value: Un: 254.3 V T: 107.5ms T_{arc}: 13.60ms I_t: 59.69kAAs I_p: 1.117kA</p>	 <p>TY231116-#4-2 IP/125A #4 MB5 Test Value: Un: 254.4 V T: 98.51ms T_{arc}: 13.45ms I_t: 55.30kAAs I_p: 1.112kA</p>	 <p>TY231116-#4-3 IP/125A #4 MB9 Test Value: Un: 254.4 V T: 107.4ms T_{arc}: 21.15ms I_t: 59.96kAAs I_p: 1.111kA</p>
 <p>TY231116-#4-4 IP/125A #4 CO Test Value: Un: 255.1 V T: 820.8ms T_{arc}: 36.66ms I_t: 490.7kAAs I_p: 1.286kA</p>	 <p>TY231116-#4-5 IP/125A #4 CO Test Value: Un: 254.8 V T: 798.1ms T_{arc}: 30.96ms I_t: 473.4kAAs I_p: 1.128kA</p>	 <p>TY231116-#4-6 IP/125A #4 CO Test Value: Un: 255.0 V T: 795.5ms T_{arc}: 41.50ms I_t: 470.6kAAs I_p: 1.181kA</p>
<p>Test Value: Un: V T: s T_{arc}: s I_t: AAs I_p: A</p>		
<p>I_p: 电流峰值 (Peak current) I_t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arching time)</p>		



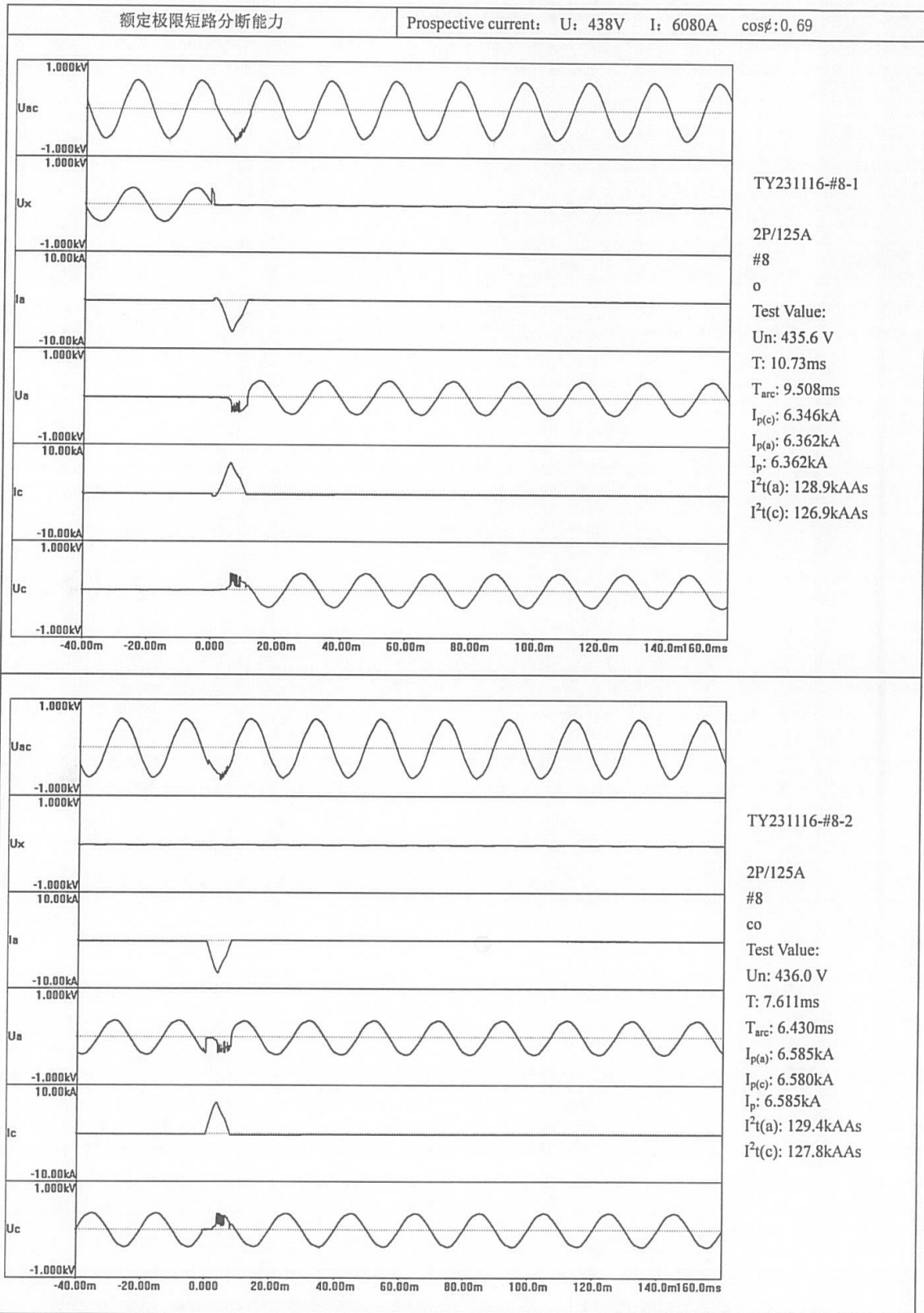
I_p : 电流峰值 (Peak current) I^2t : 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_a : 燃弧时间 (Arcing time)



I_p : 电流峰值 (Peak current) I^2t : 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_a : 燃弧时间 (Arcing time)



I_p : 电流峰值 (Peak current) I^2t : 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_a : 燃弧时间 (Arcing time)



I_p: 电流峰值 (Peak current) I²t: 焦耳积分 (Joule integral) T: 通断时间 (Make-break time) T_{arc}: 燃弧时间 (Arcing time)

