



Test Report issued under the responsibility of:



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

**Report Reference No.**.....: 3303091.50  
**Date of issue** .....: 2012-07-10  
**Total number of pages** ..... 130

**CB Testing Laboratory**.....: DEKRA Testing Services (Zhejiang) Co., Ltd.  
**Address** .....: No. 5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, 325603 Wenzhou, Zhejiang, CHINA

**Applicant's name**.....: HYUNDAI HEAVY INDUSTRIES CO., LTD  
**Address** .....: 1000, Bangeojinsunhwan-doro, DONG-gu, ULSAN  
KOREA

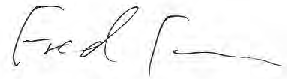

**Test specification:**  
**Standard** .....: IEC 60947-2:2006 (4<sup>th</sup> Edition) + amendment 1: 2009  
**Test procedure** .....: CB  
**Non-standard test method**.....: N/A

**Test Report Form No.**.....: IEC60947\_2F  
**Test Report Form(s) Originator** .....: KEMA Quality BV  
**Master TRF** .....: Dated 2010-01

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**Test item description** .....: Air Circuit Breaker  
**Trade Mark** .....: HYUNDAI  
**Manufacturer** .....: HYUNDAI HEAVY INDUSTRIES CO., LTD  
1000, Bangeojinsunhwan-doro, DONG-gu, ULSAN  
KOREA  
**Model/Type reference** .....: UANxx series, UASxx series, HGNxx Series and HGSxx Series  
**Ratings** .....: Ue: 500 Vac, 690 Vac  
In: 630 A, 800 A, 1000 A, 1250 A, 1600 A, 2000 A  
Icu: 42 kA, 50 kA, 65 kA, 70 kA, 85 kA at 500 V, 65 kA at 690 V  
Ics: 100% Icu  
Icw: 65 kA / 1 s at both 500 V and 690 V  
Ui: 1000 V, Uimp: 12 kV  
Refer to page 5 to 8 for more technical data

Testing procedure and testing location:	
<input checked="" type="checkbox"/> <b>CB Testing Laboratory:</b>	DEKRA Testing Services (Zhejiang) Co., Ltd.
Testing location/ address .....	No. 5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, 325603 Wenzhou, Zhejiang, CHINA
<input type="checkbox"/> <b>Associated CB Laboratory:</b>	N/A
Testing location/ address .....	N/A
Tested by (name + signature).....	Fred Fu 
Approved by (+ signature) .....	Eric Wang 
<input type="checkbox"/> Testing procedure: TMP:	N/A
Tested by (name + signature).....	N/A
Approved by (+ signature) .....	N/A
Testing location/ address .....	N/A
<input type="checkbox"/> Testing procedure: WMT:	
Tested by (name + signature).....	N/A
Witnessed by (+ signature) .....	N/A
Approved by (+ signature) .....	N/A
Testing location/ address .....	N/A
<input type="checkbox"/> Testing procedure: SMT:	N/A
Tested by (name + signature).....	N/A
Approved by (+ signature) .....	N/A
Supervised by (+ signature).....	N/A
Testing location/ address .....	N/A
<input type="checkbox"/> Testing procedure: RMT:	N/A
Tested by (name + signature).....	N/A
Approved by (+ signature) .....	N/A
Supervised by (+ signature).....	N/A
Testing location/ address .....	N/A

Summary of testing:														
Tests performed (name of test and test clause):												Testing location:		
Object	Rating		Seq I	Seq II+III (3P test)	Seq III (3P test)	Seq III (1P+N test)	Seq IV (1P+N test)	Seq VI (3P test)	EMC (annex F)	Annex F7/8/9	Annex B.2.4	Annex N	The seq I and annex B.2.4 and annex F7/8/9 were conducted in: DEKRA Testing Services (Zhejiang) Co., Ltd. No. 5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, 325603 Wenzhou, Zhejiang, CHINA  The seq II, seq III, seq IV, annex N and EMC were conducted in: Zhejiang Fangyuan Test Group – Zhejiang Fangyuan Electrical Equipment Testing Co., Ltd. West Zhonghuan Road, Jiaxing City, Zhejiang Province, P. R. China	
	Number of poles	Rated current												
ACB	4 poles	2000 A	X	X		X				X	X			
		*2000 A					X	X						
		630 A		X		X			X					
	3 poles	2000 A	X		X									
		*2000 A			X									
		630 A			X									
Shunt release	220 Vac		X									X		
Closing coil**	220 Vac		X											
Energy store motor	220 Vac		X									X		

## Note:

X means the test is applicable.

\* means the test was conducted at 690 V

\*\*Due to the construction of the closing coil is fully identical to the construction of shunt release, the tests of annex N on closing coils are not necessary.

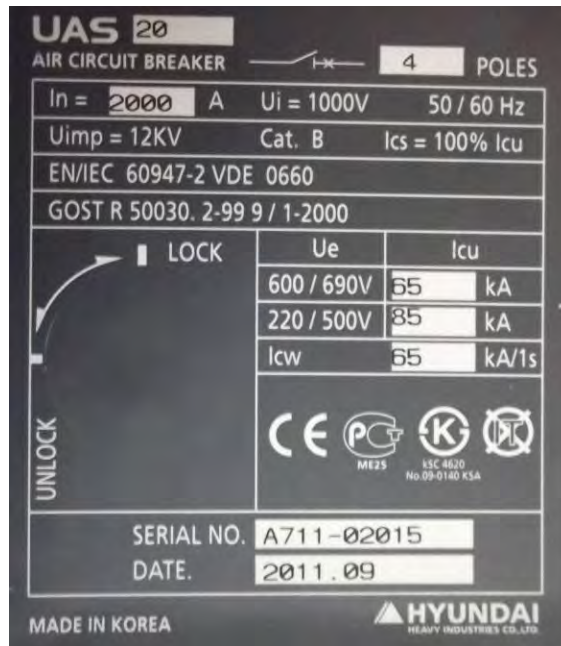
UAN(S)xx series and HGN(S)xx Series ACBs are in same frame size without construction break.

**Summary of compliance with National Differences:**

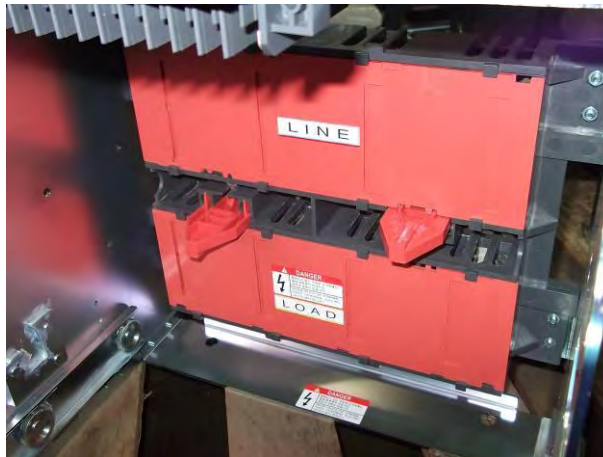
The ACBs and their accessories comply with EN 60947-2:2006 +A1:2009.

**Copy of marking plate**

example of marking:



Label



LINE and LOAD mark

<b>Test item particulars: test item vs. test requirements</b>	
<b>3. Classification</b>	
3.1. Utilization category: (A or B).....	B
3.2. Interruption medium: (air, vacuum, gas Break) .....	Air
3.3. Design: (open construction, moulded case) .....	Enclosed pole construction
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power ) .....	Independent manual and independent power
3.5. Suitability for isolation: (suitable, not -suitable).....	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable).....	Non maintainable
3.7. Method of installation: (fixed, plug in, withdrawable .....	Withdrawable
3.8. Degree of protection: (IP code) .....	IP20 (from front)
4.7. Type of release (thermo-magnetic / electronic).....	Electronic
4.8. Integral fuses (integrally fused circuit-breakers) Type and characteristics of SCPD .....	N/A
7.3 Electromagnetic compatibility (EMC)	
Environment A or B.....	A
Circuit-breaker for use on phase-earthed systems.....	N/A
Circuit-breaker for use in IT systems .....	N/A
Rated and limiting values, main circuit:	
- rated operational voltage: $U_e$ (V) .....	500 V~, 690 V~
- rated insulation voltage: $U_i$ (V) .....	1000 V
- rated impulse withstand voltage: $U_{imp}$ (kV) .....	12 kV
- rated operational current: $I_e$ (A) .....	0,8, 0,83, 0,85, 0,88, 0,9, 0,93, 0,95, 0,98, 1,0 $I_n$ $I_n = 0,5, 0,63, 0,7, 0,8, 0,9, 1$ $I_{ct}$ See page 9 for the $I_{ct}$ value See page 8 for the value of $I_n$
- kind of current .....	AC
- conventional free air thermal current: $I_{th}$ (A) .....	Equal to $I_n$
- conventional enclosed thermal current: $I_{the}$ (A).....	N/A
- current rating for four-pole circuit-breakers: (A).....	100% $I_n$
- number of poles .....	3 poles and 4 poles (3P+ N, N does not have protection)
- rated frequency: (Hz).....	50 / 60 Hz
- integral fuses (rated values).....	N/A

<b>Rated duty :</b>	
- eight-hour duty .....	N/A
- uninterrupted duty: I <sub>u</sub> (A).....	Equal to I <sub>n</sub>
<b>Short-circuit characteristic :</b>	
rated short-time making capacity: I <sub>cm</sub> (kA).....	Max 187 kA at 500 V Max 143 kA at 690 V
rated ultimate short-circuit breaking capacity: I <sub>cu</sub> (kA) .....	42 kA, 50 kA, 65 kA, 70 kA, 85 kA at 500 V 65 kA at 690 V
rated service short-circuit breaking capacity: I <sub>cs</sub> (kA) .....	100% I <sub>cu</sub>
rated short-time withstand current: I <sub>cw</sub> (kA/s) .....	65 kA / 1 s
<b>Control circuits :</b>	
Electrical control circuits : energy store motor and closing coil	
- kind of current: (AC, DC) .....	AC
- rated frequency: (Hz).....	50 / 60 Hz
- rated control circuit voltage: U <sub>c</sub> ( nature, frequency, V) ....	220 V
- rated control supply voltage: U <sub>s</sub> (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
<b>Auxiliary circuits :</b>	
Rated and limiting values, auxiliary circuits:	
- rated operational voltage U <sub>e</sub> (V) .....	N/A
- rated insulation voltage: U <sub>i</sub> (V) .....	N/A
- rated operational current: I <sub>e</sub> (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 <sub>u</sub> (A).....	N/A
- utilization category: (AC, DC, current and voltage) .....	N/A
Short-circuit characteristic:	
- Rated conditional short-circuit current (kA).....	N/A
- kind of protective device .....	N/A

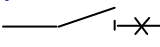


Releases :	
1) shunt release.....	: Yes
2) Over-current release .....	: Yes
a) instantaneous .....	: Yes
b) definite time delay .....	: Yes
c) inverse time delay .....	: Yes
- independent of previous load .....	: Yes (electronic type)
- dependent on previous load; (for example thermal type release).....	: N/A
3) Undervoltage release (for opening).....	: N/A
4) Other releases.....	: Ig (Ground fault release)
	Current setting Ig: 0,1, 0,2, 0,3, 0,4, 0,5, 0,6, 0,7, 0,8, 1,0 Ict, NON
	Time setting Tg: 50 ms, with tolerance of -10 ms / +40 ms 100, 200, 300, 400 ms, with tolerance of ± 20%
Characteristics:	
1) Shunt release and undervoltage release (for opening):	Shunt release
- rated control circuit voltage: Uc (nature, frequency, V) ...	: 220 V
- kind of current.....	: AC
- rated frequency: (if AC).....	: 50 / 60 Hz

2) Over-current release:


- rated current (In) ..... : 630 A, 800 A, 1000 A, 1250 A, 1600 A, 2000 A
- kind of current..... : AC
- rated frequency: (if AC)..... : 50 / 60 Hz
- current setting (or range of settings) ..... : Ir (inverse time delay tripping setting)  
 0,8, 0,83, 0,85, 0,88, 0,9, 0,93, 0,95, 0,98, 1,0 In,  
 NON  
 In = 0,5, 0,63, 0,7, 0,8, 0,9, 1 lct  
 lsd (short time delay tripping setting)  
 1, 1,5, 2, 2,5, 3, 4, 6, 8, 10 In, NON  
 li (instantaneous tripping setting)  
 2, 3, 4, 6, 8, 10, 12, 15 In, NON  
 Making Current Release (MCR):  
 equal to lsd setting  
 equal to 10 In when lsd = NON
- time settings (or range of settings) ..... : Tr (inverse time delay tripping setting)  
 0,5, 1,25, 2, 2,5, 5, 10, 15, 20, 25, 30 s  
 (respectively tripping time @ 6 Ir), with tolerance  
 of ± 15%, OFF  
 Tsd (short time delay tripping setting)  
 50 ms, with tolerance of -10 ms / +40 ms  
 100, 200, 300, 400 ms, with tolerance of ± 20%  
 Ti (instantaneous tripping setting)  
 Instantaneous  
 MCR  
 Instantaneous



Classification of installation and use.....	: Withdrawable
Supply Connection .....	: 3 phase or 3 phase with Neutral
<b>Possible test case verdicts:</b>	
- 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)
<b>Testing</b> .....	
Date of receipt of test item .....	: 2012 - 01
Date (s) of performance of tests .....	: 2012 - 01 ~ 2012 - 03
<b>General remarks:</b>	
<p>The test results presented in this report relate only to the object tested.          This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.          "(See Enclosure #)" refers to additional information appended to the report.          "(See appended table)" refers to a table appended to the report.          Throughout this report a comma is used as the decimal separator.</p>	
<b>General product information:</b>	
<p>Air circuit breaker          For technical data, please refer to page 5 to 8 of this report.</p> <p>Explanation of type reference:          UANxx, UASxx, HGNxx or HGSxx          code xx can be 06, 08, 10, 12, 16 or 20, which means the lct current 630 A, 800 A, 1000 A, 1250 A, 1600 A or 2000 A respectively.</p> <p>UANxx ACBs, UASxx ACBs, HGNxx ACBs and HGSxx ACBs are fully identical.</p>	
<b>Factory location:</b>	
<p>HYUNDAI HEAVY INDUSTRIES CO., LTD          1000, Bangeojinsunhwan-doro, DONG-gu, ULSAN          KOREA</p> <p>HYUNDAI HEAVY INDUSTRIES (CHINA) ELECTRICS CO., LTD          No 9, Hyundai Road, Xinba Scientific and Technologic Zone, Yangzhong, Jiangsu          P. R. China</p>	

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING		
a)	The following data shall be marked on the circuit-breaker itself or on a name plate or nameplates attached to the circuit-breaker, and located in a place such that they are visible and legible when the circuit-breaker is installed.		
	- rated current:	2000 A	P
	- suitability for isolation, if applicable, with the symbol 		P
	- indication of the open and closed position: with $\bigcirc$ and $\text{I}$ respectively, if symbols are used		P
b)	Marking on equipment not needed to be visible after mounting:		
	- manufacturer's name or trademark	HYUNDAI	P
	- type designation or serial number	UAS20	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	IEC 60947-2	P
	- utilization category	B	P
	- rated operational voltage(s) $U_e$	500 V~, 690 V~	P
	- Circuit-breaker for use in IT systems: Circuit-breaker for which all values of rated voltage have not been tested according to annex H or are not covered by such testing, shall be identified by the symbol  which shall be marked on the circuit-breaker immediately following these values of rated voltage	 marked	P
	- value (or range) of the rated frequency and/or the indication DC (or symbol)		P
	- rated service short-circuit breaking capacity. $I_{cs}$	100% $I_{cu}$	P
	- rated ultimate short-circuit breaking capacity. $I_{cu}$	42 kA, 50 kA, 65 kA, 70 kA, 85 kA at 500 V 65 kA at 690 V	P
	- rated short-time withstand current, ( $I_{cw}$ ) and associated short-time delay, for utilization category B	65 kA / 1 s	P
	- line and load terminals, unless their connection is immaterial		P
	- neutral pole terminals, if applicable, by the letter N		P
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1		P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- ref. temperature for non-compensated thermal releases, if different from 30°C		N/A
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 <sub>cm</sub> ) (if higher than specified in 4.3.5.1)		N/A
	- rated insulation voltage. (U <sub>i</sub> ) if higher than the maximum rated operational voltage)	1000 V	P
	- rated impulse withstand voltage (U <sub>imp</sub> ), when declared.	12 kV	P
	- pollution degree if other than 3		N/A
	- conventional enclosed thermal current (I <sub>the</sub> ) if different from the rated current:		N/A
	- IP Code, where applicable:		N/A
	- 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:	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	- r.m.s sensing if applicable, according to F.4.1.1		P
	- suitability for environment A or B	A	P
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:	220 V, 50 / 60 Hz	P
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:	Shunt release 220 V, 50 / 60 Hz	P
	- 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

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- neutral pole terminal "N"		P
	- protective earth terminal 		P
	- terminal of coils (A/B)		P
	- terminal of shunt release ( B )		P
	- 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

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker		P
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:		P
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.		P
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open		P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.		P
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.		P
	The isolating distances between the isolating contacts cannot be inadvertently reduced.		P
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. (U <sub>imp</sub> .)		
	Clearances distances:		
	- U <sub>imp</sub> is given as:	12 kV for main circuit 4 kV for control circuit	
	- max. value of rated operational voltage to earth	1000 V	
	- nominal voltage of supply system:	Max 690 V~	
	- overvoltage category:	IV	
	- pollution degree:	3	
	- field-in or homogeneous:	Case A, Inhomogeneous field condition	
	- minimum clearances (mm):	14 mm for main circuit 3 mm for control circuit	

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- measured clearances (mm):	Min 17,7 mm for main circuit Min 13,6 mm for control circuit See table 13	P
	Creepage distances:		
	- rated insulation voltage $U_i$ (V)	1000 V for main circuit 300 V for control circuit	
	- pollution degree	3	
	- comparative tracking index (V)	175 V	
	- material group	IIIa	
	- minimum creepage distances (mm)	16 mm for main circuit 5 mm for control circuit	
	- measured creepage distances (mm)	Min 17,7 mm for main circuit Min 13,6 mm for control circuit See table 13	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		P
7.1.5.2	Direction of movement		
	The direction of operation for actuators of devices shall normally conform to IEC 60447.		N/A
	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


IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
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
	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 <b>I</b> On (power)		P
	- 60417-2-IEC-5007 <b>O</b> 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"		P
	Red colour shall not be used for any other push-button		P
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073		P
7.1.6.2 part 1	Indication by the actuator		
	When the actuator is used to indicate the position of the contacts, it shall automatically take up or stay, when released, in the position corresponding to that of the moving contacts; in this case, the actuator shall have two distinct rest positions corresponding to those of the moving contacts, but for automatic opening a third distinct position of the actuator may be provided		N/A
7.1.7	Additional safety requirements for equipment suitable for isolation		
7.1.7.1	Additional constructional requirements for equipment suitable for isolation (U <sub>e</sub> > 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		N/A
	- a separate mechanical indicator		P
	- visibility of the moving contacts		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position		P
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking		N/A
	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) :	14 mm	
	- measured clearances (mm) :	34 mm	P
	- test Uimp across gap (kV) :	18,5 kV	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



IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	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 :	Prepared conductors (cable with lug) or copper bus bar	P
	minimum cross-sectional area of conductor (mm <sup>2</sup> ) :	Prepared conductors (cable with lug): 185 mm <sup>2</sup> x 2	P
	maximum cross-sectional area of conductor (mm <sup>2</sup> ) :	Copper bus bar: 100 x 5 mm <sup>2</sup> x 3	P
	number of conductors simultaneously connectable to the terminal :	As above	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
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		P
	protective earth terminal		P
	other terminals		P
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.).		P
	A switched neutral pole shall break not before and shall make not after the other poles		P
	For equipment having a value of conventional thermal current (free air or enclosed, see 4.3.2.1 and 4.3.2.2) not exceeding 63 A, this value shall be identical for all poles		N/A
	For higher conventional thermal current values, the neutral pole may have a value of conventional thermal current different from that of the other poles, but not less than half that value or 63 A, whichever is the higher	100% In	P
	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.		P
7.1.10	Provisions for protective earthing		
7.1.10.1	The exposed conductive parts (e.g. chassis, framework and fixed parts of metal enclosures) other than those which cannot constitute a danger shall be electrically interconnected and connected to a protective earth terminal for connection to an earth electrode or to an external protective conductor		P
part 1	This requirement can be met by the normal structural parts providing adequate electrical continuity and applies whether the equipment is used on its own or incorporated in an assembly		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
7.1.10.2 part 1	Protective earth terminal		
	The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed		P
	The protective earth terminal shall be suitably protected against corrosion		P
	In the case of equipment with conductive structures, enclosures, etc., means shall be provided, if necessary, to ensure electrical continuity between the exposed conductive parts the equipment and the metal sheathing of connecting conductors		P
	The protective earth terminal shall have no other function, except when it is intended to be connected to a PEN conductor (see 2.1.1.5 – Note). In this case, it shall also have the function of a neutral terminal in addition to meeting the requirements applicable to the protective earth terminal		P
7.1.10.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking		P
	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		P
	Graphical symbol to be used: 60417-2-IEC-5019  Protective earth (ground) in accordance with IEC 60417-2		P
7.1.11	Enclosure for equipment		
7.1.11.1	Design		
	The enclosure, when it is opened: all parts requiring access for installation and maintenance are readily accessible		N/A
	Sufficient space shall be provided inside the enclosure		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The fixed parts of a metal enclosure shall be electrically connected to the other exposed conductive parts of the equipment and connected to a terminal which enables them to be earthed or connected to a protective conductor		N/A
	Under no circumstances shall a removable metal part of the enclosure be insulated from the part carrying the earth terminal when the removable part is in place		N/A
	The removable parts of the enclosure shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment or vibrations		N/A
	When an enclosure is so designed as to allow the covers to be opened without the use of tools, means shall be provided to prevent loss of the fastening devices		N/A
	If the enclosure is used for mounting push-buttons, it shall not be possible to remove the buttons from the outside of the enclosure		N/A
7.1.11.2	Insulation		
	If, in order to prevent accidental contact between a metallic enclosure and live parts, the enclosure is partly or completely lined with insulating material, then this lining shall be securely fixed to the enclosure		N/A
7.1.12	Degree of protection of enclosed equipment		
	Degree of protection.	IP20 for front side	
	Test for first characteristic.	IP2X	
	Test for first numeral ..... :	2	P
	Test for second characteristic	IPX0	
	Test for second numeral ..... :	0	P
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

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Clause	Requirement + Test	Result - Remark	Verdict
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
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.		P
	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.		P

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Clause	Requirement + Test	Result - Remark	Verdict
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		P
	- when the stored energy is retained within the circuit-breaker, a device is provided which indicates when the storing mechanism is fully charged.		P
	- means for charging the operating mechanism and closing control components operates when auxiliary supply voltage is between 85% and 110% of the rated control supply voltage.		P
	- not possible for the moving contacts to move from the open position, unless the charge is sufficient for satisfactory completion of the closing operation.		P
	- by manually operated circuit-breaker is the direction of operation indicated. (not for circuit-breaker with an independent manual closing operation.)	Independent manual closing	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.		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
7.2.1.4 part 1	Limits of operation of shunt releases		
	A shunt release for opening shall cause tripping under all operating conditions of an equipment when the supply voltage of the shunt release measured during the tripping operation remains between 70% and 110% of the rated control supply voltage and, if a.c., at the rated frequency		P
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard		P
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

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Clause	Requirement + Test	Result - Remark	Verdict
	- $\hat{I}_t$ 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
	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



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Clause	Requirement + Test	Result - Remark	Verdict
8	TESTS		
8.2.4	Mechanical properties of terminals		
	Mechanical strength of terminals		
	maximum cross-sectional area of conductor (mm <sup>2</sup> ) :	100 x 5 mm <sup>2</sup> x 3	
	diameter of thread (mm) :	12 mm	
	torque (Nm) :	18,4 x 1,1 = 20,24 Nm	
	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 <sup>2</sup> ) :		
	number of conductors of the smallest cross section :		
	diameter of bushing hole (mm) :		
	height between the equipment and the platen :		
	mass at the conductor(s) (kg) :		
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	Pull-out test		
	force (N) :		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	conductor of the largest cross-sectional area (mm <sup>2</sup> ) :		
	number of conductors of the largest cross section :		
	diameter of bushing hole (mm) :		
	height between the equipment and the platen :		
	mass at the conductor(s) (kg) :		
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	Pull-out test		
	force (N) :		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	conductor of the largest and smallest cross-sectional area (mm <sup>2</sup> ) :		
	number of conductors of the smallest cross section, number of conductors of the largest cross section :		
	diameter of bushing hole (mm) :		
	height between the equipment and the platen :		
	mass at the conductor(s) (kg) :		
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	Pull-out test		
	force (N) :		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS UAS20, 2000 A, 4 poles, sample no #01		
8.3.3.1	Tripping limits and characteristic		
8.3.3.1.2	Opening under short-circuit conditions		
	Manufacturer's name or trademark	HYUNDAI	
	Type designation or serial number	UAS20	
	Sample no:	#01	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated current: In (A)	2000 A	
	Ambient temperature 10-40 °C :	19 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	Isd (short time delay tripping setting) 1, 1,5, 2, 2,5, 3, 4, 6, 8, 10 In, NON Ii (instantaneous tripping setting) 2, 3, 4, 6, 8, 10, 12, 15 In, NON In = 0,5, 0,63, 0,7, 0,8, 0,9, 1 Ict	P
	Range of adjustable setting current. (A)	Isd (short time delay tripping setting) 1, 1,5, 2, 2,5, 3, 4, 6, 8, 10 In, NON Ii (instantaneous tripping setting) 2, 3, 4, 6, 8, 10, 12, 15 In, NON In = 0,5, 0,63, 0,7, 0,8, 0,9, 1 Ict	P
	Time delay stated by the manufacturer, in the case of definite time delay releases.	Tsd (short time delay tripping setting) 50 ms, with tolerance of -10 ms / +40 ms 100, 200, 300, 400 ms, with tolerance of ± 20%	P
	<b>Electromagnetic overcurrent releases</b>		
	Test current: 80% of the rated, or <b>minimum</b> 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: 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 rated, or <b>minimum</b> 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: 80% of the <b>maximum</b> 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 <b>maximum</b> 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

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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: tripping current declared for single pole operation (A)		N/A
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: N:		N/A
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases: L1: L2: L3: N:		N/A
	<b>Electronic overcurrent releases</b>		
	For circuit-breakers with an electronic overcurrent release, the operation of the short-circuit releases shall be verified by one test only on each pole individually.		P
	Test current: 80% of the rated, or <b>minimum</b> adjustable setting current: (A)	li: 0,8 x 2 x 0,5 x 2000 A L1: 1650 A L2: 1655 A L3: 1620 A  Isd: 0,8 x 1 x 0,5 x 2000 A tsd: 50 ms L1: 848 A L2: 802 A L3: 886 A	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	0,2 s no trip 0,2 s no trip 0,2 s no trip	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	100 ms no trip 100 ms no trip 100 ms no trip	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 120% of the rated, or <b>minimum</b> adjustable setting current: (A)	li: 1,2 x 2 x 0,5 x 2000 A L1: 2270 A L2: 2240 A L3: 2190 A  Isd: 1,2 x 1 x 0,5 x 2000 A tsd: 50 ms L1: 1188 A L2: 1118 A L3: 1144 A	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	37 ms 45 ms 47 ms	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	76 ms 86 ms 84 ms	P
	Test current: 80% of the <b>maximum</b> adjustable setting current: (A)	li: 0,8 x 15 x 1 x 2000 A L1: 24211 A L2: 24211 A L3: 24211 A  Isd: 0,8 x 10 x 1 x 2000 A tsd: 400 ms L1: 16280 A L2: 16280 A L3: 16280 A	P
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:	0,2 s no trip 0,2 s no trip 0,2 s no trip	P
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	800 ms no trip 800 ms no trip 800 ms no trip	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 120% of the <b>maximum</b> adjustable setting current: (A)	li: 1,2 x 15 x 1 x 2000 A L1: 34927 A L2: 34927 A L3: 34927 A  Isd: 1,2 x 10 x 1 x 2000 A tsd: 400 ms L1: 23840 A L2: 23840 A L3: 23840 A	P
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:	40 ms 33 ms 41 ms	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:	422 ms 408 ms 418 ms	P
8.3.3.1.3	Opening under overload conditions		
a)	Instantaneous or definite time-delay releases		
	Manufacturer's name or trademark		
	Type designation or serial number		
	Sample no:		
	Rated operational voltage: Ue (V)		
	Rated current: In (A)		
	Ambient temperature 10-40 °C :		N/A
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.		N/A
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the rated, or minimum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 90% of the maximum adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the rated, or minimum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Test current: 110% of the maximum adjustable setting current: (A) circuit-breaker with neutral pole: 1,2x110% (A)		N/A
	Operating time: <0,2s in case of instantaneous releases		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
b)	Inverse time delay releases		
	Manufacturer's name or trademark	HYUNDAI	
	Type designation or serial number	UAS20	
	Sample no:	#01	
	Rated operational voltage: U <sub>e</sub> (V)	500 V~, 690 V~	
	Rated current: I <sub>n</sub> (A)	2000 A	
	For releases dependent of ambient air temperature: Reference temperature		N/A
	Test ambient temperature (°C )		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	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.		P
	Test ambient air temperature:	19 °C	P
	Range of adjustable setting current: (A)	I <sub>r</sub> (inverse time delay tripping setting) 0,8, 0,83, 0,85, 0,88, 0,9, 0,93, 0,95, 0,98, 1,0 I <sub>n</sub> , NON I <sub>n</sub> = 0,5, 0,63, 0,7, 0,8, 0,9, 1 I <sub>ct</sub>	P
	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 <b>minimum</b> adjustable setting current: (A)	852 A (1,05 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s	P
	Conventional non-tripping time: 1h when I <sub>n</sub> < 63A, 2h when I <sub>n</sub> > 63 A	2 h no trip	P
	Test current: 130% of the rated, or <b>minimum</b> adjustable setting current: (A)	1032 A (1,3 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s	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 I <sub>n</sub> < 63A, <2h when I <sub>n</sub> > 63 A	24 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 105% of the <b>maximum</b> adjustable setting current: (A)	2115 A (1,05 x 1 x 1 x 2000 A) Tr: 30 s	P
	Conventional non-tripping time: 1h when $I_n < 63A$ , 2h when $I_n > 63 A$	2 h no trip	P
	Test current: 130% of the <b>maximum</b> adjustable setting current: (A)	2565 A (1,3 x 1 x 1 x 2000 A) Tr: 30 s	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 $I_n < 63A$ , <2h when $I_n > 63 A$	20 min 38 s	P
	Thermal Magnetic releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or <b>minimum</b> 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 <b>minimum</b> 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 <b>maximum</b> 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 <b>maximum</b> 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

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Clause	Requirement + Test	Result - Remark	Verdict
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)		N/A
	Releases, independent of ambient air temperature: at 30°C	Requirement for thermal-magnetic release	N/A
	Test ambient air temperature:	19 °C	P
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)	1582 A (2 x 0,5 x 0,8 x 2000 A) Tr: 0,5 s, Tripping time declared by the manufacturer: 6,03 ±15%  3975 A (2 x 1 x 1 x 2000 A) Tr: 30 s Tripping time declared by the manufacturer: 361,5 ±15%	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	5,8 s (test current 1582 A)  339 s (test current 3975 A)	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:	Requirement for thermal-magnetic release	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)	Requirement for thermal-magnetic release	N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	Requirement for thermal-magnetic release	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting. If the test current overlaps with another tripping characteristic (e.g. an instantaneous tripping characteristic), the trip setting and the test current shall be reduced as necessary to prevent premature tripping.		
	<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>		P
	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.		P
	Test current: 1,5 times of the rated, or <b>minimum</b> adjustable setting current: (A)	Isd: 1508 A (1,5 x 1 x 0,5 x 2000 A) tsd: 50 ms	P
	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</u> (electromagnetic): (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</u> (electronic): (s)	72 ms	P
	Time-delay: between the limits stated by the manufacturer:	50 ms, with tolerance of -10 ms / +40 ms	P
	Test current: 1,5 times of the <b>maximum</b> adjustable setting current: (A)	Isd: 30200 A (1,5 x 10 x 1 x 2000 A) tsd: 400 ms	P
	Operating time, <u>overload releases</u> : (s)		N/A
	Time-delay: between the limits stated by the manufacturer:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Operating time, <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)	419 ms	P
	Time-delay: between the limits stated by the manufacturer:	400 ms $\pm$ 20%	P
b)	Non-tripping duration		
	Firstly, the test current equal to 1,5 times the current setting is maintained for a time interval equal to the non-tripping duration stated by the manufacturer.		
	Then, the current is reduced to the rated current and maintained at this value for twice the time-delay stated by the manufacturer. The circuit-breaker shall not trip.		
	<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>		P
	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.		P
	Test current: 1,5 times of the <b>minimum</b> adjustable setting current: (A)	Isd: 1508 A (1,5 x 1 x 0,5 x 2000 A) tsd: 50 ms	P
	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)	30 ms	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	100 ms Reduced to 1006 A	P
	Rated current	2000 A (set at 0,5 x 2000 A)	P
	Operating time, <u>overload releases</u> : the circuit-breaker does not trip:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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)	100 ms, no trip	P
	Test current: 1,5 times of <b>maximum</b> adjustable setting current: (A)	I <sub>sd</sub> : 30200 A (1,5 x 10 x 1 x 2000 A) t <sub>sd</sub> : 400 ms	P
	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)	320 ms	P
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)	800 ms Reduced to 2000 A	P
	Rated current	2000 A	P
	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)	800 ms, no trip	P
8.3.3.2	Test of dielectric properties, impulse withstand voltage (U <sub>imp</sub> indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	12 kV for the main circuit 4 kV for the control circuit	P
	- sea level of the laboratory:	Sea level	P
	- test U <sub>imp</sub> main circuits (kV) :	14,8 kV	P
	- test U <sub>imp</sub> auxiliary circuits (kV) :	-	N/A
	- test U <sub>imp</sub> control circuits (kV) :	6,2 kV	P
	- test U <sub>imp</sub> on open main contacts (equipment suitable for isolating) (kV) :	18,5 kV	P

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Clause	Requirement + Test	Result - Remark	Verdict
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.		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.		P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and:		P
	- the main circuit		
	- other circuits		P
	- exposed conductive parts		P
	- enclosure of mounting plate		P
	iv) equipment suitable for isolation		P
	equipment not suitable for isolation		N/A
	- no unintentional disruptive discharge during the test's		P
	Test of dielectric properties, dielectric withstand voltage (Uimp not indicated):		
	- rated insulation voltage (V) :	1000 V for main circuit 300 V for control circuit	P
	- main circuits, test voltage for 1 min (V)	2200 V, 5 s	P
	- auxiliary circuits, test voltage for 1 min (V)	1500 V, 5 s	P
	- control circuits, test voltage for 1 min (V)	1500 V, 5 s	P
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	2200 V	P
	- between each pole and all the other poles connected to the frame of the circuit-breaker	2200 V	P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	2200 V	P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	2200 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- between the terminals of one side connected together and the terminals of the other side connected together.	2200 V	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.	1500 V	P
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.	1500 V	P
	No unintentional disruptive discharge during the tests		P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 U <sub>e</sub> , and shall not exceed 0,5mA. ..... L1: 0,005 mA ..... L2: 0,005 mA ..... L3: 0,005 mA ..... N: 0,005 mA	759 V	P
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1		P
	A circuit-breaker with stored energy operation shall be checked for compliance with 7.2.1.1.5, regarding the charge indicator and the direction of operation of manual energy storing		P
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3		P
	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 7.2.1.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		P



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Clause	Requirement + Test	Result - Remark	Verdict
	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		P
	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		P
	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
c)	Undervoltage releases		
	Undervoltage releases shall comply with the requirements of 7.2.1.3 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum current rating for which the release is suitable		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 8.3.3.6		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
d)	Shunt releases		
	Shunt releases shall comply with the requirements of 7.2.1.4 of Part 1. For this purpose, the release shall be fitted to a circuit-breaker having the maximum rated current for which the release is suitable		P
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of $+ 55\text{ °C} \pm 2\text{ °C}$ without current in the main poles of the circuit-breaker	154 V was applied ACB tripped	P
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage		P
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	UAS20	
	Sample no:	#01	
	Rated current $I_n$ (A)	2000 A	
	Rated operational voltage: $U_e$ (V)	500 V~, 690 V~	
	Rated control supply voltage of closing mechanism: $U_c$ (V)	220 V	
	Rated control supply voltage of shunt releases: $U_c$ (V)	220 V	
	Rated control supply voltage undervoltage releases: $U_c$ (V)	-	
	Ambient temperature 10-40 °C :	19 °C	P
	Number of operating cycles per hour	60	P
	Number of cycles without current (total) (closing mechanism energized at the rated $U_c$ )	2500	P
	Number of cycles without current (without releases)	2250	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Applied voltage: closing mechanism (V)	220 V	P
	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 $U_c$	250	P
	Applied voltage: shunt releases (V)	220 V	P
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated $U_c$		N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)		N/A
	Applied voltage: undervoltage releases (V)		N/A
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.3.3.4	Operational performance capability with current.		
	Rated current: $I_n$ (A)	2000 A	
	Maximum rated operational voltage: $U_e$ (V)	500 V~, 690 V~	
	Conductor cross-sectional area (mm <sup>2</sup> ) :	240 mm <sup>2</sup> x 2	P
	Number of operating cycles per hour	20	P
	Number of cycles with current (total) (closing mechanism energized at the rated $U_c$ )	500	P
	Applied voltage: closing mechanism (V)	220 V	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		P
	Conditions, make/break operations:		P
	- test voltage $U/U_e = 1,0$ (V) .....L1-L2: .....L2-L3: .....L3-L1:	707 V 706 V 706 V	P
	- test current $I/I_e = 1,0$ (A).....L1: .....L2: .....L3:	2000 A 2021 A 2043 A	P
	- power factor/time constant:	0,83	P
	- frequency: (Hz)	50 Hz	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- on-time (ms):	Min 479 ms	P
	- off-time (s):	Max 179,5 s	P
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100		P
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		P
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number		
	Sample no:		
	Rated current In (A)		
	Rated operational voltage: Ue (V)		
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt releases: Uc (V)		
	Rated control supply voltage undervoltage releases: Uc (V)		
	Ambient temperature 10-40 °C :		N/A
	Number of operating cycles per hour		N/A
	Maximum rated operational voltage: Ue (V)		N/A
	Number of operating cycles per hour		N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.		N/A
	Conditions, overload operations:		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test current AC/DC: $I/I_e = 6,0/2.5$ (A) ..... L1: ..... L2: ..... L3:		N/A
	- power factor/time constant:		N/A
	- Number of cycles manually opened: 9		N/A
	- Number of cycles automatically opened by an overload release: 3		N/A
	- frequency: (Hz)		N/A
	- on-time max 2s:		N/A
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1380 V, 5 s	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. ..... L1: ..... L2: ..... L3: ..... N:	759 V  0,005 mA 0,005 mA 0,005 mA 0,005 mA	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.		P
	Temperature rise of main circuit terminals $\leq 80$ K (K) :	Max 60 K See table 1 and 2	P
	conductor cross-sectional area (mm <sup>2</sup> ) :	(100 x 5) mm <sup>2</sup> x 3	P
	test current $I_e$ (A) :	2000 A	P
8.3.3.7	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2890 A (1,45 x 2000 A) Tr: 30 s	P
	Conventional tripping time: <1h when $I_n < 63$ A, <2h when $I_n > 63$ A	4 min 07 s	P
8.3.3.8	Verification of undervoltage and shunt releases		
	Circuit-breaker fitted with undervoltage releases. The release shall not operate at 70% of the minimum control supply voltage -		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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.	154 V was applied ACB tripped	P
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		P
	actuating force for opening (N) .....	-	—
	test force with blocked main contacts for 10 s (N) ..	-	—
	Dependent power operation		N/A
	Supply voltage of 110% of rated voltage (V).....		N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		N/A
	Independent power operation		P
	Three attempts to operate the equipment by the stored energy.	The open position was not indicated during and after the test.	P
	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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS UAS20, 2000 A, 3 poles, sample no #02		
8.3.3.1	Tripping limits and characteristic		N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (U <sub>imp</sub> indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	12 kV for the main circuit 4 kV for control circuit	P
	- sea level of the laboratory:	Sea level	P
	- test U <sub>imp</sub> main circuits (kV) :	14,8 kV	P
	- test U <sub>imp</sub> auxiliary circuits (kV) :	-	N/A
	- test U <sub>imp</sub> control circuits (kV) :	6,2 kV	P
	- test U <sub>imp</sub> on open main contacts (equipment suitable for isolating) (kV) :	18,5 kV	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.		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.		P
	iii) Between each control and auxiliary circuit not normally connected to the main circuit and:		P
	- the main circuit		
	- other circuits		P
	- exposed conductive parts		P
	- enclosure of mounting plate		P
	iv) equipment suitable for isolation		P
	equipment not suitable for isolation		N/A
	- no unintentional disruptive discharge during the test's		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test of dielectric properties, dielectric withstand voltage (U <sub>imp</sub> not indicated):		
	- rated insulation voltage (V) :	800 V for main circuit 690 V for control circuit	P
	- main circuits, test voltage for 1 min (V)	2200 V, 5 s	P
	- auxiliary circuits, test voltage for 1 min (V)	1500 V, 5 s	P
	- control circuits, test voltage for 1 min (V)	1500 V, 5 s	P
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .	2200 V	P
	- between each pole and all the other poles connected to the frame of the circuit-breaker	2200 V	P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.	2200 V	P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.	2200 V	P
	- between the terminals of one side connected together and the terminals of the other side connected together.	2200 V	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.	1500 V	P
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.		P
	No unintentional disruptive discharge during the tests		P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 U <sub>e</sub> , and shall not exceed 0,5mA. ..... L1: ..... L2: ..... L3:	759 V  0,005 mA 0,005 mA 0,005 mA	P



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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.3	Mechanical operation and operational performance capability		
8.3.3.3.2	Construction and mechanical operation		N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	UAS20	
	Sample no:	#02	
	Rated current In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt releases: Uc (V)	220 V	
	Rated control supply voltage undervoltage releases: Uc (V)	-	
	Ambient temperature 10-40 °C :	19 °C	P
	Number of operating cycles per hour	60	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	2500	P
	Number of cycles without current (without releases)	2250	P
	Applied voltage: closing mechanism (V)	220 V	P
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc	250	P
	Applied voltage: shunt releases (V)	220 V	P
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc		N/A
	10 cycles without applied voltage at the undervoltage releases. (Shall not possible to close the circuit-breaker.)		N/A
	Applied voltage: undervoltage releases (V)		N/A
	Electrical components do not exceed the value indicated in tab. 7.		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	2000 A	
	Maximum rated operational voltage: Ue (V)	500 V~, 690 V~	
	Conductor cross-sectional area (mm <sup>2</sup> ) :	240 mm <sup>2</sup> x 2	P
	Number of operating cycles per hour	20	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	500	P
	Applied voltage: closing mechanism (V)	220 V	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		P
	Conditions, make/break operations:		P
	- test voltage U/Ue = 1,0 (V) .....L1-L2: .....L2-L3: .....L3-L1:	707 V 706 V 706 V	P
	- test current I/Ie = 1,0 (A).....L1: .....L2: .....L3:	2000 A 2021 A 2043 A	P
	- power factor/time constant:	0,83	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	Min 476 ms	P
	- off-time (s):	Max 179,5 s	P
	Electrical components do not exceed the value indicated in tab. 7.		P
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100		P
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		P
8.3.3.4	Overload performance		
	this test applies to circuit-breaker of rated current up to and including 630 A		
	Type designation or serial number		
	Sample no:		
	Rated current In (A)		
	Rated operational voltage: Ue (V)		

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage of closing mechanism: Uc (V)		
	Rated control supply voltage of shunt releases: Uc (V)		
	Rated control supply voltage undervoltage releases: Uc (V)		
	Ambient temperature 10-40 °C :		N/A
	Number of operating cycles per hour		N/A
	Maximum rated operational voltage: Ue (V)		N/A
	Number of operating cycles per hour		N/A
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload/short-circuit settings at maximum.		N/A
	Conditions, overload operations:		N/A
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3:		N/A
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: ..... L3:		N/A
	- power factor/time constant:		N/A
	- Number of cycles manually opened: 9		N/A
	- Number of cycles automatically opened by an overload release: 3		N/A
	- frequency: (Hz)		N/A
	- on-time max 2s:		N/A
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1380 V, 5 s	P
	- no breakdown or flashover		P

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Clause	Requirement + Test	Result - Remark	Verdict
	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 2 mA. .....L1: .....L2: .....L3:	759 V  0,005 mA 0,005 mA 0,005 mA	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.		P
	Temperature rise of main circuit terminals $\leq 80$ K (K) :	Max 59 K See table 3	P
	conductor cross-sectional area (mm <sup>2</sup> ) :	(100 x 5) mm <sup>2</sup> x 3	P
	test current Ie (A) :	2000 A	P
8.3.3.7	Verification of overload releases		N/A
8.3.3.8	Verification of undervoltage and shunt releases		N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II (lcs):		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II/III (Ics=Icu): UAS20, 2000 A, 4 poles, sample no #03, 3 phases test		P
	Type designation or serial number	UAS20	
	Sample no:	#03	
	Rated current: In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated service short-circuit breaking capacity: (kA)	85 kA at 500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- 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		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	18,4 Nm	P
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on two-poles (with RCD).		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) .....L1-L2: .....L2-L3: .....L3-L1:	5 min 56 s 5 min 48 s 6 min 06 s	P
8.3.4.1	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:	528 V 529 V 528 V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3:	87,2 kA 86,6 kA 85,5 kA	P
	power factor/time constant :	0,17	P
	- Factor "n"	2,2	P
	- peak test current (A) :	192 kA	P
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) .....L1: .....L2: .....L3:	154 kA 166 kA 190 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) .....L1: .....L2: .....L3:	241 MA <sup>2</sup> s 208 MA <sup>2</sup> s 321 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) .....L1: .....L2: .....L3:	133 kA 192 kA 166 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral $I^2dt$ (A <sup>2</sup> s) .....L1: .....L2: .....L3:	101 MA <sup>2</sup> s 228 MA <sup>2</sup> s 185 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) .....L1: .....L2: .....L3:	170 kA 192 kA 146 kA	P
	- Joule integral $I^2dt$ (A <sup>2</sup> s) .....L1: .....L2: .....L3:	228 MA <sup>2</sup> s 347 MA <sup>2</sup> s 255 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No hole	P
	Cracks observed	No crack	P
8.3.4.2	Operational performance capability with current.		
	Rated current: $I_n$ (A)	2000 A	
	Maximum rated operational voltage: $U_e$ (V)	500 V	
	Conductor cross-sectional area (mm <sup>2</sup> ):	60 x 15 mm <sup>2</sup>	
	Number of operating cycles per hour	20	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated $U_c$ )	25	P
	Applied voltage: closing mechanism (V)	220 V	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.	Overload: 1,0 $I_n$ Short-circuit: min	P
	Conditions, make/break operations:		
	- test voltage $U/U_e = 1,0$ (V) .....L1: .....L2: .....L3:	503 V 503 V 502 V	P
	- test current $I/I_e = 1,0$ (A) .....L1: .....L2: .....L3:	2100 A 2100 A 2008 A	P
	- power factor/time constant:	0,79	P



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Clause	Requirement + Test	Result - Remark	Verdict
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	Min 463 ms	P
	- off-time (s):	Max 179,5 s	P
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V / 5 s	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue) .....L1: .....L2: .....L3:	550 V 24,1 µA 17,8 µA 17,1 µA	P
8.3.4.4	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 60 K see table 4	P
	conductor cross-sectional area (mm <sup>2</sup> ) :	100 x 5 mm <sup>2</sup> x 3	P
	test current I <sub>e</sub> (A) :	2000 A	P
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	2900 A	P
	Conventional tripping time: <1h when I <sub>n</sub> < 63A, <2h when I <sub>n</sub> > 63 A	12 min 46 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on two-poles (with RCD)..		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) .....L1-L2: .....L2-L3: .....L3-L1:	3 min 45 s 3 min 47 s 3 min 43 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II/III (Ics=Icu): UAS06, 630 A, 4 poles, sample no #04A, 3 phases test		P
	Type designation or serial number	UAS06	
	Sample no:	#04A	
	Rated current: In (A)	630 A set at 0,8 x 0,5 x 630 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated service short-circuit breaking capacity: (kA)	85 kA at 500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm <sup>2</sup>		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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	upside	P
	Tightening torques: (Nm)	18,4 Nm	P
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on two-poles (with RCD).		
	Time specified by the manufacturer:	tripping time ≤ 6,03 s +15%	P
	- Operation time: (s) .....L1-L2: .....L2-L3: .....L3-L1:	6 s 6 s 6 s	P
8.3.4.1	Test of rated service short-circuit breaking capacity		P
	Test sequence of operation: O – t – CO – t – CO		P
	- test voltage U/U <sub>e</sub> = 1,05 (V) . .....L1: .....L2: .....L3:	528 V 529 V 528 V	P
	- r.m.s. test current AC/DC: (A) .....L1: .....L2: .....L3:	87,2 kA 86,6 kA 85,5 kA	P
	power factor/time constant :	0,17	P
	- Factor "n"	2,2	P
	- peak test current (A) :	192 kA	P
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) .....L1: .....L2: .....L3:	162 kA 163 kA 192 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) .....L1: .....L2: .....L3:	175 MA <sup>2</sup> s 156 MA <sup>2</sup> s 275 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) .....L1: .....L2: .....L3:	196 kA 182 kA 112 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) .....L1: .....L2: .....L3:	229 MA <sup>2</sup> s 248 MA <sup>2</sup> s 94,8 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) .....L1: .....L2: .....L3:	176 kA 160 kA 110 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) .....L1: .....L2: .....L3:	194 MA <sup>2</sup> s 174 MA <sup>2</sup> s 80,1 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No hole	P
	Cracks observed	No crack	P
8.3.4.2	Operational performance capability with current.		
	Rated current: I <sub>n</sub> (A)		
	Maximum rated operational voltage: U <sub>e</sub> (V)		
	Conductor cross-sectional area (mm <sup>2</sup> ) :		
	Number of operating cycles per hour		N/A
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated U <sub>c</sub> )		N/A
	Applied voltage: closing mechanism (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 <sub>e</sub> = 1,0 (V) .....L1: .....L2: .....L3:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test current $I/I_e = 1,0$ (A) .....L1: .....L2: .....L3:		N/A
	- power factor/time constant:		N/A
	- frequency: (Hz)		N/A
	- on-time (ms):		N/A
	- off-time (s):		N/A
8.3.4.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V	1000 V / 5 s	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue) .....L1: .....L2: .....L3:	550 V 75,4 $\mu$ A 183 $\mu$ A 74,6 $\mu$ A	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.		N/A
	Temperature rise of main circuit terminals. $\leq 80$ K (K) :		N/A
	conductor cross-sectional area (mm <sup>2</sup> ) :		N/A
	test current $I_e$ (A) :		N/A
8.3.4.5	Verification of overload releases		
	Test current: 1.45 times the value of their current setting at the reference temperature: (A)	365 A	P
	Conventional tripping time: <1h when $I_n < 63$ A, <2h when $I_n > 63$ A	15 s	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on two-poles (with RCD)..		
	Time specified by the manufacturer:	tripping time $\leq 6,03$ s +15%	P
	- Operation time: (s) .....L1-L2: .....L2-L3: .....L3-L1:	4 s 4 s 3 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) UAS20, 2000 A, 3 poles, sample no #05, 3 phases test		
	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 serial number	UAS20	
	Sample no:	#05	
	Rated current: In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated ultimate short-circuit breaking capacity: (kA)	85 kA at 500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	5 min 54 s 6 min 03 s 5 min 47 s	P
8.3.5.2	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.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm <sup>2</sup>		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		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening, torques: (Nm)	18,4 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/U <sub>e</sub> = 1,05 (V) ..... L1: ..... L2: ..... L3:	528 V 529 V 528 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: ..... L3:	87,2 kA 86,6 kA 85,5 kA	P
	power factor/time constant :	0,17	P
	- Factor "n"	2,2	P
	- peak test current (A <sub>max</sub> ) :	192 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	156 kA 142 kA 190 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	154 MA <sup>2</sup> s 154 MA <sup>2</sup> s 248 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	154 kA 190 kA 171 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	148 MA <sup>2</sup> s 268 MA <sup>2</sup> s 199 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V / 5 s	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U <sub>e</sub> ) ..... L1: ..... L2: ..... L3:	550 V 13,6 μA 24,8 μA 75,8 μA	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	3 min 58 s 3 min 46 s 3 min 47 s	P



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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) UAS20, 2000 A, 3 poles, sample no #06, 3 phases test		
	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 serial number	UAS20	
	Sample no:	#06	
	Rated current: In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated ultimate short-circuit breaking capacity: (kA)	65 kA at 690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	6 min 04 s 6 min 02 s 5 min 51 s	P
8.3.5.2	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.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm <sup>2</sup>		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		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening, torques: (Nm)	18,4 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/U <sub>e</sub> = 1,05 (V) ..... L1: ..... L2: ..... L3:	738 V 739 V 738 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: ..... L3:	66,0 kA 65,0 kA 65,9 kA	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A <sub>max</sub> ) :	148 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	125 kA 115 kA 150 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	127 MA <sup>2</sup> s 98,3 MA <sup>2</sup> s 167 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	100 kA 136 kA 143 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	90,9 MA <sup>2</sup> s 139 MA <sup>2</sup> s 155 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1380 V / 5 s	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U <sub>e</sub> ) ..... L1: ..... L2: ..... L3:	759 V 28,5 μA 27,7 μA 27,6 μA	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	3 min 23 s 3 min 56 s 3 min 31 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) UAS06, 630 A, 3 poles, sample no #07, 3 phases test		
	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 serial number	UAS06	
	Sample no:	#07	
	Rated current: In (A)	630 A set at 0,8 x 0,5 x 630 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated ultimate short-circuit breaking capacity: (kA)	85 kA at 500 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 6,03 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	6 s 6 s 6 s	P
8.3.5.2	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.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm <sup>2</sup>		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		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening, torques: (Nm)	18,4 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/Ue = 1,05 (V) ..... L1: ..... L2: ..... L3:	528 V 529 V 528 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: ..... L3:	87,2 kA 86,6 kA 85,5 kA	P
	power factor/time constant :	0,17	P
	- Factor "n"	2,2	P
	- peak test current (Amax) :	192 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	163 kA 158 kA 188 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	175 MA <sup>2</sup> s 147 MA <sup>2</sup> s 262 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	145 kA 189 kA 175 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	132 MA <sup>2</sup> s 259 MA <sup>2</sup> s 203 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V / 5 s	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U <sub>e</sub> ) ..... L1: ..... L2: ..... L3:	550 V 15,7 µA 14,6 µA 30,2 µA	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 6,03 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	4 s 3 s 4 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) UAS20, 2000 A, 4 poles, sample no #08, phase + N test		
	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 serial number	UAS20	
	Sample no:	#08	
	Rated current: In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated ultimate short-circuit breaking capacity: (kA)	51 kA (60% Icu) at 500 V / $\sqrt{3}$	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time $\leq 361,5 \text{ s} + 15\%$	P
	- Operation time: (s) ..... L3:	6 min 02 s	P
8.3.5.2	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.		P
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- 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		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening, torques: (Nm)	18,4 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage $U/U_e = 1,05$ (V) ..... L3-N:	305 V	P
	- r.m.s. test current AC/DC: (A)..... L3:	51,1 kA	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,2	P
	- peak test current (A <sub>max</sub> ) :	114 kA	P
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L3:	109 kA	P
	- Joule integral $I^2dt$ (A <sup>2</sup> s) ..... L3:	116 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P



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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L3:	89,9 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L3:	87,8 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U <sub>e</sub> ) ..... L3: ..... N:	550 V 17,3 µA 18,2 µA	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L3:	3 min 54 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) UAS06, 630 A, 4 poles, sample no #09, phase + N test		
	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 serial number	UAS06	
	Sample no:	#09	
	Rated current: In (A)	630 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated ultimate short-circuit breaking capacity: (kA)	51 kA (60% Icu) at 500 V / $\sqrt{3}$	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	This test sequence need not be made when Icu = Ics		
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time $\leq 6,03$ s +15%	P
	- Operation time: (s) ..... L3:	6 s	P
8.3.5.2	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.		P
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- 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		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening, torques: (Nm)	18,4 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/U <sub>e</sub> = 1,05 (V) ..... L3-N:	305 V	P
	- r.m.s. test current AC/DC: (A)..... L3:	51,1 kA	P
	power factor/time constant :	0,19	P
	- Factor "n"	2,2	P
	- peak test current (A <sub>max</sub> ) :	114 kA	P
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L3:	106 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L3:	78,4 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L3:	84,8 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L3:	48,5 MA <sup>2</sup> s	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.5.3	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V	P
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 U <sub>e</sub> ) ..... L3: ..... N:	550 V 18,9 µA 18,5 µA	P
8.3.5.4	Verification of overload releases		
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 6,03 s +15%	P
	- Operation time: (s) ..... L3:	3 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.6	TEST SEQUENCE IV UAS20, 2000 A, 4 poles, sample no #10, phase + N test		
	Rated short-time withstand current		
	Except where the combined test sequence applies, this test sequence applies to circuit-breakers of utilization category B and to those circuit-breaker of category A covered by note 3 of table 4, and comprises the following tests:		
	Where integrally fused circuit-breaker are of utilization category B, they shall meet the requirements of this sequence.		
	Type designation or serial number	UAS20	
	Sample no:	#10	
	Rated current: In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated short-time withstand current: (kA/s)	39 kA / 1 s (60% Icw)	
	Rated frequency: (Hz)	50 Hz	
8.3.6.1	Verification of overload releases		
	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L3:	6 min 04 s	P
8.3.6.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- duration of the test: (s)	1,01 s	P
	- test frequency: (Hz)	50 Hz	P
	- power factor / time constant (ms):	0,22	P
	- factor "n"	2,1	P
	- test voltage: (V) ..... L3-N:	426 V	P
	- r.m.s. test current: (kA) ..... L3:	39,1 kA	P
	- highest peak current: (kA)	87,4 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.6.3	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 52 K See table 5	P
	conductor cross-sectional area (mm <sup>2</sup> ) :	100 x 5 mm <sup>2</sup> x 3	P
	test current I <sub>e</sub> (A) :	2000 A	P
8.3.6.4	Test of short-circuit breaking capacity at the max. short-time withstand current.		
	Rated short-time withstand current: (kA/s)		
	Test sequence: O – t – CO		
	max. available time setting of the short-time delay short-circuit release. (s)	400 ms	P
	- test voltage U/U <sub>e</sub> = 1,05 (V) ..... L3-N:	426 V	P
	- r.m.s. test current AC/DC: (A)..... L3:	39,1 kA	P
	- highest peak current: (kA)	87,4 kA	P
	- test frequency: (Hz)	50 Hz	P
	- power factor / time constant (ms):	0,22	P
	- factor "n"	2,1	P
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L3:	85,7 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L3:	640 MA <sup>2</sup> s	P
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release and -	422 ms	P
	- the instantaneous override, if any, shall not operate.		P
	-pause: t (s)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L3:	61,6 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L3:	32,4 MA <sup>2</sup> s	P
	- the circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release and -		P
	- the instantaneous override, if any, shall not operate.		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- if the circuit-breaker has a making current release, this requirement does not apply to the CO operation, if the prospective current exceeds the pre-determined value, since it will then operate.		P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.6.5	Verification of dielectric withstand		P
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	
	- 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 Ue, and shall not exceed 2 mA. ..... L3: 27,6 µA ..... N: 28,9 µA	550 V	P
8.3.6.6	Verification of overload releases		P
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the maximum value stated by the manufacturer for twice the value of the current setting, at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L3:	3 min 46 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.7	TEST SEQUENCE V		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
8.3.8	TEST SEQUENCE VI: Combined test sequence UAS20, 2000 A, 4 poles, sample no #11, 3 phases test		
	At the discretion of, or in agreement with the manufacturer, this sequence may be applied to circuit-breaker of utilization cat. B:		
	Type designation or serial number	UAS20	P
	Sample no:	#11	P
	Rated current: In (A)	2000 A	P
	Rated operational voltage: Ue (V)	500 V~, 690 V~	P
	Rated short-time withstand current: (kA/s)	65 kA / 1 s	P
	Rated frequency: (Hz)	50 Hz	P
8.3.8.1	Verification of overload releases		
	The operation of overload releases shall be verified twice times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	6 min 08 s 6 min 06 s 5 min 58 s	P
8.3.8.2	Test of rated short-time withstand current.		
	For this test, any over-current release, including the instantaneous override, if any, likely to operate during the test, shall be rendered inoperative.		
	- duration of the test: (s)	1,02 s	P
	- test frequency: (Hz)	50 Hz	P
	- power factor / time constant (ms):	0,18	P
	- factor "n"	2,2	P
	- test voltage: (V) ..... L1: ..... L2: ..... L3:	738 V 738 V 739 V	P
	- r.m.s. test current: (kA) ..... L1: ..... L2: ..... L3:	66,0 kA 65,0 kA 65,9 kA	P
	- highest peak current: (kA)	148 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.8.3	Test of rated service short-circuit breaking capacity		
	At the highest voltage applicable to the rated short-time current.		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	UAS20	
	Sample no:	#11	
	Rated current: In (A)	2000 A	
	Rated operational voltage: Ue (V)	500 V~, 690 V~	
	Rated service short-circuit breaking capacity: (kA)	65 kA at 690 V	
	Rated control supply voltage of closing mechanism: Uc (V)	220 V	
	Rated control supply voltage of shunt release: Uc (V)	220 V	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.		P
	closing mechanism energized with 85% at the rated Uc: (V)	176 V	P
	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)	Left / Right: 60 mm Up: 150 mm Down / Front / Back: 0 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		P
	- perforated metal		N/A
	- 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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	100 x 5 mm <sup>2</sup> x 3	P
	If terminals unmarked: line connected at: (underside/upside)	Upside	P
	Tightening torques: (Nm)	18,4 Nm	P
	Test sequence of operation: O – t – CO – t – CO		P
	The highest voltage applicable to the rated short-time current.		P
	- test voltage U/U <sub>e</sub> = 1,05 (V) ..... L1: ..... L2: ..... L3:	738 V 738 V 739 V	P
	- r.m.s. test current AC/DC: (A)..... L1: ..... L2: ..... L3:	66,0 kA 65,0 kA 65,9 kA	P
	power factor/time constant :	0,18	P
	- Factor "n"	2,2	P
	- peak test current (A) :	148 kA	P
	Test sequence "O"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	125 kA 115 kA 150 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	1,81 GA <sup>2</sup> s 1,73 GA <sup>2</sup> s 1,82 GA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	110 kA 142 kA 134 kA	P
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	80,3 MA <sup>2</sup> s 136 MA <sup>2</sup> s 124 MA <sup>2</sup> s	P
	Pause, t: (min)	3 min	P
	Test sequence "CO"		
	- max. let-through current: (kA <sub>peak</sub> ) ..... L1: ..... L2: ..... L3:	118 kA 144 kA 127 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I <sup>2</sup> dt (A <sup>2</sup> s) ..... L1: ..... L2: ..... L3:	88,4 MA <sup>2</sup> s 144 MA <sup>2</sup> s 115 MA <sup>2</sup> s	P
	The circuit-breaker shall remain closed for the short-time corresponding to the max. available time setting of the short-time delay short-circuit release.	417 ms for O operation	P
	During this test the instantaneous override shall not operate	For O operation	P
	- and the making current release shall operate	For CO operation	P
	Melting of the fusible element	No melting	P
	Holes in the PE-sheet for test sequence "O"	No holes	P
	Cracks observed	No cracks	P
8.3.8.4	Operational performance capability with current.		
	Rated current: In (A)	2000 A	P
	Maximum rated operational voltage: Ue (V)	500 V~, 690 V~	P
	Conductor cross-sectional area (mm <sup>2</sup> ) :	60 x 15 mm <sup>2</sup>	P
	Number of operating cycles per hour	20	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	25	P
	Applied voltage: closing mechanism (V)	220 V	P
	For circuit-breaker fitted with adjustable releases, test shall be made with the overload setting at maximum and short-circuit setting at minimum.		P
	Conditions, make/break operations:		P
	- test voltage U/Ue = 1,0 (V) ..... L1: ..... L2: ..... L3:	696 V 698 V 698 V	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: ..... L3:	2010 A 2020 A 2020 A	P
	- power factor/time constant:	0,8	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	Min 463 ms	P
	- off-time (s):	Max 179,5 s	P
8.3.8.5	Verification of dielectric withstand		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- equal to twice the rated operational voltage with a minimum of 1000 V	1380 V	
	- no breakdown or flashover		P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1,1 Ue) ..... L1: ..... L2: ..... L3:	759 V  29,3 µA 33,2 µA 30,8 µA	P
8.3.8.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed the those specified in tab. 7.		P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	Max 62 K See table 6	P
	conductor cross-sectional area (mm <sup>2</sup> ) :	(100 x 5) mm <sup>2</sup> x 3	P
	test current Ie (A) :	2000 A	P
8.3.8.7	Verification of overload releases		
	Test current: 1,45 times the value of their current setting at the reference temperature: (A)	2900 A	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	13 min 27 s	P
	The operation of overload releases shall be verified at 2,5 times the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	tripping time ≤ 361,5 s +15%	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3:	3 min 57 s 3 min 47 s 3 min 51 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
Annex B	Circuit-breakers incorporating residual current protection		
B I	Test sequence B I		
	Tests shall be made at the following values of voltage applied to the relevant terminals: - 0,85 times the minimum rated voltage for the tests specified in B.8.2.4 and B.8.2.5.1; - 1,1 times the maximum rated voltage for the tests specified in B.8.2.5.2.		N/A
	CBRs with more than one rated frequency or a range of rated frequencies shall be tested in each case at the highest and lowest rated frequency. However, for CBRs rated at 50 Hz and 60 Hz, tests at 50 Hz or 60 Hz are considered to cover the requirements.	Test at 50 Hz	P
B.8.2.4	Off-load test at 20 °C ± 5 °C		P
B.8.2.4.1	Verification of operating in case of steady increase of the residual current (figure B.1)		P
	Increase the residual current from 0,2 I $\Delta$ n to I $\Delta$ n in 30 sec. Required: value between I $\Delta$ no and I $\Delta$ n	Tg: 50 ms As per definite time delay declared by manufacturer I $\Delta$ n = 1,2 I <sub>g</sub>	P
	Min. setting I $\Delta$ n.(mA): Interm. setting I $\Delta$ n.(mA): Max. setting I $\Delta$ n.(mA):	202 A ~ 206 A (I <sub>g</sub> = 0,1 I <sub>n</sub> ) 972 A ~ 978 A (I <sub>g</sub> = 0,5 I <sub>n</sub> ) 2035 A ~ 2050 A (I <sub>g</sub> = 1,0 I <sub>n</sub> )	P
B.8.2.4.2	Verification of operating in case of closing on residual current (figure B.1)		P
	The CBR is closes on I $\Delta$ n or each specified setting Required : no value exceeds the specified limiting value of Table B1 ( 300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms	Tg: 400 ms Required: As per definite time delay declared by manufacturer	P
	Min. setting I $\Delta$ n.(ms): Interm. setting I $\Delta$ n.(ms): Max. setting I $\Delta$ n.(ms):	419 ms ~ 425 ms (I <sub>g</sub> = 0,1 I <sub>n</sub> ) 422 ms ~ 425 ms (I <sub>g</sub> = 0,5 I <sub>n</sub> ) 422 ms ~ 426 ms (I <sub>g</sub> = 1,0 I <sub>n</sub> )	P
B.8.2.4.3	Verification of operating in case of a sudden appearance of the residual current (figure B.1)		P
	A residual current is sudden appear on the CBR of I $\Delta$ n Required : no value exceeds the specified limiting value of Table B1 (300 ms) or Table B2 (500 ms) and a non actuating time of 60 ms	Tg: 400 ms Required: As per definite time delay declared by manufacturer	P
	Min. setting I $\Delta$ n.(ms): Interm. setting I $\Delta$ n.(ms): Max. setting I $\Delta$ n.(ms):	425 ms ~ 428 ms (I <sub>g</sub> = 0,1 I <sub>n</sub> ) 422 ms ~ 423 ms (I <sub>g</sub> = 0,5 I <sub>n</sub> ) 422 ms ~ 422 ms (I <sub>g</sub> = 1,0 I <sub>n</sub> )	P

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Clause	Requirement + Test	Result - Remark	Verdict
	A residual current is sudden appear on the CBR of 2 I $\Delta$ n Required : no value exceeds the specified limiting value of Table B1 (150 ms) or Table B2 (200 ms) and a non actuating time of 60 ms	Tg: 400 ms Required: As per definite time delay declared by manufacturer	P
	Min. setting I $\Delta$ n.(ms): Interm. setting I $\Delta$ n.(ms): Max. setting I $\Delta$ n.(ms):	415 ms ~ 417 ms (I <sub>g</sub> = 0,1 I <sub>n</sub> ) 413 ms ~ 414 ms (I <sub>g</sub> = 0,5 I <sub>n</sub> ) 413 ms ~ 414 ms (I <sub>g</sub> = 1,0 I <sub>n</sub> )	P
	A residual current is sudden appear on the CBR of <input checked="" type="checkbox"/> 5 I $\Delta$ n or <input type="checkbox"/> 0,25 A Required : no value exceeds the specified limiting value of Table B1 (40ms) or Table B2 (150 ms) and a non actuating time of 60 ms	Tg: 400 ms Required: As per definite time delay declared by manufacturer	P
	Min. setting I $\Delta$ n.(ms): Interm. setting I $\Delta$ n.(ms): Max. setting I $\Delta$ n.(ms):	410 ms ~ 410 ms (I <sub>g</sub> = 0,1 I <sub>n</sub> ) 410 ms ~ 411 ms (I <sub>g</sub> = 0,5 I <sub>n</sub> ) 411 ms ~ 411 ms (I <sub>g</sub> = 1,0 I <sub>n</sub> )	P
	A residual current is sudden appear on the CBR of <input checked="" type="checkbox"/> 10 I $\Delta$ n or <input type="checkbox"/> 0,5 A Required : no value exceeds the specified limiting value of Table B1 ( 40 ms) or Table B2 (150 ms) and a non actuating time of 60 ms	Tg: 400 ms Required: As per definite time delay declared by manufacturer	P
	Min. setting I $\Delta$ n.(ms): Interm. setting I $\Delta$ n.(ms): Max. setting I $\Delta$ n.(ms):	409 ms ~ 409 ms (I <sub>g</sub> = 0,1 I <sub>n</sub> ) 410 ms ~ 410 ms (I <sub>g</sub> = 0,5 I <sub>n</sub> ) 409 ms ~ 410 ms (I <sub>g</sub> = 1,0 I <sub>n</sub> )	P
B.8.2.4.4	Verification of the limiting non-operating time of time delayed type CBRs		P
	A residual current is sudden appear on the CBR of 2 I $\Delta$ n for a time declared by the manufacturer Required : The CBR shall not operate	I <sub>g</sub> : 0,1 I <sub>n</sub> Tg: 400 ms	P
	Min. setting I $\Delta$ n. Max. setting time delay (ms):	320 ms no trip	P

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Clause	Requirement + Test	Result - Remark	Verdict
Annex C	Individual pole short-circuit test sequence		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
Annex F	Additional tests for circuit-breakers with electronic over-current protection		P
F4 and F5	Verification of electromagnetic compatibility (EMC)		
	The current setting shall be set at minimum.....,,: Ir = 0,8 In In = 0,5 Ict		P
	Short-time and instantaneous release settings shall each, if applicable, be adjusted to minimum value but to not less than 2,5 times Ir.....,,: Short-time release: In Instantaneous release: 2 In		P
	Current was applied on two-phases chosen at random according to Figure F.2		P
F4	Immunity test		P
F.4.1	Harmonic currents		P
	Type designation or serial number	UAS06	
	Sample no:	#13	
	Rated current: In (A)	630 A	
	The tests shall be performed at the rated frequency(Hz)	50 Hz	P
F.4.1.2	Test of option b)		P
	Amplitude of third harmonic > 60%.....,,: 76,76%		P
	Amplitude of fifth harmonic > 14%.....,,: 40,61%		P
	Amplitude of seventh harmonic > 7%.....,,: 8,89%		P
	Peak factor Ip/Irms ≥ 2,1.....,,: 2,37		P
	Current conduction time, for each half-wave is ≤21% of the period.....,,: 21%		P
F.4.1.3	First, test current at 0,9 Ir.....,,: 227 A		P
	Test duration, 10 times of the tripping time at 2 Ir.: 60,3 s		P
	No tripping was observed		P
	Then, test current at 2Ir.....,,: 504 A		P
	The operating time shall be within 0,9 times the minimum value and 1,1 times the maximum value stated by the manufacturer for twice the current setting		
	Time specified by the manufacturer.....,,: 4,62 – 7,62 s		P
	Trip time.....,,: 6,1 s		P
F.4.2	Electrostatic discharges		P
	Type designation or serial number	UAS06	

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Clause	Requirement + Test	Result - Remark	Verdict
	Sample no:	#13	
	Rated current: In (A)	630 A	
	Discharge test voltage.....:	8 kV contact 8 kV air	P
	Polarity of discharges.....:	positive/negative	P
	10 positive and 10 negative discharge with interval time of 1s		P
	During the test, the current 0,9 Ir.....:	227 A	P
	After the test, test current at 2,0 Ir.....:	504 A	P
	The operating time shall be within the value stated by the manufacturer for twice the current setting		
	Time specified by the manufacturer.....:	5,13-6,93 s	P
	Trip time.....:	5,47 s	P
F.4.3	Radiated radio-frequency electromagnetic fields		P
	Type designation or serial number	UAS06	
	Sample no:	#13	
	Rated current: In (A)	630 A	
	Test level .....	10 V/m	P
	Frequency range.....:	80 MHz - 1 GHz 1,4 - 2,0 GHz	P
	During test, the current 0,9 Ir.....:	227 A	P
	Sweeping the frequency range, the dwell time of the amplitude modulated carrier for each frequency shall be between 500ms and 1000ms, and the step size shall be 1% of the previous frequency.		P
	No tripping was observed		P
	Then, test current at 2Ir.....:	504 A	P
	the test shall be performed at each of the following frequencies: 80; 100; 120; 180; 240; 320; 480; 640; 960; 1400 and 1920MHz, the operation being verified after the field at each frequency has stabilized.		P
	The operating time shall be within 0,9 times the minimum value and 1,1 times the maximum value stated by the manufacturer for twice the current setting		
	Time specified by the manufacturer.....:	4,62 – 7,62 s	P
	Trip time.....:	Horizontal. : 5,20; 5,17; 5,15; 5,18; 5,18; 5,27; 5,29;	P

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Clause	Requirement + Test	Result - Remark	Verdict
		5,28; 5,28; 5,19; 5,21 s. Vertical.: 5,23; 5,33; 5,27; 5,35; 5,37; 5,46; 5,41; 5,31; 5,49; 5,42; 5,50 s	
F.4.4	Electrical fast transients/bursts (EFT/B)		P
	Type designation or serial number	UAS06	
	Sample no:	#13	
	Rated current: In (A)	630 A	
	Test level.....:	4 kV	P
	Tr/Th:5/50ns		P
	Repetition frequency.....:	5 KHz	P
	Test duration.....:	1 min	P
	During test, the current 0,9 Ir.....:	227 A	P
	No tripping was observed		P
	Then, test current at 2Ir.....:	504 A	P
	The operating time shall be within 0,9 times the minimum value and 1,1 times the maximum value stated by the manufacturer for twice the current setting		
	Time specified by the manufacturer.....:	4,62 – 7,62 s	P
	Trip time.....:	Positive: 5,36 s Negative: 5,38 s	P
F.4.5	Surges		P
	Type designation or serial number	UAS06	
	Sample no:	#13	
	Rated current: In (A)	630 A	
	Test level.....:	4 kV (line to earth) 2 kV (line to line)	P
	Tr/Th:1,2/50 µs		P
	Pulses with both positive and negative polarity shall be applied, the phase angles being 0° and 90°.		P
	A series of five pulses is applied for each polarity and each phase angel(total number of pulses:20), the interval between two pulses being approximately 1min.		P
	During the test, the current 0,9 Ir.....:	227 A	P
	After the test, test current at 2,0 Ir.....:	504 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The operating time shall be within the value stated by the manufacturer for twice the current setting		
	Time specified by the manufacturer.....:	5,13-6,93 s	P
	Trip time.....:	5,53 s (line to earth) 5,54 s (line to line)	P
F.4.6	Conducted disturbances induced by radio-frequency fields (common mode)		P
	Type designation or serial number	UAS06	
	Sample no:	#13	
	Rated current: In (A)	630 A	
	Test level .....	10 V	P
	Frequency range.....:	0,15 – 80 MHz	P
	During test, the current 0,9 Ir.....:	227 A	P
	Sweeping the frequency range, the dwell time of the amplitude modulated carrier for each frequency shall be between 500ms and 1000ms, and the step size shall be 1% of the previous frequency.		P
	No tripping was observed		P
	Then, test current at 2Ir.....:	504 A	P
	the test shall be performed at each of the following frequencies: 0,150; 0,300; 0,450; 0,600; 0,900; 1,20; 1,80; 2,40; 3,60; 4,80; 7,20; 9,60; 12,0; 19,2; 27,0; 49,4; 72,0 and 80,0MHz, the operation being verified after the level of the disturbing voltage at each frequency has stabilized.		P
	The operating time shall be within 0,9 times the minimum value and 1,1 times the maximum value stated by the manufacturer for twice the current setting		
	Time specified by the manufacturer.....:	4,62 – 7,62 s	P
	Trip time.....:	5,51; 5,29; 5,47; 5,48; 5,40; 5,45; 5,39; 5,35; 5,25; 5,27; 5,29; 5,28; 5,26; 5,19; 5,17; 5,14; 5,16; 5,19 s.	P
F.4.7	Current dips		P
	Type designation or serial number	UAS06	
	Sample no:	#13	
	Rated current: In (A)	630 A	
	Initial test current 0,9 Ir.....:	227 A	P

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Clause	Requirement + Test	Result - Remark	Verdict
	$I_D$ is dip the test current, T is period of the sinusoidal current		P
	Test duration, 3-4 times of the tripping time at 2 Ir or 10 min, whichever is lower.....:	21 s	P
	Test no. 1 with $I_D = 0$ and $\Delta t = 0,5T$		P
	No tripping was observed		P
	Test no. 2 with $I_D = 0$ and $\Delta t = 1T$		P
	No tripping was observed		P
	Test no. 3 with $I_D = 0$ and $\Delta t = 5T$		P
	No tripping was observed		P
	Test no. 4 with $I_D = 0$ and $\Delta t = 25T$		P
	No tripping was observed		P
	Test no. 5 with $I_D = 0$ and $\Delta t = 50T$		P
	No tripping was observed		P
	Test no. 6 with $I_D = 0,4 \times I_r$ and $\Delta t = 10T$		P
	No tripping was observed		P
	Test no. 7 with $I_D = 0,4 \times I_r$ and $\Delta t = 25T$		P
	No tripping was observed		P
	Test no. 8 with $I_D = 0,4 \times I_r$ and $\Delta t = 50T$		P
	No tripping was observed		P
	Test no. 9 with $I_D = 0,7 \times I_r$ and $\Delta t = 10T$		P
	No tripping was observed		P
	Test no. 10 with $I_D = 0,7 \times I_r$ and $\Delta t = 25T$		P
	No tripping was observed		P
	Test no. 11 with $I_D = 0,7 \times I_r$ and $\Delta t = 50T$		P
	No tripping was observed		P
F.5	Emission tests		P
F.5.1	Harmonics		N/A
	The electronic control circuits operate at very low power and hence create negligible disturbances; therefore no tests are required.		N/A
F.5.2	Voltage fluctuations		N/A
	The electronic control circuits operate at very low power and hence create negligible disturbances;		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	therefore no tests are required.		
F.5.3	Conducted RF disturbances (150 kHz – 30 MHz)		N/A
	Circuit-breakers covered by this annex are independent of line voltage or of any auxiliary supply and have no direct coupling to the supply; the electronic circuits operate at very low power. These circuit-breakers create negligible disturbances and therefore no tests are required.		N/A
F.5.4	Radiated RF disturbances (30 MHz – 1 GHz)		P
	Type designation or serial number	UAS06	P
	Sample no:	#13	P
	Rated current: In (A)	630 A	P
	Limits of Class A of CISPR11 / CISPR22		P
	Limits of Class B of CISPR11 / CISPR22		N/A
	The product does not exceed the limits		P
F6	Suitability for multiple frequencies		N/A
	The tests shall be performed at each rated frequency or, when a range of rated frequencies is declared, at the lowest and the highest rated frequencies.		N/A
F.6.2	Tests shall be performed on any pair of phase-poles chosen at random at any convenient voltage. Under-voltage releases, if any, shall either be energized or disabled. All other auxiliaries shall be disconnected during the test.		N/A
	The short-time and instantaneous trip current settings shall each, if relevant, be adjusted to 2,5 times the current setting. If this setting is not available, the next closest higher setting shall be used.		
	A current of 0,95 times the conventional non-tripping current (see Table 6) is applied for a time equal to 10 times the tripping time which corresponds to 2,0 times the current setting.		
	Immediately following the test of a), a current of 1,05 times the conventional tripping current (see Table 6) is applied.		
	A further test starting from the cold state is made at 2,0 times the current setting.		
	For each test frequency, the overload tripping characteristics shall comply with the following requirements: – for test a) no tripping shall occur; – for test b) tripping shall occur within the conventional time (see Table 6); – for test c) tripping shall occur within 1,1 times the maximum and 0,9 times the minimum values of the manufacturer's stated time-current characteristic.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
F.7.	Dry heat test		P
F.7.1	The test shall be performed on the circuit-breaker in accordance with 7.2.2 at the maximum rated current for a given frame size, on all phase poles, at an ambient temperature of 40 °C	2000 A	
	The duration of the test, once temperature equilibrium is reached, shall be 168 h		
	Tightening torques applied to the terminals shall be in accordance with the manufacturers' instructions. In absence of such instructions, table 4 of IEC 60947-1 shall apply	18,4 Nm	
	As an alternative, the test may be performed as follows:		
	- measure and record the highest temperature rise of the air surrounding the electronic components, during the temperature rise verification of test sequence 1		
	- install the electronic controls in the chamber		
	- supply the electronic controls with their input energizing value		
	- adjust the temperature of the test chamber to a value of 40 K above the temperature rise recorded for the surrounding the electronic components and maintain this temperature for 168 h	49 °C	
	Test carried out.....:	<input type="checkbox"/> normal <input checked="" type="checkbox"/> alternative	
F.7.2	Test results		P
	The circuit-breaker and the electronic controls shall meet the following requirements:		
	- no tripping of the circuit-breaker shall occur		P
	- no operating of the electronic controls which would cause the circuit-breaker to trip shall occur		P
F.7.3	Verification of the overload releases		P
	Following the test F.7.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).		P
7.2.1.2.4	Opening by over-current releases		P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The release shall cause tripping of the circuit-breaker with an accuracy of + 10% of the tripping current value of the current setting for all values of current setting of the overload release		N/A
2)	Inverse timer-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	2125 A (1,05 x 1 x 1 x 2000 A) Tr: 30 s 2 h no trip  846 A (1,05 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s 2 h no trip	P
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current, tripping shall then occur in less than the conventional time later	2580 A (1,3 x 1 x 1 x 2000 A) Tr: 30 s 20 min 28 s  1024 A (1,3 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s 22 s	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		P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature		P
F.8.	Damp heat test		P
F.8.1	Test procedure		P
	The test shall be performed according to IEC 60068-2-30 ( 12 +12 hours cycle)		
	Test Db temperature cycle between 25°C and upper temperature		
	The upper temperature shall be 55°C ± 2 °C (variant 1) and number of cycles shall be six.		
	The relative humidity is maintained at a high level at the upper temperature		



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Clause	Requirement + Test	Result - Remark	Verdict
	The test may be performed with only the electronic controls in the test chamber		
	Test result.....:		P
F.8.2	Verification of the overload releases		P
	Following the test F.8.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).		P
7.2.1.2.4	Opening by over-current releases		P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation		N/A
	The release shall cause tripping of the circuit-breaker with an accuracy of + 10% of the tripping current value of the current setting for all values of current setting of the overload release		N/A
2)	Inverse timer-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	2120 A (1,05 x 1 x 1 x 2000 A) Tr: 30 s 2 h no trip  852 A (1,05 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s 2 h no trip	P
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current, tripping shall then occur in less than the conventional time later	2585 A (1,3 x 1 x 1 x 2000 A) Tr: 30 s 20 min 21 s  1036 A (1,3 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s 22 s	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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	The width of the temperature band shall be at least 10 K on either side of the reference temperature		P
F.9.	Temperature variation cycles at a specified rate of change		P
F.9.1	Test conditions		P
	Each design of electronic controls shall be submitted to temperature variation cycles in according with figure F.15		
	The rise and fall of temperature during the rate of variation shall be 1 K/min $\pm$ 0,2 K/min.		
	Their temperature, once reached, shall be maintained for at least 2 h.		
	The number of cycles shall be 28.		
F.9.2	Test procedure		P
	The test shall be carried out according IEC 60068-2-14.		
	For the these test, the electronic controls may be mounted inside the circuit-breaker or separately.		
	The electronic controls shall be energized to simulate service conditions.		
	Where the electronics controls are mounted inside the circuit-breaker, the main circuit shall not be energized.		
F.9.3	Test results		P
	The electronic controls shall meet the following requirement.		P
	No operation of the electronic controls which would cause the circuit-breaker to trip during the 28 cycles shall occur.		P
F.9.4	Verification of overload releases		P
	Following the test F.8.1, the operation of the overload releases of the circuit-breaker shall be verified in accordance with 7.2.1.2.4, item b).		P
7.2.1.2.4	Opening by over-current releases		P
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation		N/A
	The release shall cause tripping of the circuit-breaker with an accuracy of + 10% of the tripping current value of the current setting for all values of current setting of the overload release		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
2)	Inverse timer-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	2115 A (1,05 x 1 x 1 x 2000 A) Tr: 30 s 2 h no trip  844 A (1,05 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s 2 h no trip	P
	Moreover, when at the end of the conventional time the value of current is immediately raised to 1,30 times the current setting, i.e. with the conventional tripping current, tripping shall then occur in less than the conventional time later	2570 A (1,3 x 1 x 1 x 2000 A) Tr: 30 s 20 min 29 s  102 A (1,3 x 0,8 x 0,5 x 2000 A) Tr: 0,5 s 23 s	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		P
	The width of the temperature band shall be at least 10 K on either side of the reference temperature		P

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Clause	Requirement + Test	Result - Remark	Verdict
Annex H	Individual pole short-circuit test sequence		N/A
	Circuit-breaker for use in IT systems		N/A
Annex J	Electromagnetic compatibility (EMC) – Requirements and test methods for circuit-breakers		P
		annex F and annex N	P
Annex L	Circuit-breakers not fulfilling the requirements for overcurrent protection		N/A
Annex M	Modular residual current devices (without integral current breaking device)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M		P
	Name of accessory	Shunt release	P
	Type designation or serial number	AC 220 V	P
	Rated voltage:	AC 220 V	P
	Sample no:	#14	P
N.2	Immunity		P
	Device, except closing coils, shall be tested with the circuit-breaker closed.		P
	Closing coils, if applicable, shall be tested with the circuit-breaker ready to close (main springs charged).		N/A
	Criterion A: during the test, the status of the circuit-breaker shall not change and the status of the outputs of remote indication modules shall not change.		P
	Criterion B: during the test, the status of the circuit-breaker shall not change while the status of the outputs of remote indication modules may change temporarily, but shall indicate the correct status of the circuit-breaker after the test.		P
	After the tests, the simplified functional verification of N.2.1.3 shall be made		P
N.2.1.3	For both criteria, after the test, the operation of the device shall be checked at the rated voltage , or , in the case of a range of rated voltages, at any convenient voltage within this range:		P
	An undervoltage release, when energized, shall not prevent the circuit-breaker from being closed; when the voltage is removed, the circuit-breaker shall trip.		N/A
	A shunt trip, when energized, shall trip the circuit-breaker.		P
	A closing coil, when energized, shall close the circuit-breaker.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	A motor-operator, when energized in accordance with the manufacturer's instructions, shall be capable of closing and opening the circuit-breaker.		N/A
N.2.2	Electrostatic discharge	8 kV / air discharge 8 kV / contact discharge	P
	Performance criterion B of N.2.1.2 applies.		P
N.2.3	Radiated radio-frequency electromagnetic field	10 V/m	P
	Frequency range.....:	80 – 1000 MHz 1,4 – 2,0 GHz	P
	Step 1, sweeping the frequency range, the dwell time of the amplitude modulated carrier for each frequency shall be between 500ms and 1000ms, and the step size shall be 1% of the precious frequency.		P
	Performance criterion A of N.2.1.2 applies.		P
	Step 2, the test shall be performed at each of the following frequencies: 80; 100; 120; 180; 240; 320; 480; 640; 960; 1400 and 1920MHz, the operation being verified after the field at each frequency has stabilized.		P
	At each of the frequencies, the operation of the device shall be checked according to N.2.1.3, the test is not applicable to remote status indicators,		P
N.2.4	Electrical fast transient (EFT/B)	4 kV on power ports / 1 min	P
	Performance criterion A of N.2.1.2 applies		P
N.2.5	Surges	4 kV (line to earth) 2 kV (line to line)	P
	Performance criterion B of N.2.1.2 applies		P
N.2.6	Conducted radio-frequency immunity test	10 V	P
	Frequency range.....:	0,15 – 80 MHz	P
	Step 1, sweeping the frequency range, the dwell time of the amplitude modulated carrier for each frequency shall be between 500ms and 1000ms, and the step size shall be 1% of the precious frequency.		P
	Performance criterion A of N.2.1.2 applies.		P
	Step 2, the test shall be performed at each of the following frequencies: 0,150; 0,300; 0,450; 0,600; 0,900; 1,20; 1,80; 2,40; 3,60; 4,80; 7,20; 9,60; 12,0; 19,2; 27,0; 49,4; 72,0 and 80,0MHz, the operation being verified after the level of the disturbing voltage at each frequency has stabilized		P

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Clause	Requirement + Test	Result - Remark	Verdict
	At each of the frequencies, the operation of the device shall be checked according to N.2.1.3, the test is not applicable to remote status indicators,		P
N.2.7	Voltage dips and interruptions		P
	The tests are applicable to devices with permanent a.c. power supply only.	Test at both 50 Hz and 60 Hz	P
	Dips	0 % during 0,5 / 0,5 cycle 0 % during 1 / 1 cycle 40% during 10 / 12 cycles 70% during 25 / 30 cycles 80% during 250 / 300 cycles	P
	Interruptions	0 % during 250 / 300 cycles	P
	During the test, the status of the circuit-breaker may change.		P
	The status of the outputs of the remote indication modules may change, but shall indicate the correct status of the breaker after the test.		P
	After the test, the correct operation of the device shall be checked in accordance with N.2.1.3		P
N.3	Emission		P
N.3.1	These tests are applicable to devices incorporating electronic circuits with fundamental switching frequencies greater than 9 kHz, and intended for continuous operation.		P
	Not applicable to shunt trips intended only for use with a clearing switch, either built-in or separate.	Shunt trip can be energized continuously	N/A
	Not applicable to motor-operators not incorporating permanently energized electronic circuits.		N/A
	Closing coils, when applicable, shall be tested with circuit-breaker ready to close (main springs charged).		N/A
	Undervoltage releases and closing coils shall be tested with the circuit-breaker closed.		N/A
	Shunt trips and motor-operators shall be tested with the circuit-breaker closed.		P
	Remote status indicators shall be tested with the circuit-breaker closed.		N/A
N.3.2	Conducted RF disturbances (150 kHz – 30 MHz)		P
	Limits of Class A of CISPR11 / CISPR22		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Limits of Class B of CISPR11 / CISPR22		N/A
	The product does not exceed the limits		P
N.3.3	Radiated RF disturbances (30 MHz – 1 GHz)		P
	Limits of Class A of CISPR11 / CISPR22		P
	Limits of Class B of CISPR11 / CISPR22		N/A
	The product does not exceed the limits		P



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Clause	Requirement + Test	Result - Remark	Verdict
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M		P
	Name of accessory	Motor	P
	Type designation or serial number	AC 220 V	P
	Rated voltage:	AC 220 V	P
	Sample no:	#15	P
N.2	Immunity		P
	Device, except closing coils, shall be tested with the circuit-breaker closed.	Only rectifier with diodes is in the circuit of motor	P
	Closing coils, if applicable, shall be tested with the circuit-breaker ready to close (main springs charged).		N/A
	Criterion A: during the test, the status of the circuit-breaker shall not change and the status of the outputs of remote indication modules shall not change.		P
	Criterion B: during the test, the status of the circuit-breaker shall not change while the status of the outputs of remote indication modules may change temporarily, but shall indicate the correct status of the circuit-breaker after the test.		P
	After the tests, the simplified functional verification of N.2.1.3 shall be made		P
N.2.1.3	For both criteria, after the test, the operation of the device shall be checked at the rated voltage , or , in the case of a range of rated voltages, at any convenient voltage within this range:		P
	An undervoltage release, when energized, shall not prevent the circuit-breaker from being closed; when the voltage is removed, the circuit-breaker shall trip.		N/A
	A shunt trip, when energized, shall trip the circuit-breaker.		N/A
	A closing coil, when energized, shall close the circuit-breaker.		N/A
	A motor-operator, when energized in accordance with the manufacturer's instructions, shall be capable of closing and opening the circuit-breaker.		P

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Clause	Requirement + Test	Result - Remark	Verdict
N.2.2	Electrostatic discharge		N/A
	Performance criterion B of N.2.1.2 applies.		N/A
N.2.3	Radiated radio-frequency electromagnetic field		N/A
	Frequency range.....:		N/A
	Step 1, sweeping the frequency range, the dwell time of the amplitude modulated carrier for each frequency shall be between 500ms and 1000ms, and the step size shall be 1% of the precious frequency.		N/A
	Performance criterion A of N.2.1.2 applies.		N/A
	Step 2, the test shall be performed at each of the following frequencies: 80; 100; 120; 180; 240; 320; 480; 640; 960; 1400 and 1920MHz, the operation being verified after the field at each frequency has stabilized.		N/A
	At each of the frequencies, the operation of the device shall be checked according to N.2.1.3, the test is not applicable to remote status indicators,		N/A
N.2.4	Electrical fast transient (EFT/B)		N/A
	Performance criterion A of N.2.1.2 applies		N/A
N.2.5	Surges	4 kV (line to earth) 2 kV (line to line)	P
	Performance criterion B of N.2.1.2 applies		P
N.2.6	Conducted radio-frequency immunity test		N/A
	Frequency range.....:		N/A
	Step 1, sweeping the frequency range, the dwell time of the amplitude modulated carrier for each frequency shall be between 500ms and 1000ms, and the step size shall be 1% of the precious frequency.		N/A
	Performance criterion A of N.2.1.2 applies.		N/A
	Step 2, the test shall be performed at each of the following frequencies: 0,150; 0,300; 0,450; 0,600; 0,900; 1,20; 1,80; 2,40; 3,60; 4,80; 7,20; 9,60; 12,0; 19,2; 27,0; 49,4; 72,0 and 80,0MHz, the operation being verified after the level of the disturbing voltage at each frequency has stabilized		N/A
	At each of the frequencies, the operation of the device shall be checked according to N.2.1.3, the test is not applicable to remote status indicators,		N/A
N.2.7	Voltage dips and interruptions		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	The tests are applicable to devices with permanent a.c. power supply only.		N/A
	Dips		N/A
	Interruptions		N/A
	During the test, the status of the circuit-breaker may change.		N/A
	The status of the outputs of the remote indication modules may change, but shall indicate the correct status of the breaker after the test.		N/A
	After the test, the correct operation of the device shall be checked in accordance with N.2.1.3		N/A
N.3	Emission		N/A
N.3.1	These tests are applicable to devices incorporating electronic circuits with fundamental switching frequencies greater than 9 kHz, and intended for continuous operation.		N/A
	Not applicable to shunt trips intended only for use with a clearing switch, either built-in or separate.		N/A
	Not applicable to motor-operators not incorporating permanently energized electronic circuits.		N/A
	Closing coils, when applicable, shall be tested with circuit-breaker ready to close (main springs charged).		N/A
	Undervoltage releases and closing coils shall be tested with the circuit-breaker closed.		N/A
	Shunt trips and motor-operators shall be tested with the circuit-breaker closed.		N/A
	Remote status indicators shall be tested with the circuit-breaker closed.		N/A
N.3.2	Conducted RF disturbances (150 kHz – 30 MHz)		N/A
	Limits of Class A of CISPR11 / CISPR22		N/A
	Limits of Class B of CISPR11 / CISPR22		N/A
	The product does not exceed the limits		N/A
N.3.3	Radiated RF disturbances (30 MHz – 1 GHz)		N/A
	Limits of Class A of CISPR11 / CISPR22		N/A
	Limits of Class B of CISPR11 / CISPR22		N/A
	The product does not exceed the limits		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex O	Instantaneous trip circuit-breakers (ICB)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	<b>TABLE 1: Heating Test</b> (Seq I, 8.3.3.6, sample number #01)		P
	Test current (A): .....	2000 A	—
	Ambient (°C): .....	21 °C	—
Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)	
3 Phases test			
Top left pole	55 K	80 K	
Top centre pole	59 K	80 K	
Top right pole	60 K	80 K	
Bottom left pole	53 K	80 K	
Bottom centre pole	54 K	80 K	
Bottom right pole	51 K	80 K	
Front enclosure of electrical release	6 K	60 K	
Back enclosure of electrical release	7 K	Ref.	
Button	3 K	35 K	
Handle for store energy	2 K	35 K	
Front cover	3 K	60 K	

	<b>TABLE 2: Heating Test</b> (Seq I, 8.3.3.6, sample number #01)		P
	Test current (A): .....	2000 A	—
	Ambient (°C): .....	18 °C	—
Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)	
Phase + N test			
Top adjacent pole	50 K	80 K	
Top N pole	47 K	80 K	
Bottom adjacent pole	43 K	80 K	
Bottom N pole	41 K	80 K	

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 3: Heating Test (Seq I, 8.3.3.6, sample number #02)			P
Test current (A): .....		2000 A	—
Ambient (°C): .....		19 °C	—
Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)	
3 Phases test			
Top left pole	55 K	80 K	
Top centre pole	51 K	80 K	
Top right pole	59 K	80 K	
Bottom left pole	52 K	80 K	
Bottom centre pole	47 K	80 K	
Bottom right pole	50 K	80 K	
Front enclosure of electrical release	7 K	60 K	
Back enclosure of electrical release	8 K	Ref.	
Button	2 K	35 K	
Handle for store energy	2 K	35 K	
Front cover	2 K	60 K	

TABLE 4: Heating Test (Seq II + III, 8.3.4.4, sample number #03)			P
Test current (A): .....		2000 A	—
Ambient (°C): .....		15 °C	—
Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)	
Top left pole	48 K	80 K	
Top centre pole	50 K	80 K	
Top right pole	54 K	80 K	
Bottom left pole	53 K	80 K	
Bottom centre pole	60 K	80 K	
Bottom right pole	55 K	80 K	

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 5: Heating Test (Seq IV, 8.3.6.3, sample number #10)			P
Test current (A): .....		2000 A	—
Ambient (°C): .....		14 °C	—
Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)	
Top adjacent pole	46 K	80 K	
Top N pole	52 K	80 K	
Bottom adjacent pole	52 K	80 K	
Bottom N pole	54 K	80 K	

TABLE 6: Heating Test (Seq VI, 8.3.8.6, sample number #11)			P
Test current (A): .....		2000 A	—
Ambient (°C): .....		12 °C	—
Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)	
Top left pole	57 K	80 K	
Top centre pole	58 K	80 K	
Top right pole	59 K	80 K	
Bottom left pole	60 K	80 K	
Bottom centre pole	62 K	80 K	
Bottom right pole	57 K	80 K	

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 7: dielectric strength (Seq I, 8.3.3.5, sample number #01, #02, #03)			P
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)	
between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation	2200 V	No	
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	2200 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the main circuit	1500 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the other circuits	1500 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the exposed conductive parts	1500 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the enclosure or mounting plate	1500 V	No	
across the poles of the main circuit	2200 V	No	
supplementary information: N/A			



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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8: dielectric strength (Seq II + III, 8.3.5.3, sample number #03, #4A)		P
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)
between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation	1000 V	No
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	1000 V	No
between each control and auxiliary circuit not normally connected to the main circuit and the main circuit	1000 V	No
between each control and auxiliary circuit not normally connected to the main circuit and the other circuits	1000 V	No
between each control and auxiliary circuit not normally connected to the main circuit and the exposed conductive parts	1000 V	No
between each control and auxiliary circuit not normally connected to the main circuit and the enclosure or mounting plate	1000 V	No
across the poles of the main circuit	1000 V	No
supplementary information: N/A		

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 9: dielectric strength (Seq III, 8.3.5.3, sample number #05, #07, #08, #09)			P
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)	
between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation	1000 V	No	
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	1000 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the main circuit	1000 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the other circuits	1000 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the exposed conductive parts	1000 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the enclosure or mounting plate	1000 V	No	
across the poles of the main circuit	1000 V	No	
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 10: dielectric strength (Seq III, 8.3.5.3, sample number #06)			P
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)	
between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation	1380 V	No	
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	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the main circuit	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the other circuits	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the exposed conductive parts	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the enclosure or mounting plate	1380 V	No	
across the poles of the main circuit	1380 V	No	
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 11: dielectric strength (Seq IV, 8.3.6.5, sample number #10)			P
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)	
between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation	1380 V	No	
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	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the main circuit	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the other circuits	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the exposed conductive parts	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the enclosure or mounting plate	1380 V	No	
across the poles of the main circuit	1380 V	No	
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 12: dielectric strength (Seq VI, 8.3.8.5, sample number #11)			P
test voltage applied between:	test potential applied (V)	breakdown / flashover (Yes/No)	
between all the terminals of the main circuit connected together (including the control and auxiliary circuits connected to the main circuit) and the enclosure or mounting plate, with the contacts in all normal positions of operation	1380 V	No	
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	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the main circuit	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the other circuits	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the exposed conductive parts	1380 V	No	
between each control and auxiliary circuit not normally connected to the main circuit and the enclosure or mounting plate	1380 V	No	
across the poles of the main circuit	1380 V	No	
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 13: clearance and creepage distance measurements						P
clearance cl and creepage distance dcr at/of:	Ui(V)	U imp (kV)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Between poles	1000 V	12 kV	8 mm	17,7 mm	16 mm	17,7 mm
Between live parts of main circuit and parts intended to be earthed	1000 V	12 kV	8 mm	34,4 mm	16 mm	34,4 mm
Between the contacts in the open position	1000 V	12 kV	8 mm	34 mm	16 mm	34 mm
Between live parts of main circuit and control circuit	300 V	4 kV	3 mm	50 mm	5 mm	50 mm
Between live parts of control circuit and parts intended to be earthed	300 V	4 kV	3 mm	20 mm	5 mm	20 mm
Between different polarities of control circuit	300 V	4 kV	3 mm	13,6 mm	5 mm	13,6 mm
supplementary information: N/A						

TABLE 14: threaded part torque test			P
threaded part identification	diameter of thread (mm)	column number ( I, II, or III)	applied torque ( Nm )
Screws terminal	12 mm	III	202,4 Nm Test as per manufacturer's request
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

TABLE 15: Resistance to fire (Glow wire test)							P
No.	Description	Colour	Temp. °C	burning after t (s)	drops	support burning	—
1	Base	Grey	960 °C	0 s	N	N	P
2	Middle cover	Grey	650 °C	0 s	N	N	P
3	Front cover	Grey	650 °C	0 s	N	N	P
4	Handle	Black	650 °C	0 s	N	N	P
5	Arcing chamber	Red	960 °C	2,9 s	N	N	P

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

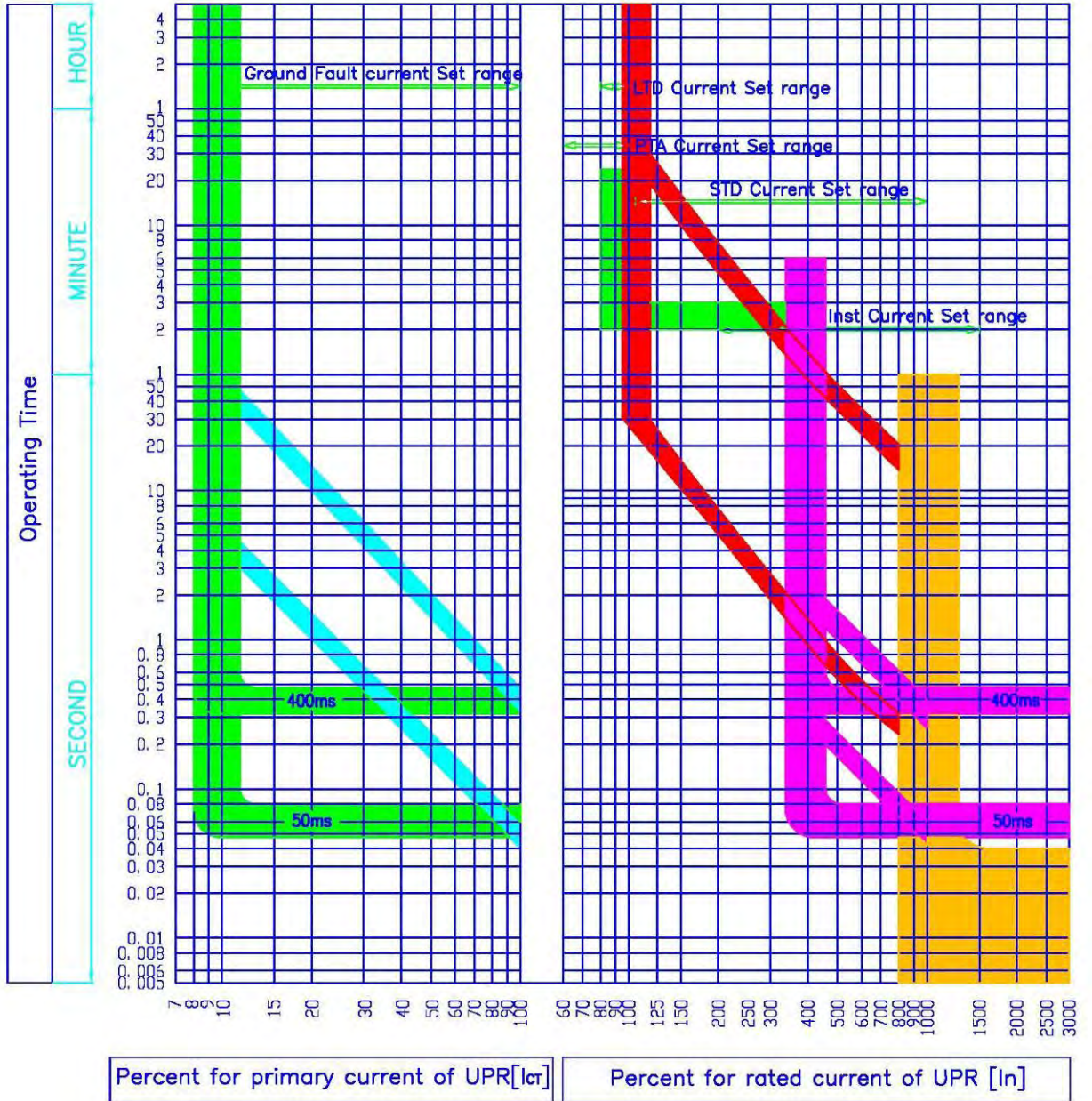
Test for special curve	Tripping limits and characteristic for $I_{sd}^2 t$ is ON UAS20, 2000 A, 4 poles, sample no #12		
	Tripping limits and characteristic		
	Opening under short-circuit conditions		
	Manufacturer's name or trademark	HYUNDAI	
	Type designation or serial number	UAS20	
	Sample no:	#12	
	Rated operational voltage: $U_e$ (V)	500 V~, 690 V~	
	Rated current: $I_n$ (A)	2000 A	
	Tripping time = $((10 I_n)^2 / (I_{testing})^2) \times T_{sd}$ setting		
	Test ambient air temperature:	21 °C	P
	Range of adjustable setting current: (A)	$I_{sd}$ (short time delay tripping setting) 1, 1,5, 2, 2,5, 3, 4, 6, 8, 10 $I_n$ , NON $I_n = 0,5, 0,63, 0,7, 0,8, 0,9, 1$ $I_{ct}$	P
	Test current: 150% of the <b>minimum</b> adjustable setting current: (A)	1494 A (1,5 x 1 x 0,5 x 2000 A) $T_{sd}$ : 50 ms	P
	Conventional tripping time: 2222,22 ±20%	2268 ms	P
	Test current: 150% of the <b>maximum</b> adjustable setting current: (A)	29880 A (1,5 x 10 x 1 x 2000 A) $T_{sd}$ : 400 s	P
	Conventional tripping time: 177,78 ±20%	201 ms	P



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

Test for special curve	Tripping limits and characteristic for $I_{g^2t}$ is ON UAS20, 2000 A, 4 poles, sample no #12		
	Tripping limits and characteristic		
	Opening under short-circuit conditions		
	Manufacturer's name or trademark	HYUNDAI	
	Type designation or serial number	UAS20	
	Sample no:	#12	
	Rated operational voltage: $U_e$ (V)	500 V~, 690 V~	
	Rated current: $I_n$ (A)	2000 A	
	Tripping time = $((1 I_{ct})^2 / (I_{testing})^2) \times T_g$ setting		
	Test ambient air temperature:	21 °C	P
	Range of adjustable setting current: (A)	$I_g$ (Ground fault release current setting): 0,1, 0,2, 0,3, 0,4, 0,5, 0,6, 0,7, 0,8, 1,0 $I_{ct}$ , NON	P
	Test current: 200% of the <b>minimum</b> adjustable setting current: (A)	396 A (2 x 0,1 x 2000 A) $T_g$ : 50 ms	P
	Conventional tripping time: 1250 ±20%	1250 ms	P
	Test current: 150% of the <b>maximum</b> adjustable setting current: (A)	2980 A (1,5 x 1,0 x 2000 A) $T_g$ : 400 ms	P
	Conventional tripping time: 177,78 ±20%	206 ms	P

Time current characteristics



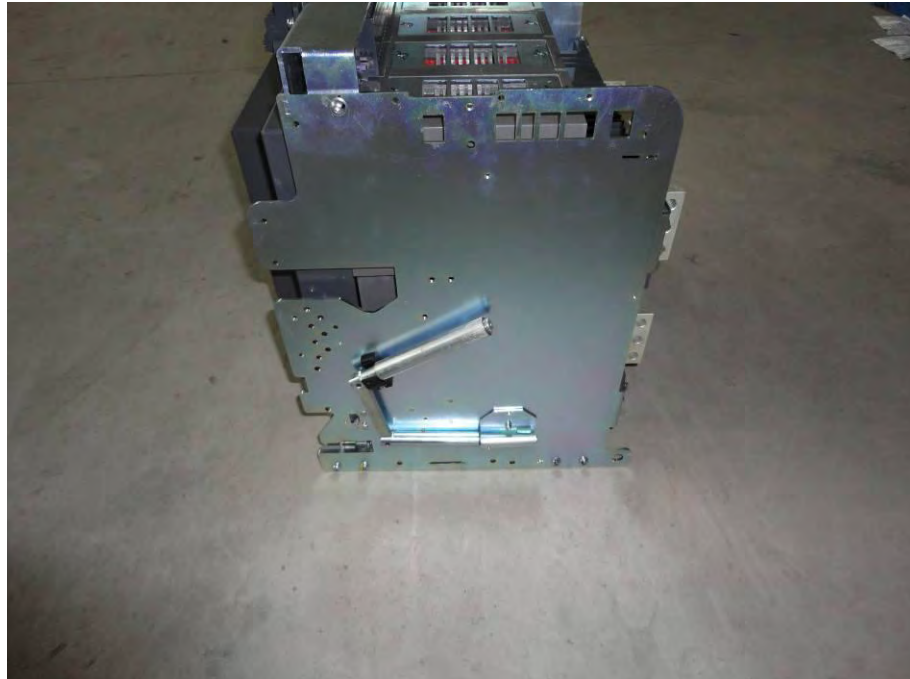
Photographs



Overview



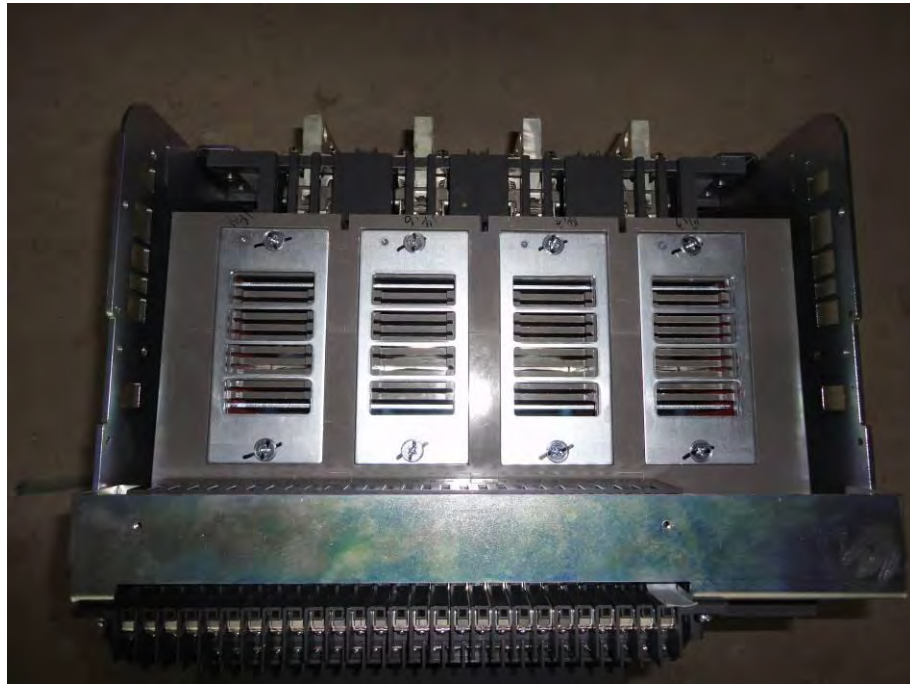
Front view



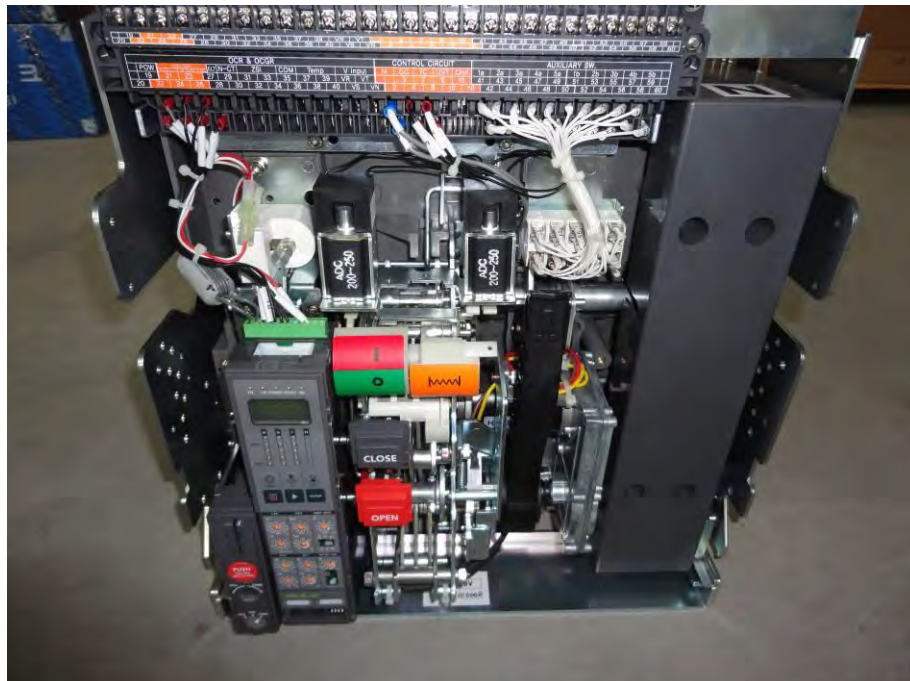
Side view



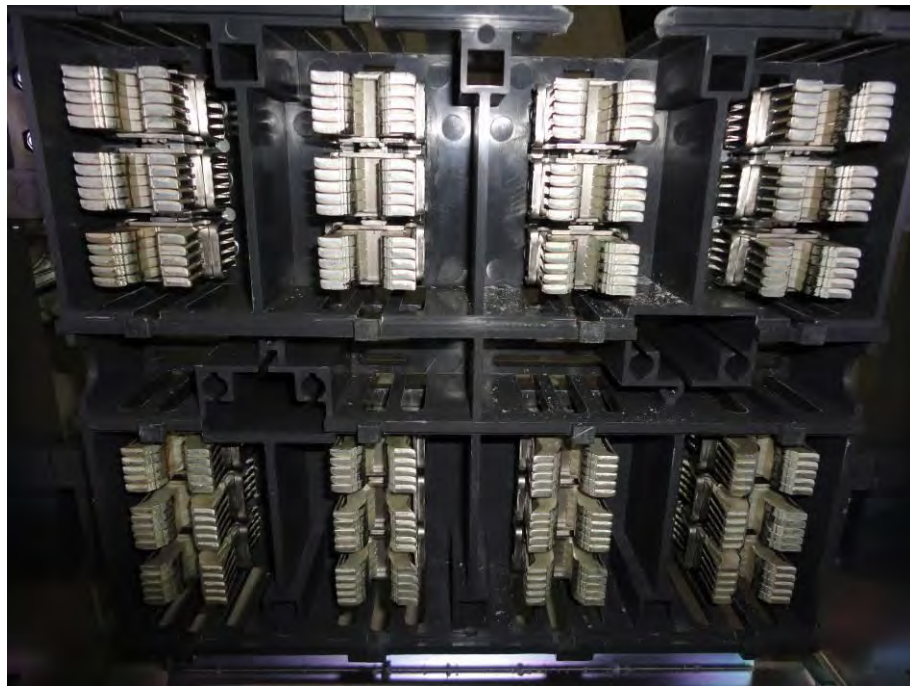
Back view



Top view



Open view



Cluster in cradle



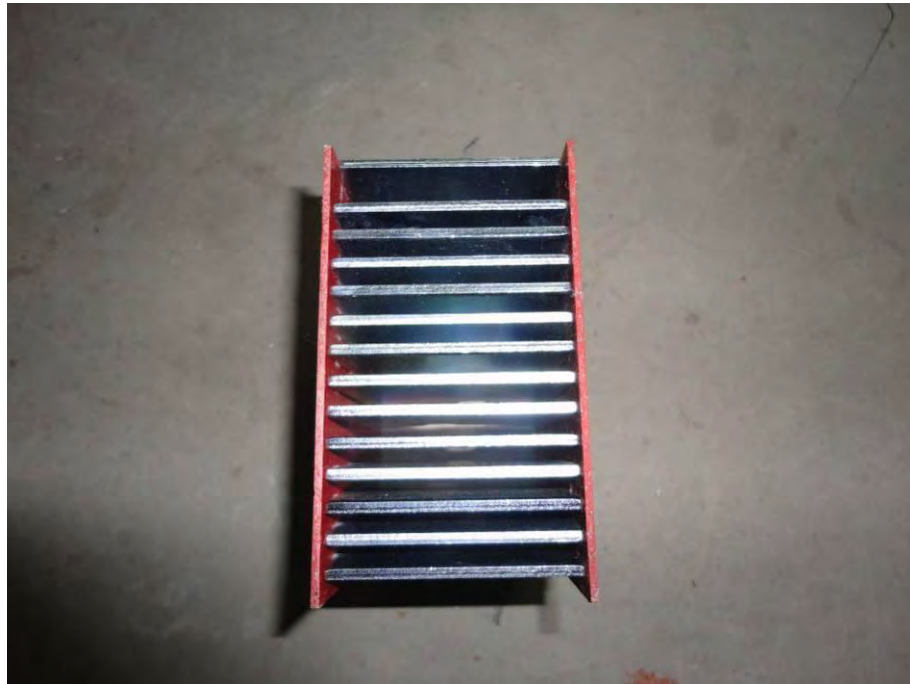
Contact



Arc chamber



Arc chamber



Arc chamber



Arc chamber





Overcurrent release



Overcurrent release



Overcurrent release