CB TEST CERTIFICATE

Ref. Certificate No.

NL-32141

IEC SYSTEM OF CONFORMITY ASSESSMENT SCHEMES FOR ELECTROTECHNICAL EQUIPMENT AND COMPONENTS (IECEE) CB SCHEME

Issued by:	DEKRA Certification B.V.		
Product:	Moulded-Case Circuit Breaker		
Applicant:	HYUNDAI HEAVY INDUSTRIES CO., LTD	1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan	Korea, Republic of
Manufacturer:	HYUNDAI HEAVY INDUSTRIES CO., LTD	1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan	Korea, Republic of
Factory: nb: Additional factory information on page 2	HYUNDAI HEAVY INDUSTRIES CO., LTD	1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan	Korea, Republic of
Rating and principal characteristics:	Ue: 380 / 415 / 440 / 460 Vac, Ui: 1000 Vac, Uimp: 8 kV, In: 500 A, 630 A, 700 A, 800 A, 50 / 60 Hz 2P, 3P and 4P (unprotected N pole) Icu: 20 kA at 380 / 415 / 440 / 460 Vac for F series 26 kA at 380 / 415 / 440 / 460 Vac for N series 45 kA at 380 / 415 Vac, 38 kA at 440 / 460 Vac for E series 65 kA at 380 / 415 Vac, 50 kA at 440 / 460 Vac for S series 85 kA at 380 / 415 Vac, 70 kA at 440 / 460 Vac for H series 85 kA at 380 / 415 / 440 / 460 Vac for L series Ics = 100% Icu See annex for further ratings		
Trade mark (if any):	HYUNDAI		
Model/Type reference:	HGM 800 F, HGM 800 N, HGM 800 E, HGM 800 S, HGM 800 H, HGM 800 L, HGM 630 F, HGM 630 N, HGM 630 E, HGM 630 S, HGM 630 H, HGM 630 L		
Additional information:			
Sample of product tested to be in conformity with IEC:	60947-2(ed.4);am1;am2		
Test Report Ref. No:	3306418.50		

This CB Test Certificate is issued by the National Certification Body:

DEKRA Certification B.V.
Meander 1051, 6825 MJ
Arnhem
The Netherlands

Signed by: F.S.Strikwerda

Date of issue: 2014-08-21

HYUNDAI HEAVY INDUSTRIES(CHINA) ELECTRICS CO., LTD
Xinba Scientific and Technologic Zone, Yangzhong, Jiangsu
China

Additional information (if necessary)

This CB Test Certificate is issued by the National Certification Body:

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Meander 1051, 6825 MJ
Arnhem
The Netherlands

DEKRA

Signed by: F.S.Strikwerda

Date of issue: 2014-08-21

Ratings:

number of poles	:	2P, 3P and 4P (unprotected N pole)
protected pole	:	2 or 3
rated operational voltage (Ue)	:	380 / 415 / 440 / 460 Vac
rated insulation voltage (Ui)	:	1000 Vac
rated impulse withstand voltage (Uimp)	:	8 kV
rated current (In)	:	500 A, 630 A for 630 series, 700 A, 800 A for 800 series
rated operational current (Ie)	:	0,63 - 1,0 In or fixed
conventional thermal current (Ith)	:	Equal to In
current rating for four-pole circuit-breakers	:	Equal to In
rated frequency	:	50 / 60 Hz
rated ultimate short-circuit breaking capacity (Icu)	:	20 kA at 380 / 415 / 440 / 460 Vac for F series 26 kA at 380 / 415 / 440 / 460 Vac for N series 45 kA at 380 / 415 Vac, 38 kA at 440 / 460 Vac for E series 65 kA at 380 / 415 Vac, 50 kA at 440 / 460 Vac for S series 85 kA at 380 / 415 Vac, 70 kA at 440 / 460 Vac for H series 85 kA at 380 / 415 / 440 / 460 Vac for L series
rated service short-circuit breaking capacity (Ics)	:	Ics = 100% Icu
suitable for isolation	:	Suitable
utilization category	:	A
safety distance (screen-circuit breaker)	:	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm
instantaneous release	:	Magnetic type, fixed, 2 poles in series: Ii = 10 In single pole: 12 In
time setting of the instantaneous release	:	Fixed
inverse time delay release	:	Thermal type, fixed and adjustable Ir: 0,63 In, 0.8 In, 1,0 In
time setting of the inverse time delay release	:	Fixed
method of mounting	:	Fixed
EMC environment	:	A and B
circuit-breaker for use on phase-earthed systems	:	N/A
circuit-breaker for use in IT systems	:	Yes, 9,6 kA at 460 Vac
line/load terminal	:	Marked
connection	:	Copper conductor with cable lug

Test Report issued under the responsibility of:

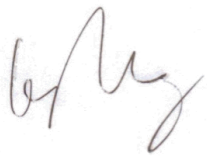
DEKRA

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

Report Reference No.....:	3306418.50
Date of issue .....:	2014-08-20
Total number of pages.....:	115
CB Testing Laboratory.....:	DEKRA Testing Services (Zhejiang) Co., Ltd.
Address.....:	No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P. R. China
Applicant's name.....:	HYUNDAI HEAVY INDUSTRIES CO., LTD.
Address.....:	1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan, Korea
Test specification:	
Standard .....:	IEC 60947-2:2006 (Fourth Edition) + A1: 2009 + A2: 2013
Test procedure .....:	CB scheme
Non-standard test method……..:	N/A
Test Report Form No.....:	IEC60947_2G
Test Report Form(s) Originator.....:	DEKRA Certification BV
Master TRF .....:	Dated 2013-11

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

Test item description..... :	Moulded-case circuit-breaker
Trade Mark.....:	HYUNDAI
Manufacturer.....:	HYUNDAI HEAVY INDUSTRIES CO., LTD. 1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan, Korea
Model/Type reference.....:	HGM 800 F, N, E, S, H, L; HGM 630 F, N, E, S, H, L
Ratings.....:	2P, 3P and 4P (unprotected N pole) Ue: 380 / 415 / 440 / 460 Vac, Ui: 1000 V, Uimp: 8 kV In: 500 A, 630 A, 700 A, 800 A, 50 / 60 Hz Icu: 20 kA at 380 / 415 / 440 / 460 Vac for F series 26 kA at 380 / 415 / 440 / 460 Vac for N series 45 kA at 380 / 415 Vac, 38 kA at 440 / 460 Vac for E series 65 kA at 380 / 415 Vac, 50 kA at 440 / 460 Vac for S series 85 kA at 380 / 415 Vac, 70 kA at 440 / 460 Vac for H series 85 kA at 380 / 415 / 440 / 460 Vac for L series Ics = 100% Icu Refer to page 7 to 11 for more technical data

Testing procedure and testing location:		
☒ **CB Testing Laboratory:**	DEKRA Testing Services (Zhejiang) Co., Ltd.	
Testing location/ address.....:	No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P. R. China	
Tested by (name + signature) .....:	King Wang	
Approved by (name + signature) .....:	Eric Wang	
☐ **Testing procedure: TMP**		
Testing location/ address.....:		
Tested by (name + signature) .....:		
Approved by (name + signature) .....:		
☐ **Testing procedure: WMT**		
Testing location/ address.....:		
Tested by (name + signature) .....:		
Witnessed by (name + signature) ....:		
Approved by (name + signature) .....:		
☐ **Testing procedure: SMT**		
Testing location/ address.....:		
Tested by (name + signature) .....:		
Approved by (name + signature) .....:		
Supervised by (name + signature)...:		

List of Attachments (including a total number of pages in each attachment): N/A

Summary of testing:

In case of alternative test programs for circuit breakers with a different number of poles, the following program is used:

☐ **Programme 1 (three pole fully tested)**

☒ **Programme 2 (four pole fully tested)**

☐ **Alternative program not applicable**

Tests performed (name of test and test clause):

The following tests were conducted according to table 9 and 10 of IEC/EN 60947-2:2006 + A1:2009 + A2:2013

No.	Current	Number of poles	Type	Voltage	Short circuit current	Test sequence
#01	800 A	4P	HGM 800 L	460 Vac	-	I
#02	800 A	3P	HGM 800 L	460 Vac	-	I
#03	800 A	4P	HGM 800 L	460 Vac	85 kA	II+III
#04	500 A	4P	HGM 800 L	460 Vac	85 kA	II+III
#05	800 A	4P	HGM 800 L	460 Vac / √3	51 kA	III
#06	500 A	4P	HGM 630 L	460 Vac / √3	51 kA	III
#07	800 A	3P	HGM 800 L	460 Vac	85 kA	III
#08	800 A	4P	HGM 800 L	460 Vac	9,6 kA	Annex H

Note:

1. The products of HGM 800 F, HGM 800 N, HGM 800 E, HGM 800 S, HGM 800 H, HGM 800 L, HGM 630 F, HGM 630 N, HGM 630 E, HGM 630 S, HGM 630 H, HGM 630 L are a series of MCCBs with same frame size:
   - 800 refers to 700 A, 800 A
   - 630 refers to 500 A, 630 A

2. There is no construction break within the frame size.

3. As per manufacturer's declaration, the release with adjustable or fixed is for commercial reasons. The circuit breaker with adjustable release and fixed release are fully identical except the mark on the labels.

4. The N pole is fully identical to phase pole except the N pole is not protected, N pole can be at right or left side of product.

5. The 2-pole circuit-breaker produced by removing the centre current path from a 3-pole circuit-breaker, so it needs not be tested as it is considered to be covered by the tests on the 3-pole variant.

6. F, N, E, S, H and L are fully identical except the short circuit capacities and type references marked on the labels:
   - F refers to 20 kA at 380 / 415 / 440 / 460 Vac
   - N refers to 26 kA at 380 / 415 / 440 / 460 Vac
   - E refers to 45 kA at 380 / 415 Vac, 38 kA at 440 / 460 Vac
   - S refers to 65 kA at 380 / 415 Vac, 50 kA at 440 / 460 Vac
   - H refers to 85 kA at 380 / 415 Vac, 70 kA at 440 / 460 Vac
   - L refers to 85 kA at 380 / 415 / 440 / 460 Vac

   Therefore, the tests conducted on HGM 800 L with maximum rated current at maximum short-circuit breaking capacity and HGM 630 L with minimum rated current at maximum short-circuit breaking capacity are deemed to cover the tests of all other models listed above.

Testing location:

Sequence I tests were conducted in:
DEKRA Testing Services (Zhejiang) Co., Ltd.
No.5, Changjiang Road, Great Bridge Industrial Park, North Baixiang, Wenzhou, Zhejiang, 325603, P. R. China

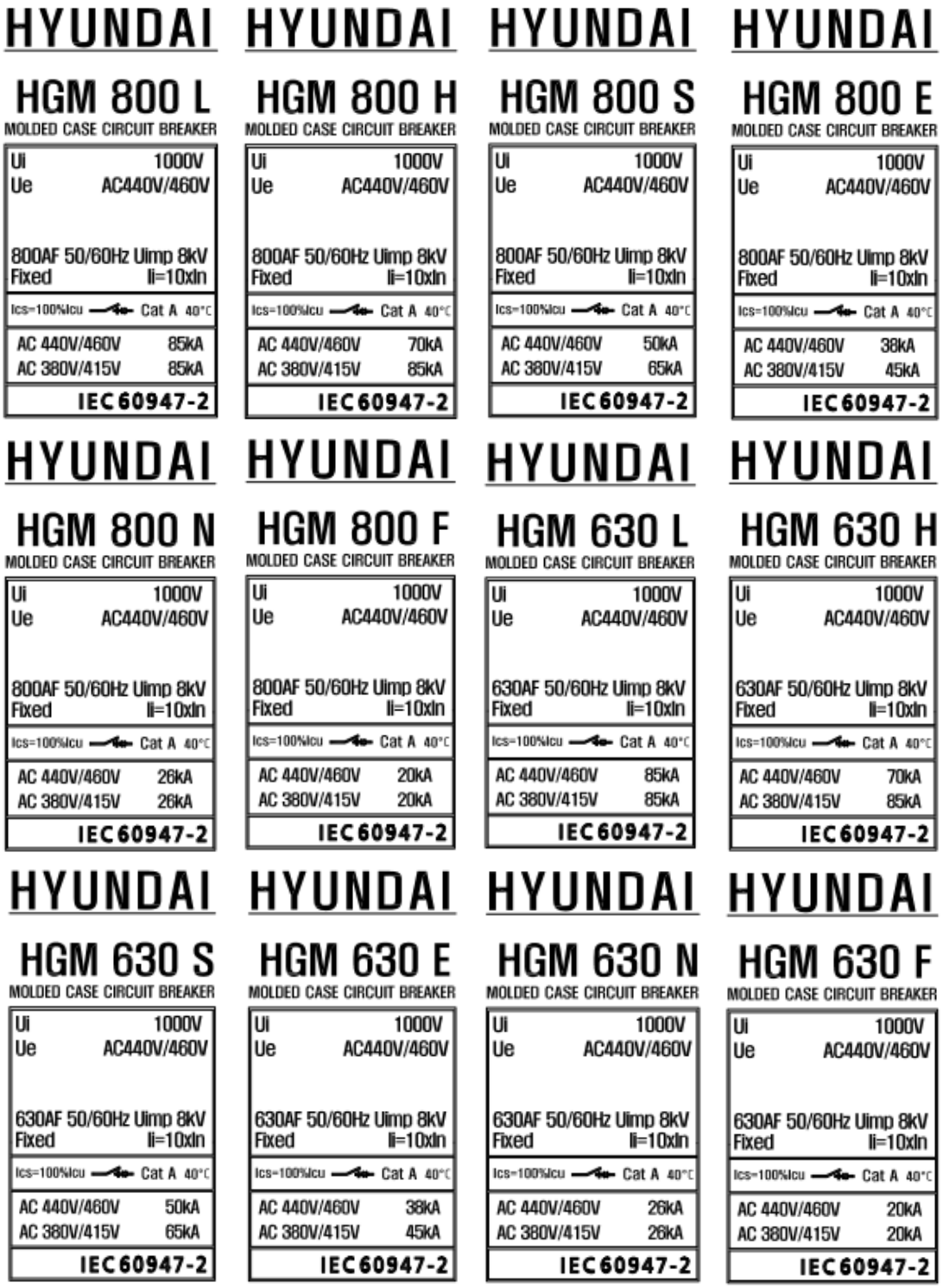
Sequence II+III, III and annex H tests were conducted in:
Zhejiang Fangyuan Test Group Co., Ltd.
Guangqiong Road, Jiaxing City, Zhejiang Province, China

Summary of compliance with National Differences
List of countries addressed:

N/A

Copy of marking plate:

"The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks"



Copy of marking plate (continued):

"The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks"

Test item particulars: test item vs. test requirements	
3. Classification	
3.1. Utilization category: (A or B).	A
3.2. Interruption medium: (air, vacuum, gas Break).....	Air
3.3. Design: (open construction, moulded case).....	Moulded case
3.4. Method of controlling the operation mechanism: (dependent manual, independent manual, dependent power, independent power).....	Independent manual
3.5. Suitability for isolation: (suitable, not -suitable)	Suitable
3.6. Provision for maintenance: (maintainable, non maintainable)	Maintainable
3.7. Method of installation: (fixed, plug in, withdrawable	Fixed
3.8. Degree of protection: (IP code).....	IP20 (only front side)
4.7. Type of release (thermo-magnetic / electronic).....	Thermo-magnetic
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 and B
Circuit-breaker for use on phase-earthed systems	N/A
Circuit-breaker for use in IT systems	Yes, 9,6 kA at 460 Vac
Rated and limiting values, main circuit.....:	
- rated operational voltage: Ue (V).....	380 / 415 / 440 / 460 Vac
- rated insulation voltage: Ui (V)	1000 V
- rated impulse withstand voltage: Uimp (kV)	8 kV
- rated operational current: Ie (A).....	0,63 - 1,0 In or fixed
- kind of current	AC
- conventional free air thermal current: Ith (A)	Equal to In
- conventional enclosed thermal current: Ithe (A)	N/A
- current rating for four-pole circuit-breakers: (A).....	Equal to In
- number of poles	2P, 3P and 4P (unprotected N pole)
- rated frequency: (Hz).....	50 / 60 Hz
- integral fuses (rated values).....	N/A

Rated duty :	
- eight-hour duty	N/A
- uninterrupted duty: Iu (A)	Equal to In
Short-circuit characteristic :	
rated short-time making capacity: Icm (kA)	HGM 800 F, HGM 630 F: 40 kA at 380 / 415 / 440 / 460 Vac HGM 800 N, HGM 630 N: 54,6 kA at 380 / 415 / 440 / 460 Vac HGM 800 E, HGM 630 E: 94,5 kA at 380 / 415 Vac, 79,8 kA at 440 / 460 Vac HGM 800 S, HGM 630 S: 143 kA at 380 / 415 Vac, 105 kA at 440 / 460 Vac HGM 800 H, HGM 630 H: 187 kA at 380 / 415 Vac, 154 kA at 440 / 460 Vac HGM 800 L, HGM 630 L: 187 kA at 380 / 415 / 440 / 460 Vac

rated ultimate short-circuit breaking capacity: Icu (kA).	HGM 800 F, HGM 630 F: 20 kA at 380 / 415 / 440 / 460 Vac HGM 800 N, HGM 630 N: 26 kA at 380 / 415 / 440 / 460 Vac HGM 800 E, HGM 630 E: 45 kA at 380 / 415 Vac, 38 kA at 440 / 460 Vac HGM 800 S, HGM 630 S: 65 kA at 380 / 415 Vac, 50 kA at 440 / 460 Vac HGM 800 H, HGM 630 H: 85 kA at 380 / 415 Vac, 70 kA at 440 / 460 Vac HGM 800 L, HGM 630 L: 85 kA at 380 / 415 / 440 / 460 Vac
rated service short-circuit breaking capacity: Ics (kA)	100% Icu
rated short-time withstand current: Icw (kA/s)	N/A
Control circuits : Electrical control circuits :	
- kind of current: (AC, DC).....	N/A
- rated frequency: (Hz).....	N/A
- rated control circuit voltage: Uc (nature, frequency, V) ...	N/A
- rated control supply voltage: Us (nature, frequency V)	N/A
Air supply control circuits: (pneumatic or electro-pneumatic)	
- rated pressure and its limit.....	N/A
- volumes of air, at atmospheric pressure, required for each closing and each opening operation.....	N/A

Auxiliary circuits :	
Rated and limiting values, auxiliary circuits:	
- rated operational voltage Ue (V)	N/A
- rated insulation voltage: Ui (V)	N/A
- rated operational current: Ie (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: Iu (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	N/A
2) Over-current release	Yes
a) instantaneous	Yes
b) definite time delay	N/A
c) inverse time delay	Yes
- independent of previous load	N/A
- dependent on previous load; (for example thermal type release)	Yes, thermo-magnetic release
3) Undervoltage release (for opening)	N/A
4) Other releases	N/A
Characteristics :	
1) Shunt release and undervoltage release (for opening) :	N/A
- rated control circuit voltage: Uc (nature, frequency, V) :	N/A
- kind of current	N/A
- rated frequency: (if AC)	N/A
2) Over-current release	Yes
- rated current(In)	500 A, 630 A for 630 series, 700 A, 800 A for 800 series
- kind of current	AC
- rated frequency: (if AC)	50 / 60 Hz
- current setting (or range of settings)	Instantaneous tripping (short circuit condition): Fixed, 2 poles in series: Ii = 10 In single pole: 12 In Inverse time delay tripping (overload condition): 0,63 In, 0,8 In, 1,0 In or fixed
- time settings (or range of settings)	Instantaneous tripping: fixed Inverse time delay tripping: fixed

Classification of installation and use ..... :	Fixed
Supply Connection ..... ::	3 phase or 3 phase with neutral

Possible test case verdicts:

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

Testing..... :	
Date of receipt of test item ..... :	2014 - 06
Date (s) of performance of tests ..... :	2014 - 06 - 2014 - 07

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.
Throughout this report a ☒ comma / ☐ point is used as the decimal separator.

Though it is not mentioned on the first page, the following standard was also taken into consideration:
EN 60947-2:2006 + A1:2009 + A2:2013.
IEC 60947-1:2007 + A1:2010
EN 60947-1:2007 + A1:2011

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

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

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

Name and address of factory (ies) ..... :	Factory 1: HYUNDAI HEAVY INDUSTRIES CO., LTD. 1000, Bangeojinsunhwan-doro, Dong-gu, Ulsan, Korea Factory 2: HYUNDAI HEAVY INDUSTRIES (CHINA) ELECTRICS CO., LTD. Xinba Scientific and Technologic Zone, Yangzhong, Jiangsu, P.R. China.

General product information:

Technical data of the MCCBs are listed on page 7 to 11 of this report.

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
5.2	MARKING HGM 800 L, 800 A, 4P/3P/2P, sample no. #09, #10, #11		
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:	800 A	P
	- suitability for isolation, if applicable, with the symbol 	Suitable for isolation	P
	- indication of the open and closed position: with ○ and 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	HGM 800 L	P
	- IEC 60947-2 if the manufacturer claims compliance with this standard.	IEC 60947-2	P
	- utilization category	A	P
	- rated operational voltage(s) Ue	380 / 415 / 440 / 460 Vac	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	Suitable for IT systems	N/A
	- value (or range) of the rated frequency and/or the indication DC (or symbol)	50 / 60 Hz	P
	- rated service short-circuit breaking capacity. Ics	Ics = 100% Icu	P
	- rated ultimate short-circuit breaking capacity. Icu	85 kA at 380 / 415 / 440 / 460 Vac	P
	- rated short-time withstand current, (Icw) and associated short-time delay, for utilization category B		N/A
	- line and load terminals, unless their connection is immaterial	LINE / LOAD are marked	P
	- neutral pole terminals, if applicable, by the letter N	N is marked for 4P	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- protective earth terminal, where applicable, by the symbol acc. 7.1.9.3 of part 1		N/A
	- ref. temperature for non-compensated thermal releases, if different from 30°C	40 °C	P
	- range of the current setting (Ir) of adjustable overload release	Ir = 0,63 In, 0,8 In, 1,0 In, adjustable	P
	- value / range of the rated instantaneous short-circuit current setting (Ii), fixed or adjustable	Ii = 10 In, fixed	P
c)	Marked on the circuit-breaker as specified in item b), or shall be made available in the manufacturer's published information:		
	- rated short-circuit making capacity (Icm) (if higher than specified in 4.3.5.1)		N/A
	- rated insulation voltage. (Ui) if higher than the maximum rated operational voltage)	1000 V	P
	- rated impulse withstand voltage (Uimp), when declared.	8 kV	P
	- pollution degree if other than 3		N/A
	- conventional enclosed thermal current (Ithe) if different from the rated current:		N/A
	- IP Code, where applicable:	IP20 (only front side)	P
	- minimum enclosure size and ventilation data (if any) to which marked ratings apply:		N/A
	- details of minimum distance between circuit-breaker and earthed metal parts for circuit-breaker intended for use without enclosure:	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	- r.m.s sensing if applicable, according to F.4.1.1		N/A
	- suitability for environment A or B	A and B	P
	- minimum cable cross-section, if different from Table 9 of IEC 60947-1, for ratings ≤ 20 A according to rated ultimate short-circuit breaking capacity Icu;		N/A
	- values of tightening torque for the circuit-breaker terminals.	42,2 Nm	P

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
d)	The following data concerning the opening and closing devices of the circuit-breaker shall be placed either on their own nameplates or on the nameplate of the circuit-breaker:		
	- rated control circuit voltage of the closing device, and rated frequency for AC:		N/A
	- rated control circuit voltage of the shunt release and/or of the under-voltage release, and rated frequency:		N/A
	- rated current of indirect over-current releases:		N/A
	- number and type of auxiliary contacts and kind of current, rated frequency (if AC) and rated voltages of the auxiliary switches, if different from those of the main circuit.		N/A
e)	Terminal shall be clearly and permanently identified in acc. with IEC 60445 and annex L :		
	- line terminal	LINE is marked	P
	- load terminal	LOAD is marked	P
	- neutral pole terminal ”N”	N is marked for 4P	P
	- protective earth terminal ⏚		N/A
	- terminal of coils (A/B)		N/A
	- terminal of shunt release (B)		N/A
	- terminals of under-voltage release (D)		N/A
	- terminals of interlocking electromagnets (E)		N/A
	- terminals of indicated light devices (X)		N/A
	- terminals of contact elements for switching devices (no)		N/A

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.1	CONSTRUCTION		
7.1.1	Withdrawable circuit-breaker		N/A
	In the disconnected position (main- and auxiliary circuits)		
	Isolating distances for circuit-breaker suitable for isolating warranted:		N/A
	Mechanism fitted with a reliable indicating device with indicates the position of the isolating contacts.		N/A
	Mechanism fitted with interlocks which only permit the isolating contacts to be separate or re-closed when main contacts are open		N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when the isolating contacts are fully closed.		N/A
	Mechanism fitted with interlock, which only permit the main contacts to be closed when in disconnected position.		N/A
	The isolating distances between the isolating contacts cannot be inadvertently reduced.		N/A
7.1.2.1 part 1	Resistance to abnormal heat and fire	See appended table 10	P
7.1.3 part 1	Current-carrying parts and their connection		P
7.1.4	Clearances and creepage distances:		
	For circuit-breakers for which the manufacturer has declared a value of rated impulse withstand voltage. (Uimp.)		
	Clearances distances:		
	- Uimp is given as:	8 kV	
	- max. value of rated operational voltage to earth	600 V	
	- nominal voltage of supply system:	380 / 415 / 440 / 460 Vac	
	- overvoltage category:	III	
	- pollution degree:	3	
	- field-in or homogeneous:	Inhomogeneous field	
	- minimum clearances (mm):	8 mm	

IEC 60947-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- measured clearances (mm):	Min measured value: 17,6 mm See appended table 9	P
	Creepage distances:		
	- rated insulation voltage Ui (V)	1000 V	
	- pollution degree	3	
	- comparative tracking index (V)	175 V	
	- material group	IIIa	
	- minimum creepage distances (mm)	16 mm	
	- measured creepage distances (mm)	Min measured value: 22,4 mm See appended table 9	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.		P
	Where devices cannot conform to these requirements, e.g. due to special applications or alternative mounting positions, they shall be clearly marked such that there is no doubt as to the ”I” and ”O” positions and the direction of operation		P

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 **I** On (power)		P
	- 60417-2-IEC-5007 **O** Off (power)		P
	For equipment operated by means of two push-buttons, only the push-button designated for the opening operation shall be red or marked with the symbol ”O”		N/A
	Red colour shall not be used for any other push-button		P
	The colours of other push-buttons, illuminated push-buttons and indicator lights shall be in accordance with IEC 60073		N/A
7.1.6.2 part 1	Indication by the actuator		
	When the actuator is used to indicate the position of the contacts, it shall automatically take up or stay, when released, in the position corresponding to that of the moving contacts; in this case, the actuator shall have two distinct rest positions corresponding to those of the moving contacts, but for automatic opening a third distinct position of the actuator may be provided		P
7.1.7	Additional safety requirements for equipment suitable for isolation		
7.1.7.1	Additional constructional requirements for equipment suitable for isolation (Ue > 50 V):		
	Equipment suitable for isolation shall provide in the open position an isolation distance in acc. with the requirements necessary to satisfy the isolating function. Indication of the main contacts shall be provide by one or more of the following means:		
	- the position of the actuator		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- a separate mechanical indicator		N/A
	- visibility of the moving contacts		N/A
	When means are provided or to lock the equipment in the open position, locking only be possible when contacts are in the open position		N/A
	Actuator front-plate fitted to the equipment in a manner which ensures correct contact position indication and locking		P
	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) :	8 mm	
	- measured clearances (mm) :	28,4 mm	P
	- test Uimp across gap (kV) :	12,3 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

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Clause	Requirement + Test	Result - Remark	Verdict
	During the closing operation the contacts of the auxiliary switch shall close after or simultaneously with the contacts of the main poles		N/A
	A suitable opening time interval may also be provided by an intermediate position (between the ON and OFF position) at which the interlocking contact(s) is (are) open and the main poles remain closed		N/A
7.1.7.3	Supplementary requirements for equipment provided with means for padlocking the open position:		
	the locking means shall be designed in such a way that it cannot be removed with the appropriate padlock(s) installed		N/A
	Alternatively, the design may provide padlockable means to prevent access to the actuator		N/A
	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 :	Cable with lug	P
	minimum cross-sectional area of conductor (mm²) :	150 mm^2 x 2	P
	maximum cross-sectional area of conductor (mm²) :	240 mm^2 x 2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	number of conductors simultaneously connectable to the terminal :	2	P
7.1.8.3	Connection		
	terminals for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P
7.1.8.4	Terminal identification and marking		
	terminal intended exclusively for the neutral conductor	N is marked for 4P	P
	protective earth terminal		N/A
	other terminals		N/A
7.1.9 part 1	Additional requirements for equipment provided with a neutral pole		
	When equipment is provided with a pole intended only for connecting the neutral, this pole shall be clearly identified to that effect by the letter N (see 7.1.7.4.).	N is marked for 4P	P
	A switched neutral pole shall break not before and shall make not after the other poles	The neutral pole is unprotected	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	The neutral pole current equals to 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		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
part 1	This requirement can be met by the normal structural parts providing adequate electrical continuity and applies whether the equipment is used on its own or incorporated in an assembly		N/A
	Exposed conductive parts are considered not to constitute a danger if they cannot be touched on large areas or grasped with the hand or if they are of small size (approximately 50 mm x 50 mm) or are so located as to exclude any contact with live parts		N/A
7.1.10.2 part 1	Protective earth terminal		
	The protective earth terminal shall be readily accessible and so placed that the connection of the equipment to the earth electrode or to the protective conductor is maintained when the cover or any other removable part is removed		N/A
	The protective earth terminal shall be suitably protected against corrosion		N/A
	In the case of equipment with conductive structures, enclosures, etc., means shall be provided, if necessary, to ensure electrical continuity between the exposed conductive parts the equipment and the metal sheathing of connecting conductors		N/A
	The protective earth terminal shall have no other function, except when it is intended to be connected to a PEN conductor (see 2.1.1.5 – Note). In this case, it shall also have the function of a neutral terminal in addition to meeting the requirements applicable to the protective earth terminal		N/A
7.1.10.3	Protective earth terminal marking and identification		
	The protective earth terminal shall be clearly and permanently identified by its marking		N/A
	The identification shall be achieved by colour (green-yellow mark) or by the notation PE, or PEN, as applicable, in accordance with IEC 60445, subclause 5.3, or, in the case of PEN, by a graphical symbol for use on equipment		N/A
	Graphical symbol to be used: 60417-2-IEC-5019 ⏚ Protective earth (ground) in accordance with IEC 60417-2		N/A

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

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Clause	Requirement + Test	Result - Remark	Verdict
	Test for second numeral .....:	1 2 3 4 5 6 7 8	N/A
7.1.13 part 1	Conduit pull-out, torque and bending with metallic conduits		
	Polymeric enclosures of equipment, whether integral or not, provided with threaded conduit entries, intended for the connection of extra heavy duty, rigid threaded metal conduits complying with IEC 60981, shall withstand the stresses occurring during its installation such as pull-out, torque, bending		N/A

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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.		N/A

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

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

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Clause	Requirement + Test	Result - Remark	Verdict
7.2.1.5 part 1	Limits of operation of current operated relays and released		
	Limits of operation of current operated relays and releases shall be stated in the relevant product standard		N/A
7.2.1.2.4	Opening by over-current releases		
a)	Opening under short-circuit conditions		
	The short-circuit release shall cause tripping of the circuit-breaker with an accuracy of 20% of the tripping current value of the current setting for all values of the current setting of the short-circuit current release		P
	Where necessary for over-current co-ordination the manufacturer shall provide information (usually curves) showing		N/A
	- maximum cut-off (let-through) peak current as a function of prospective current (r.m.s. symmetrical)		N/A
	- I^2t characteristics for circuit-breakers of utilization category A and, if applicable, B for circuit-breakers with instantaneous override (see note to 8.3.5)		N/A
b)	Opening under overload conditions		
1)	Instantaneous or definite time-delay operation		N/A
	The release shall cause tripping of the circuit-breaker with an accuracy of ± 10% of the tripping current value of the current setting for all values of current setting of the overload release		N/A
2)	Inverse time-delay operation		
	At the reference temperature and at 1,05 times the current setting with the conventional non-tripping current, the opening release being energized on all poles, tripping shall not occur in less than the conventional time from the cold state, i.e. with the circuit-breaker at the reference temperature		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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 (mm²) :	240 mm^2 x 2	
	diameter of thread (mm) :	12 mm	
	torque (Nm) :	1,1 x 42,2 = 46,4 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 (mm²) :		
	number of conductors of the smallest cross section :		
	diameter of bushing hole (mm) :		
	height between the equipment and the platen :		
	mass at the conductor(s) (kg) :		
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	Pull-out test		
	force (N) :		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	conductor of the largest cross-sectional area (mm²) :		
	number of conductors of the largest cross section :		
	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) :		

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Clause	Requirement + Test	Result - Remark	Verdict
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	conductor of the largest and smallest cross-sectional area (mm²) :		
	number of conductors of the smallest cross section, number of conductors of the largest cross section :		
	diameter of bushing hole (mm) :		
	height between the equipment and the platen :		
	mass at the conductor(s) (kg) :		
	135 continuous revolutions: the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A
	Pull-out test		
	force (N) :		
	1 min, the conductor shall neither slip out of the terminal nor break near the clamping unit		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS HGM 800 L, 800 A, 4P, 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	HGM 800 L	
	Sample no:	#01	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated current: In (A)	800 A	
	Ambient temperature 10-40 °C :	23,2 °C	P
	Value of the tripping current declared by the manufacturer for a single pole, at which value they shall operate.	for two poles in series: 10 In for a single pole: 12 In	P
	Range of adjustable setting current. (A)		N/A
	Time delay stated by the manufacturer, in the case of definite time delay releases.		N/A
	Electromagnetic overcurrent releases		
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)	0,8 x 10 x In L1-L2: 6540 A L1-L3: 6600 A L2-L3: 6620 A	P
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	 0,2 s non-tripping 0,2 s non-tripping 0,2 s non-tripping	P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)	1,2 x 10 x In L1-L2: 8940 A L1-L3: 9100 A L2-L3: 9230 A	P
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L1-L3: L2-L3: N-Lx:	 49 ms 44 ms 40 ms	P
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:		N/A
	Test current: 80% of the **maximum** adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases: L1-L2: L2-L3: L1-L3: N-Lx:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1-L2: L1-L3: L2-L3: N-Lx:		N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)		N/A
	Operating time: <0,2s in case of instantaneous releases: L1-L2: L2-L3: L1-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)	12 x In L1: 8960 A L2: 8960 A L3: 9240 A	P
	Operating time: < 0,2 s in case of instantaneous release: L1: L2: L3: N:	 43 ms 39 ms 61 ms	P
	Operating time: < twice time delay stated by manufacturer in case of definite time delay releases L1: L2: L3: N:		N/A
	Electronic overcurrent releases		
	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.		N/A
	Test current: 80% of the rated, or **minimum** adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 120% of the rated, or **minimum** adjustable setting current: (A)		N/A
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: < twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A
	Test current: 80% of the **maximum** adjustable setting current: (A)		N/A
	Operating time: >0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A
	Operating time: > twice time delay stated by the manufacturer, in the case of definite time delay releases: L1: L2: L3: N:		N/A
	Test current: 120% of the **maximum** adjustable setting current: (A)		N/A
	Operating time: <0,2s in case of instantaneous releases: L1: L2: L3: N:		N/A

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

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Clause	Requirement + Test	Result - Remark	Verdict
	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	HGM 800 L	
	Sample no:	#01	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated current: In (A)	800 A	
	For releases dependent of ambient air temperature: Reference temperature	40 °C	P
	Test ambient temperature (°C)	40 °C	P
	For releases dependent on ambient air temperature, the operating characteristics shall be verified at the reference temperature, the release being energized on all phase poles. If the test made at a different ambient temperature, a correction shall be made in accordance with the manufacturer’s correction temperature/current data		P
	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

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Clause	Requirement + Test	Result - Remark	Verdict
	For electronic releases, the operating characteristic shall be verified at the ambient temperature of the test room (see 6.1.1 of IEC 60947-1), the release being energised on all phase poles.		N/A
	Test ambient air temperature:		N/A
	Range of adjustable setting current: (A)	Ir: 0,63 In - 1,0 In	P
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P
	Thermal Magnetic releases, independent of ambient air temperature: at 30°C		N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)	530 A (1,05 x 0,63 x In)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h non-tripping	P
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)	655 A (1,3 x 0,63 x In)	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	45 min 01 s	P
	Test current: 105% of the **maximum** adjustable setting current: (A)	840 A (1,05 x In)	P
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A	2 h non-tripping	P
	Test current: 130% of the **maximum** adjustable setting current: (A)	1040 A (1,3 x In)	P
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	13 min 29 s	P
	Thermal Magnetic releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: 105% of the rated, or **minimum** adjustable setting current: (A)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the rated, or **minimum** adjustable setting current: (A)		N/A
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	Test current: 105% of the **maximum** adjustable setting current: (A)		N/A
	Conventional non-tripping time: 1h when In < 63A, 2h when In > 63 A		N/A
	Test current: 130% of the **maximum** adjustable setting current: (A)		N/A
	For circuit-breakers having an identified neutral pole provided with an overload release (see 8.3.3.1.1), the test current at the conventional tripping current shall be multiplied by the factor 1,2.		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
	An additional test, at a current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer		
	Releases, dependent of ambient air temperature: Reference temperature (°C)	40 °C	P
	Releases, independent of ambient air temperature: at 30°C		N/A
	Test ambient air temperature:	40 °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)	1008 A (2 x 0,63 x In)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	8 min 35 s Tripping time specified by the manufacturer: 3 min 20 s ≤ t ≤ 25 min	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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 **maximum** adjustable setting current: (A)	1600 A (2 x In)	P
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)	4 min 20 s Tripping time specified by the manufacturer: 1 min 30 s ≤ t ≤ 14 min 10 s	P
	Releases, independent of ambient air temperature: at 20°C or 40°C		
	Test ambient air temperature:		N/A
	Test current: at current specified by the manufacturer to verify the time/current characteristic of the releases conform to the curves provided by the manufacturer. % at the rated, or minimum adjustable setting current: (% or A)		N/A
	Tripping time acc. time/current characteristic of the releases conform to the curves provided by the manufacturer. (within the stated tolerances)		N/A
8.3.3.1.4	Additional test for definite time-delay releases		
a)	Time delay		
	Test is made at a current equal to 1,5 times the current setting. If the test current overlaps with another tripping characteristic (e.g. an instantaneous tripping characteristic), the trip setting and the test current shall be reduced as necessary to prevent premature tripping.		
	overload releases: (all phase poles loaded)		N/A
	for circuit-breakers having an identified neutral pole provided with an overload release, the test current for this release shall be 1,5 times the current setting;		N/A
	short-circuit releases		N/A
	Electromagnetic release: two poles in series carrying the test current, using successively all possible combinations of poles having a short-circuit release.		N/A
	Electronic releases: on one pole chosen at random.		N/A
	Test current: 1,5 times of the rated, or **minimum** adjustable setting current: (A)		N/A

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

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

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Clause	Requirement + Test	Result - Remark	Verdict
	Test current: 1,5 times of **maximum** adjustable setting current: (A)		N/A
	non-tripping duration stated by the manufacturer for overload release: (s)		N/A
	non-tripping duration stated by the manufacturer for short-circuit release thermal magnetic: (s)		N/A
	non-tripping duration stated by the manufacturer for short-circuit release electronic: (s)		N/A
	Time duration of current when reduced to the rated current: shall be twice the delay-time stated by the manufacturer: (s)		N/A
	Rated current		N/A
	Operating time, overload releases: the circuit-breaker does not trip:		N/A
	Operating time, short-circuit releases (electromagnetic), shall not trip: (s) L1-L2: L1-L3: L2-L3:		N/A
	Operating time, short-circuit releases (electronic), shall not trip: (s) L1: L2: L3:		N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	Sea level	P
	- test Uimp main circuits (kV) :	9,8 kV	P
	- test Uimp auxiliary circuits (kV) :		N/A
	- test Uimp control circuits (kV) :		N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,3 kV	P
a)	Application of test voltage		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	iv) equipment suitable for isolation		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	P
	- main circuits, test voltage for 1 min (V)	2200 V, 5 s	P
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .		P
	- between each pole and all the other poles connected to the frame of the circuit-breaker		P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.		P

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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.		P
b)	Control and auxiliary circuits		
1)	- between all the control and auxiliary circuits which are not normally connected to the main circuit, connected together, and the frame of the circuit-breaker.		N/A
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.		N/A
	No unintentional disruptive discharge during the tests		P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 0,5mA.	L1: 0,005 mA L2: 0,005 mA L3: 0,005 mA N: 0,005 mA	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		N/A
	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		N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3		N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer		N/A
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		N/A

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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		N/A
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuit-breaker		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

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Clause	Requirement + Test	Result - Remark	Verdict
ii)	Test for limits of operation		
	Starting with the circuit-breaker open, at the temperature of the test room, and with the supply voltage at 30% rated maximum control supply voltage, it shall be verified that the circuit-breaker cannot be closed by the operation of the actuator		N/A
	When the supply voltage is raised to 85% of the minimum control supply voltage, it shall be verified that the circuit-breaker can be closed by the operation of the actuator		N/A
iii)	Performance under overvoltage conditions		
	With the circuit-breaker closed and without current in the main circuit, it shall be verified that the undervoltage release will withstand the application of 110% rated control supply voltage for 4 h without impairing its functions		N/A
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		N/A
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of + 55 °C ± 2 °C without current in the main poles of the circuit-breaker		N/A
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage		N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	HGM 800 L	
	Sample no:	#01	
	Rated current In (A)	800 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt releases: Uc (V)	No shunt releases	

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Clause	Requirement + Test	Result - Remark	Verdict
	Rated control supply voltage undervoltage releases: Uc (V)	No undervoltage releases	
	Ambient temperature 10-40 °C :	23,7 °C	P
	Number of operating cycles per hour	20 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	2500 cycles	P
	Number of cycles without current (without releases)	2500 cycles	P
	Applied voltage: closing mechanism (V)		N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc		N/A
	Applied voltage: shunt releases (V)		N/A
	10% of total cycles for circuit-breaker with undervoltage releases: (50% at the beginning- and 50% at the end of the test.) Energized at the minimum rated Uc		N/A
	10 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: In (A)	800 A	
	Maximum rated operational voltage: Ue (V)	460 Vac	
	Conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	Number of operating cycles per hour	20 cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	500 cycles (no electric closing mechanism)	P
	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.	Overload: 1,0 In Short-circuit: fixed	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Conditions, make/break operations:		P
	- test voltage U/Ue = 1,0 (V) ……..…L1-L2: ……..L2-L3: ……..L3-L1:	462,4 Vac 462,8 Vac 462,6 Vac	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	817,9 A 830,2 A 832,6 A	P
	- power factor/time constant:	0,84	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	Min. 467,4 ms	P
	- off-time (s):	Max. 2 min 59,5 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		N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		N/A
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

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Clause	Requirement + Test	Result - Remark	Verdict
	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: ……...L2-L3: ……L3-L1:		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	1000 V, 5 s	P
	- no breakdown or flashover	See appended table 5	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.	L1: 0,008 mA L2: 0,006 mA L3: 0,006 mA N: 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.	See appended table 1 All phase poles are loaded	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	Max: 67 K	P
	conductor cross-sectional area (mm²) :	240 mm^2 x 2	P

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Clause	Requirement + Test	Result - Remark	Verdict
	test current Ie (A) :	800 A	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See appended table 2 N pole and adjacent phase pole are loaded	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	Max: 66 K	P
	conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	test current Ie (A) :	800 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)	1160 A (1,45 x In)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	7 min 35 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
	and shall operate at 35% of the maximum control supply voltage.		N/A
	Circuit-breaker fitted with shunt releases. The release shall operate at 70% of the minimum rated control supply voltage. Test made at room temperature.		N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		P
	actuating force for opening (N) ..... :	209 N	
	test force with blocked main contacts for 10 s (N) :	400 N for 10 s	
	Dependent power operation		N/A
	Supply voltage of 110% of rated voltage (V)……:		N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		N/A
	Independent power operation		N/A
	Three attempts to operate the equipment by the stored energy.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts ..... :		N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3	TEST SEQUENCE I: GENERAL PERFORMANCE CHARACTERISTICS HGM 800 L, 800 A, 3P, sample no. #02		
8.3.3.1	Tripping limits and characteristic		N/A
8.3.3.2	Test of dielectric properties, impulse withstand voltage (Uimp indicated):		
8.3.3.4 part1	The 1,2/50µs impulse voltage shall be applied five times for each polarity at intervals of 1s minimum		
	- rated impulse withstand voltage (kV) :	8 kV	P
	- sea level of the laboratory:	Sea level	P
	- test Uimp main circuits (kV) :	9,8 kV	P
	- test Uimp auxiliary circuits (kV) :		N/A
	- test Uimp control circuits (kV) :		N/A
	- test Uimp on open main contacts (equipment suitable for isolating) (kV) :	12,3 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: - the main circuit		N/A
	- other circuits		N/A
	- exposed conductive parts		N/A
	- enclosure of mounting plate		N/A
	iv) equipment suitable for isolation		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 (Uimp not indicated):		
	- rated insulation voltage (V) :	1000 V	P
	- main circuits, test voltage for 1 min (V)	2200 V, 5 s	P
	- auxiliary circuits, test voltage for 1 min (V)		N/A
	- control circuits, test voltage for 1 min (V)		N/A
8.3.3.2.2	Application of test voltage		
1)	with circuit-breaker in the closed position		
	- between all live parts of all poles connected together and the frame of the circuit-breaker .		P
	- between each pole and all the other poles connected to the frame of the circuit-breaker		P
2)	with the circuit-breaker in the open position and, additionally, in the tripped position, if any.		P
	- between all live parts of all poles connected together and the frame of the circuit-breaker.		P
	- between the terminals of one side connected together and the terminals of the other side connected together.		P
b)	Control and auxiliary circuits		
1)	- between all the control and auxiliary circuits which are not normally connected to the main circuit, connected together, and the frame of the circuit-breaker.		N/A
2)	- where appropriate, between each part of the control an auxiliary circuits which may be isolated from the other parts during normal operation and all the other parts connected together.		N/A
	No unintentional disruptive discharge during the tests		P
8.3.3.2	For circuit-breaker suitable for isolation, the leakage current shall be measured through each pole with the contacts in the open position, at a test voltage of 1,1 Ue, and shall not exceed 0,5mA.	L1: 0,005 mA L2: 0,005 mA L3: 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		
a)	Construction		
	A withdrawable circuit-breaker shall be checked for the requirements stated in 7.1.1		N/A
	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		N/A
b)	Mechanical operation		
	A circuit-breaker with dependent power operation shall comply with the requirements stated in 7.2.1.1.3		N/A
	A circuit-breaker with dependent power operation shall operate with the operating mechanism charged to the minimum and maximum limits stated by the manufacturer		N/A
	A circuit-breaker with stored energy operation shall comply with the requirements stated in 7.2.1.5 with the auxiliary supply voltage at 85% and 110% of the rated control supply voltage.		N/A
	It shall also be verified that the moving contacts cannot be moved from the open position when the operating mechanism is charged to slightly below the full charge as evidenced by the indicating device		N/A
	For a trip-free circuit-breaker it shall not be possible to maintain the contacts in the touching or closed position when the tripping release is in the position to trip the circuit-breaker		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

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Clause	Requirement + Test	Result - Remark	Verdict
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
	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

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Clause	Requirement + Test	Result - Remark	Verdict
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		N/A
	It shall be verified that the release will operate to open the circuit-breaker at 70% rated control supply voltage when tested at an ambient temperature of + 55 °C ± 2 °C without current in the main poles of the circuit-breaker		N/A
	In the case of a release having a range of rated control supply voltages, the test voltage shall be 70% of the minimum rated control supply voltage		N/A
8.3.3.3.3	Operational performance capability without current.		
	Type designation or serial number	HGM 800 L	
	Sample no:	#02	
	Rated current In (A)	800 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt releases: Uc (V)	No shunt releases	
	Rated control supply voltage undervoltage releases: Uc (V)	No undervoltage releases	
	Ambient temperature 10-40 °C :	23,9 °C	P
	Number of operating cycles per hour	20 cycles per hour	P
	Number of cycles without current (total) (closing mechanism energized at the rated Uc)	2500 cycles	P
	Number of cycles without current (without releases)	2500 cycles	P
	Applied voltage: closing mechanism (V)		N/A
	10% of total cycles for circuit-breaker with fitted shunt release: (50% at the beginning- and 50% at the end of the test.) Energized at the rated Uc		N/A
	Applied voltage: shunt releases (V)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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
8.3.3.3.4	Operational performance capability with current.		
	Rated current: In (A)	800 A	
	Maximum rated operational voltage: Ue (V)	460 Vac	
	Conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	Number of operating cycles per hour	20 cycles per hour	P
	Number of cycles with current (total) (closing mechanism energized at the rated Uc)	500 cycles (no electric closing mechanism)	P
	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.	Overload: 1,0 In Short-circuit: fixed	P
	Conditions, make/break operations:		P
	- test voltage U/Ue = 1,0 (V) ……..…L1-L2: ……..L2-L3: ……..L3-L1:	461,9 Vac 462,5 Vac 462,5 Vac	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	814,8 A 825,9 A 824,9 A	P
	- power factor/time constant:	0,85	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	Min. 538,3 ms	P
	- off-time (s):	Max. 2 min 59,5 s	P
	Electrical components do not exceed the value indicated in tab. 7.		P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.3.3.5	Additional test of operational performance capability without current for withdrawable circuit-breaker.		
	Number of operations cycles : 100		N/A
	After test, the isolating contacts, withdrawable mechanism and interlocks shall be suitable for further service.		N/A
8.3.3.4	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: ……...L2-L3: ……L3-L1:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- test current AC/DC: I/Ie = 6,0/2.5 (A) ..... L1: ..... L2: L3:		N/A
	- power factor/time constant:		N/A
	- Number of cycles manually opened: 9		N/A
	- Number of cycles automatically opened by an overload release: 3		N/A
	- frequency: (Hz)		N/A
	- on-time max 2s:		N/A
8.3.3.5	Verification of dielectric withstand		
	- equal to twice the rated operational voltage with a minimum of 1000 V for 5 seconds	1000 V, 5 s	P
	- no breakdown or flashover	See appended table 5	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.	L1: 0,006 mA L2: 0,005 mA L3: 0,006 mA	P
8.3.3.6	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See appended table 3 All phase poles are loaded	P
	Temperature rise of main circuit terminals ≤ 80 K (K) :	Max: 61 K	P
	conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	test current Ie (A) :	800 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)		N/A
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A		N/A
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.		N/A
8.3.3.9	Verification of the main contact position for circuit-breakers for isolation		P
	actuating force for opening (N) ..... :	194 N	
	test force with blocked main contacts for 10 s (N) :	400 N for 10 s	
	Dependent power operation		N/A
	Supply voltage of 110% of rated voltage (V)……:		N/A
	Three attempts of 5 s to operate the equipment at intervals of 5 min.		N/A
	Independent power operation		N/A
	Three attempts to operate the equipment by the stored energy.		N/A
	Lock ability of driving mechanism in OFF-position at test force and blocked main contacts ..... :		N/A
	Position indicator does not show OFF-position after capture of test force at blocked main contacts		P

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

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II/III (Ics=Icu): HGM 800 L, 800 A, 4P, sample no. #03		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	HGM 800 L	
	Sample no:	#03	
	Rated current: In (A)	800 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated service short-circuit breaking capacity: (kA)	85 kA at 460 Vac	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt release: Uc (V)	No shunt releases	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Overload: 1,0 In Short-circuit: fixed	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		P
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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 (mm²) :	240 mm^2 x 2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	42,2 Nm	P
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	1 min 30 s ≤ t ≤ 14 min 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	5 min 06 s 4 min 57 s 5 min 13 s	P
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		P
	- test voltage U/Ue = 1,05 (V)……L1-L2: ……L2-L3: ……..L3-L1:	486 Vac 486 Vac 487 Vac	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 85,7 kA 85,3 kA 85,4 kA	P
	power factor/time constant :	0,18	P
	- Factor ”n”	2,2	P
	- peak test current (A) :	190 kA	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	47,8 kA 61,9 kA 27,9 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	8,75 MA^2s 11,2 MA^2s 4,24 MA^2s	P
	Pause, t: (min)	4 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	39,8 kA 60,6 kA 47,2 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	4,11 MA^2s 12,7 MA^2s 5,77 MA^2s	P
	Pause, t: (min)	5 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	59,8 kA 36,6 kA 45,3 kA	P
	- Joule integral I²dt (MA²s) ..... L1: ..... L2: L3:	11,1 MA^2s 6,90 MA^2s 9,83 MA^2s	P
	Melting of the fusible element	No melting of the fusible element	P
	Damage to insulation on conductors	No damage	P
	Holes in the PE-sheet for test sequence ”O”	The music wire of 0,26 mm diameter cannot be inserted the arc chamber area	N/A
	Cracks observed	No cracks observed	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)	800 A	
	Maximum rated operational voltage: Ue (V)	460 Vac	
	Conductor cross-sectional area (mm²) :	240 mm^2 x 2	
	Number of operating cycles per hour	20 cycles per hour	P
	Number (5% of the number given in column 4, tab. 8) of cycles with current (total) (closing mechanism energized at the rated Uc)	25 cycles (no electric closing mechanism)	P
	Applied voltage: closing mechanism (V)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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 In Short-circuit: fixed	P
	Conditions, make/break operations:		
	- test voltage U/Ue = 1,0 (V) .....L1-L2: .....L2-L3: L3-L1:	469 Vac 472 Vac 471 Vac	P
	- test current I/Ie = 1,0 (A)..... L1: ..... L2: L3:	813 A 813 A 816 A	P
	- power factor/time constant:	L1: 0,78 L2: 0,79 L3: 0,79	P
	- frequency: (Hz)	50 Hz	P
	- on-time (ms):	Min. 445 ms	P
	- off-time (s):	Max. 2 min 59,6 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	See appended table 6	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	L1: 29,8 µA L2: 40,6 µA L3: 38,3 µA	P
8.3.4.4	Verification of temperature-rise		
	- the values of temperature-rise do not exceed those specified in tab. 7.	See appended table 4	P
	Temperature rise of main circuit terminals. ≤ 80 K (K) :	Max: 71 K	P
	conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	test current Ie (A) :	800 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)	1160 A (1,45 x In)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	1 min 07 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
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:	t ≤ 14 min 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	3 min 11 s 2 min 57 s 3 min 06 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.4	TEST SEQUENCE II/III (Ics=Icu): HGM 630 L, 500 A, 4P, sample no. #04		
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		
	Type designation or serial number	HGM 630 L	
	Sample no:	#04	
	Rated current: In (A)	500 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated service short-circuit breaking capacity: (kA)	85 kA at 460 Vac	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt release: Uc (V)	No shunt releases	
	For circuit-breaker fitted with adjustable releases, test shall be made with the current and time settings at maximum.	Overload: 0,63 In Short-circuit: fixed	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		P
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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 (mm²) :	150 mm^2 x 2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	42,2 Nm	P
8.3.5.1	The operation of overload releases shall be verified at twice the value of their current setting on each pole separately.		
	The operating time shall not exceed the max. value stated by the manufacturer for twice the current setting at the reference temperature, on a pole singly.		
	Time specified by the manufacturer:	3 min 20 s ≤ t ≤ 25 min	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	14 min 21 s 13 min 14 min 57 s	P
8.3.4.1	Test of rated service short-circuit breaking capacity		
	Test sequence of operation: O – t – CO – t – CO		P
	- test voltage U/Ue = 1,05 (V)……L1-L2: ……L2-L3: ……..L3-L1:	486 Vac 486 Vac 487 Vac	P
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	 85,7 kA 85,3 kA 85,4 kA	P
	power factor/time constant :	0,18	P
	- Factor ”n”	2,2	P
	- peak test current (A) :	190 kA	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	46,0 kA 61,3 kA 28,9 kA	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	7,45 MA^2s 10,7 MA^2s 3,60 MA^2s	P
	Pause, t: (min)	3 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	56,9 kA 39,4 kA 51,1 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	8,65 MA^2s 5,58 MA^2s 11,8 MA^2s	P
	Pause, t: (min)	5 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	45,2 kA 61,5 kA 32,1 kA	P
	- Joule integral I²dt (MA²s) ..... L1: ..... L2: L3:	6,67 MA^2s 11,0 MA^2s 3,19 MA^2s	P
	Melting of the fusible element	No melting of the fusible element	P
	Damage to insulation on conductors	No damage	P
	Holes in the PE-sheet for test sequence ”O”	The music wire of 0,26 mm diameter cannot be inserted the arc chamber area	N/A
	Cracks observed	No cracks observed	P
8.3.4.2	Operational performance capability with current.		
	Rated current: In (A)		
	Maximum rated operational voltage: Ue (V)		
	Conductor cross-sectional area (mm²) :		
	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 Uc)		N/A
	Applied voltage: closing mechanism (V)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	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/Ue = 1,0 (V) .....L1-L2: .....L2-L3: L3-L1:		N/A
	- test current I/Ie = 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	See appended table 6	P
	- the leaking current for circuit-breaker suitable for isolation: (<2mA / 1.1 Ue)	L1: 28,7 µA L2: 25,3 µA L3: 26,9 µA	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. ≤ 80 K (K) :		N/A
	conductor cross-sectional area (mm²) :		N/A
	test current Ie (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)	457 A (1,45 x In)	P
	Conventional tripping time: <1h when In < 63A, <2h when In > 63 A	23 min 18 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
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:	t ≤ 25 min	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	9 min 16 s 9 min 10 s 8 min 43 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) HGM 800 L, 800 A, 4P, sample no. #05		
	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	HGM 800 L Test for phase + N	
	Sample no:	#05	
	Rated current: In (A)	800 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated ultimate short-circuit breaking capacity: (kA)	51 kA (60% Icu) at 460 V / √3	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt release: Uc (V)	No shunt releases	
	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:	1 min 30 s ≤ t ≤ 14 ming 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	5 min 03 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
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.	Overload: 1,0 In Short-circuit: fixed	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		P
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening, torques: (Nm)	42,2 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/Ue = 1,05 (V) ……..L1-L2: ……L2-L3: ……L3-N:	281 Vac	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	51,9 kA	P
	power factor/time constant :	0,19	P
	- Factor ”n”	2,2	P
	- peak test current (Amax) :	116 kA	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	38,4 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	5,76 MA²s	P
	Pause, t: (min)	4 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	24,5 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	2,13 MA²s	P
	Melting of the fusible element	No melting of the fusible element	P
	Damage to insulation on conductors	No damage	P
	Holes in the PE-sheet for test sequence ”O”	The music wire of 0,26 mm diameter cannot be inserted the arc chamber area	N/A
	Cracks observed	No cracks observed	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	See appended table 7	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	L3: 38,9 µA N: 32,8 µA	P

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Clause	Requirement + Test	Result - Remark	Verdict
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:	t ≤ 14 min 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	2 min 01 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) HGM 630 L, 500 A, 4P, sample no. #06		
	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	HGM 630 L Test for phase + N	
	Sample no:	#06	
	Rated current: In (A)	500 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated ultimate short-circuit breaking capacity: (kA)	51 kA (60% Icu) at 460 V / √3	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt release: Uc (V)	No shunt releases	
	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:	3 min 20 s ≤ t ≤ 25 min	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	9 min 17 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
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.	Overload: 0,63 In Short-circuit: fixed	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		P
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	150 mm^2 x 2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening, torques: (Nm)	42,2 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/Ue = 1,05 (V) ……..L1-L2: ……L2-L3: ……L3-N:	281 Vac	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	51,9 kA	P
	power factor/time constant :	0,19	P
	- Factor ”n”	2,2	P
	- peak test current (Amax) :	116 kA	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	36,4 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	5,39 MA²s	P
	Pause, t: (min)	4 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	34,3 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	4,74 MA²s	P
	Melting of the fusible element	No melting of the fusible element	P
	Damage to insulation on conductors	No damage	P
	Holes in the PE-sheet for test sequence ”O”	The music wire of 0,26 mm diameter cannot be inserted the arc chamber area	N/A
	Cracks observed	No cracks observed	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	See appended table 7	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	L3: 32,1 µA N: 30,6 µA	P

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Clause	Requirement + Test	Result - Remark	Verdict
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:	t ≤ 25 min	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	5 min 37 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.5	TEST SEQUENCE III (Icu) HGM 800 L, 800 A, 3P, sample no. #07		
	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	HGM 800 L	
	Sample no:	#07	
	Rated current: In (A)	800 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated ultimate short-circuit breaking capacity: (kA)	85 kA at 460 Vac	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt release: Uc (V)	No shunt releases	
	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:	1 min 30 s ≤ t ≤ 14 min 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	6 min 21 s 6 min 01 s 6 min 55 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
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.	Overload: 1,0 In Short-circuit: fixed	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		P
	- expanded metal		N/A
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse "F": copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²) :	240 mm^2 x 2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening, torques: (Nm)	42,2 Nm	P
	Test sequence of operation: O – t – CO		P
	- test voltage U/Ue = 1,05 (V) ……..L1-L2: ……L2-L3: ……L3-L1:	486 Vac 486 Vac 487 Vac	P

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Clause	Requirement + Test	Result - Remark	Verdict
	- r.m.s. test current AC/DC: (A) ..... L1: ..... L2: L3:	85,7 kA 85,3 kA 85,4 kA	P
	power factor/time constant :	0,18	P
	- Factor ”n”	2,2	P
	- peak test current (Amax) :	190 kA	P
	Test sequence ”O”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	48,1 kA 60,8 kA 31,4 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	9,53 MA²s 10,7 MA²s 4,81 MA²s	P
	Pause, t: (min)	5 min	P
	Test sequence ”CO”		
	- max. let-through current: (kApeak) ..... L1: ..... L2: L3:	46,4 kA 61,5 kA 29,9 kA	P
	- Joule integral I²dt (kA²s) ..... L1: ..... L2: L3:	7,53 MA²s 11,1 MA²s 3,63 MA²s	P
	Melting of the fusible element	No melting of the fusible element	P
	Damage to insulation on conductors	No damage	P
	Holes in the PE-sheet for test sequence ”O”	The music wire of 0,26 mm diameter cannot be inserted the arc chamber area	N/A
	Cracks observed	No cracks observed	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	See appended table 7	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	L1: 27,9 µA L2: 28,3 µA L3: 25,3 µA	P

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Clause	Requirement + Test	Result - Remark	Verdict
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:	t ≤ 14 min 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	4 min 03 s 4 min 07 s 3 min 52 s	P

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Clause	Requirement + Test	Result - Remark	Verdict
8.3.6	TEST SEQUENCE IV		N/A
8.3.7	TEST SEQUENCE V		N/A
8.3.8	TEST SEQUENCE VI: Combined test sequence		N/A
Annex B	Circuit-breakers incorporating residual current protection		N/A
Annex C	Individual pole short-circuit test sequence		N/A
Annex F	Additional tests for circuit-breakers with electronic over-current protection		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex H	Individual pole short-circuit test sequence HGM 800 L, 800 A, 4P, sample no. #08		
	Circuit-breaker for use in IT systems		
H.2	Test of individual pole short-circuit breaking capacity		
	A short-circuit test is made on the individual poles of a multipole circuit-breaker at a value of prospective current (IIT) equal to 1,2 times the maximum setting of the short-time delay release tripping current or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release, or, where relevant 1,2 times the maximum setting of the definite time delay release tripping current, but not less than 500 A nor exceeding 50kA.		
	Type designation or serial number	HGM 800 L	
	Sample no:	#08	
	Rated current: In (A)	800 A	
	Rated operational voltage: Ue (V)	380 / 415 / 440 / 460 Vac	
	Rated ultimate short-circuit breaking capacity: (kA)	85 kA at 460 Vac	
	Rated control supply voltage of closing mechanism: Uc (V)	No electric closing mechanism	
	Rated control supply voltage of shunt release: Uc (V)	No shunt releases	
	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.	Overload: 1,0 In Short-circuit: fixed	P
	closing mechanism energized with 85% at the rated Uc: (V)		N/A
	The circuit-breaker is mounted complete on its own support or an equivalent support.		P
	Test made in free air:		P
	Distances of the metallic screen's: (all sides)	Front / Back: 0 mm, Left / Right: 80 mm, Up / Down: 100 mm	P
	The characteristics of the metallic screen:		
	- woven wire mesh		N/A
	- perforated metal		P
	- expanded metal		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- ratio hole area/total area: 0,45-0,65		P
	- size of hole: <30mm^2		P
	- finish: bare or conductive plating		P
	Test made in specified individual enclosure: Details of these tests, including the dimensions of the enclosure:		N/A
	Fuse ”F”: copper wire: diameter 0,8 mm, 50 mm long		P
	Circuit is earthed at: (load-star- or supply-star point)	Load-star	P
	Conductor cross-sectional area (mm²):	240 mm^2 x 2	P
	If terminals unmarked: line connected at: (underside/upside)		N/A
	Tightening torques: (Nm)	42,2 Nm	P
	Test sequence of operation: O – t – CO		P
	Test circuit according figure: 9		P
	- test voltage U/Ue = 1,05 (V) ..... L1-L2: ..... L2-L3: L1-L3:	486 Vac	P
	Short-circuit test current (I_{IT}): equal to 1,2 times the max. setting of the short-time delay release tripping current,		N/A
	or, in the absence of such a release, 1,2 time the max. setting of the tripping current of the instantaneous release,	1,2 x 10 In = 9600 A	P
	or, where relevant 1,2 times the max. setting of the definite time delay release tripping current, but not exceeding 50kA.		N/A
	- r.m.s. test current AC/DC: (A)	9,89 kA	P
	power factor/time constant:	0,46	P
	- Factor ”n”	1,7	P
	- peak test current (Amax) :	17,1 kA	P
	Test sequence ”O” L1		
	- max. let-through current: (kApeak) L1:	15,1 kA	P
	- Joule integral I²dt (A²s) L1:	1,72 MA²s	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Pause, t: (min)	4 min	P
	Test sequence ”CO” L1		
	- max. let-through current: (kApeak) L1:	14,9 kA	P
	- Joule integral I²dt (A²s) L1:	1,53 MA²s	P
	Test sequence ”O” L2		
	- max. let-through current: (kApeak) L2:	14,8 kA	P
	- Joule integral I²dt (A²s) L2:	1,51 MA²s	P
	Pause, t: (min)	4 min	P
	Test sequence ”CO” L2		
	- max. let-through current: (kApeak) L2:	11,2 kA	P
	- Joule integral I²dt (A²s) L2:	1,08 MA²s	P
	Test sequence ”O” L3		
	- max. let-through current: (kApeak) L3:	15,0 kA	P
	- Joule integral I²dt (A²s) L3:	1,66 MA²s	P
	Pause, t: (min)	4 min	P
	Test sequence ”CO” L3		
	- max. let-through current: (kApeak) L3:	14,2 kA	P
	- Joule integral I²dt (A²s) L3:	1,43 MA²s	P
	For 4-pole circuit-breakers with a protected neutral pole, the test voltage for that pole shall be phase-to-phase voltage divided by √3. This test is applicable only where the construction of the protected neutral pole differs from that of the phase poles.		N/A
	Test sequence ”O” N		
	- max. let-through current: (kApeak) .....N:		N/A
	- Joule integral I²dt (A²s) .....N:		N/A
	Pause, t: (min)		N/A
	Test sequence ”CO” N		
	- max. let-through current: (kApeak) .....N:		N/A
	- Joule integral I²dt (A²s) .....N:		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Melting of the fusible element	No melting of the fusible element	P
	Damage to insulation on conductors	No damage	P
	Holes in the PE-sheet for test sequence ”O”	The music wire of 0,26 mm diameter cannot be inserted the arc chamber area	N/A
	Cracks observed	No cracks observed	P
H.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	See appended table 8	P
	- the leaking current for circuit-breaker suitable for isolation: (<6mA / 1,1 Ue)	L1: 24,6 µA L2: 27,8 µA L3: 25,3 µA	P
H.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:	t ≤ 14 min 10 s	P
	- Operation time: (s) ..... L1: ..... L2: ..... L3: .....N :	4 min 07 s 3 min 57 s 4 min 18 s	P
H.5	Marking		
	Circuit-breaker for which all values of rated voltage have not been tested according to this annex or are not covered by such testing, shall be identified by the symbol  which shall be market on the circuit-breaker immediately following these values of rated voltage	Suitable for IT system	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
Annex J	Electromagnetic compatibility (EMC) – Requirements and test methods for circuit-breakers		N/A
Annex L	Circuit-breakers not fulfilling the requirements for overcurrent protection		N/A
Annex M	Modular residual current devices (without integral current breaking device)		N/A
Annex N	Electromagnetic compatibility (EMC) – Additional requirements and test methods for devices not covered by Annexes B, F and M		N/A
Annex O	Instantaneous trip circuit-breakers (ICB)		N/A

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE 1: Heating Test (Seq I, 8.3.3.6, sample number #01)		P
	Test current (A):	800 A	—
	Ambient (°C):	24,4 °C	—

Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)
3 Phases test		
Terminal of top left phase pole	66 K	80 K
Terminal of top centre phase pole	63 K	80 K
Terminal of top right phase pole	67 K	80 K
Terminal of bottom left phase pole	59 K	80 K
Terminal of bottom centre phase pole	53 K	80 K
Terminal of bottom right phase pole	62 K	80 K
Actuator	24 K	35 K
Front side	31 K	50 K
Side	46 K	60 K

	TABLE 2: Heating Test (Seq I, 8.3.3.6, sample number #01)		P
	Test current (A):	800 A	—
	Ambient (°C):	24,6 °C	—

Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)
Phase + N test		
Terminal of top right phase pole	66 K	80 K
Terminal of top N pole	65 K	80 K
Terminal of bottom right phase pole	58 K	80 K
Terminal of bottom N pole	66 K	80 K
Actuator	14 K	35 K
Front side	30 K	50 K
Side	44 K	60 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):	800 A	—
	Ambient (°C):	23,6 °C	—

Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)
Terminal of top left phase pole	58 K	80 K
Terminal of top centre phase pole	59 K	80 K
Terminal of top right phase pole	57 K	80 K
Terminal of bottom left phase pole	56 K	80 K
Terminal of bottom centre phase pole	61 K	80 K
Terminal of bottom right phase pole	54 K	80 K
Actuator	23 K	35 K
Front side	27 K	50 K
Side	43 K	60 K

	TABLE 4: Heating Test (Seq II+III, 8.3.4.4, sample number #03)		P
	Test current (A):	800 A	—
	Ambient (°C):	27,9 °C	—

Thermocouple Locations	max. temperature rise measured, (K)	max. temperature limit, (K)
Terminal of top left phase pole	69 K	80 K
Terminal of top centre phase pole	71 K	80 K
Terminal of top right phase pole	63 K	80 K
Terminal of bottom left phase pole	61 K	80 K
Terminal of bottom centre phase pole	56 K	80 K
Terminal of bottom right phase pole	52 K	80 K

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE 5: dielectric strength (Seq I, 8.3.3.5, sample number #01 and #02)		P
test voltage applied between:		test potential applied (V)	breakdown / flashover (Yes/No)
Between all the terminals of the main circuit connected together 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 the incoming and outgoing terminals with the circuit-breaker open		1000 V	No
supplementary information: N/A			

	TABLE 6: dielectric strength (Seq II+III, 8.3.4.3, sample number #03 and #04)		P
test voltage applied between:		test potential applied (V)	breakdown / flashover (Yes/No)
Between all the terminals of the main circuit connected together 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 the incoming and outgoing terminals with the circuit-breaker open		1000 V	No
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE 7: dielectric strength (Seq III, 8.3.5.3, sample number #05, #06 and #07)		P
test voltage applied between:		test potential applied (V)	breakdown / flashover (Yes/No)
Between all the terminals of the main circuit connected together 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 the incoming and outgoing terminals with the circuit-breaker open		1000 V	No
supplementary information: N/A			

	TABLE 8: dielectric strength (Annex H, H.3, sample number #08)		P
test voltage applied between:		test potential applied (V)	breakdown / flashover (Yes/No)
Between all the terminals of the main circuit connected together 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 the incoming and outgoing terminals with the circuit-breaker open		1000 V	No
supplementary information: N/A			

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE 9: clearance and creepage distance measurements					P
clearance cl and creepage distance dcr at/of:	Ui (V)	Uimp (kV)	required cl (mm)	cl (mm)	required dcr (mm)	dcr (mm)
Between poles	1000 V	8 kV	8 mm	33,5 mm	16 mm	56,2 mm
Between live parts and parts intended to be earthed	1000 V	8 kV	8 mm	37,4 mm	16 mm	37,4 mm
Between the contacts in the open position	1000 V	8 kV	8 mm	28,4 mm	16 mm	49,7 mm
Between live parts and actuator	1000 V	8 kV	8 mm	17,6 mm	16 mm	22,4 mm

	TABLE 10: Resistance to fire (Glow wire test)						P
No.	Description	Colour	Temp. °C	burning after t (s)	drops	support burning	—
1	Front cover	White	960 °C	4 s	No	No	P
2	Middle cover	Black	960 °C	4 s	No	No	P
3	Base	Black	960 °C	4 s	No	No	P
4	Handle	Black	960 °C	6 s	No	No	P
5	Axis of moving contact	Black	960 °C	0 s	No	No	P
6	Leading lever	Black	960 °C	0 s	No	No	P
7	Leading lever	Brown	960 °C	0 s	No	No	P

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Clause	Requirement + Test	Result - Remark	Verdict

	TABLE 11: Resistance to tracking (tracking test)						P
Specimen							Verdict
Description	Colour	Drops (no.)	Thick (mm)	Burning	Current (A)	Test voltage (V)	
Front cover	White	50	3 mm	N	0 A	175 V	P
Middle cover	Black	50	3 mm	N	0 A	300 V	P
Base	Black	50	3 mm	N	0 A	300 V	P
Handle	Black	50	3 mm	N	0 A	250 V	P
Axis of moving contact	Black	50	3 mm	N	0 A	300 V	P
Leading lever	Black	50	3 mm	N	0 A	250 V	P
Leading lever	Brown	50	3 mm	N	0 A	250 V	P

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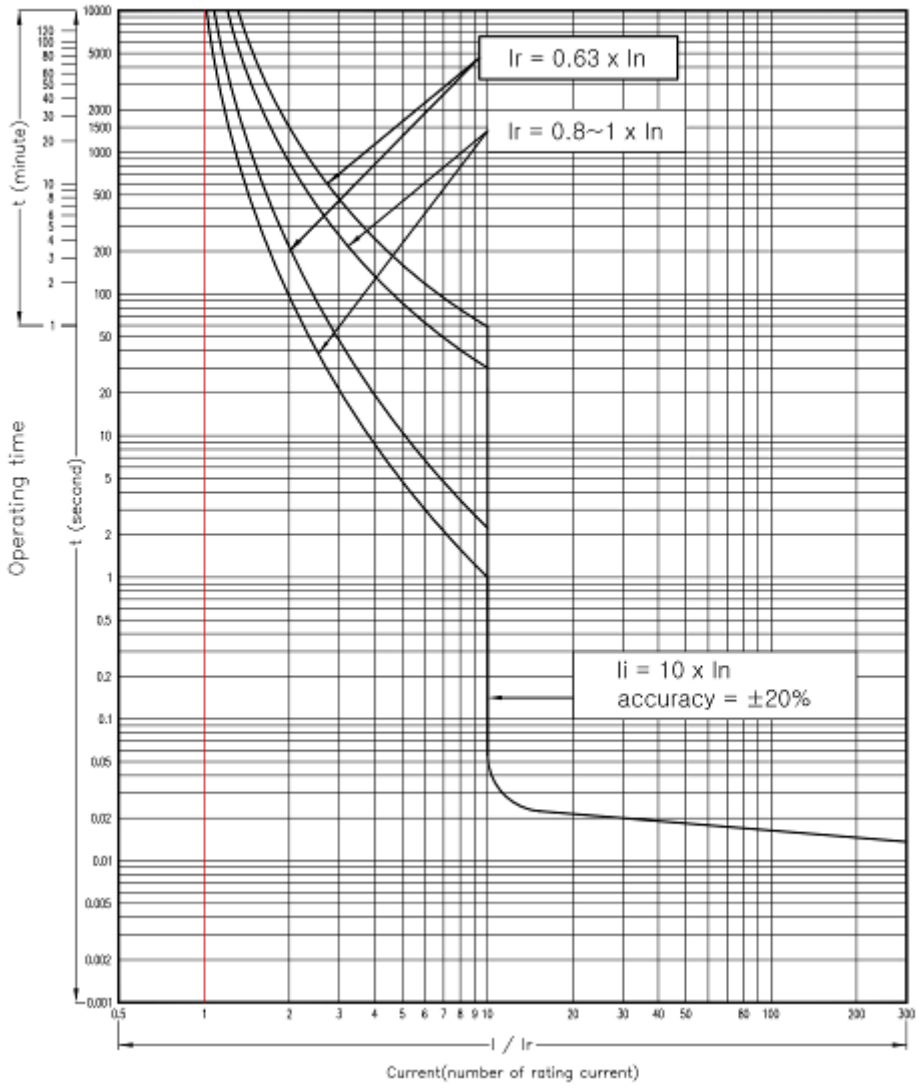
Time current characteristics

630~800A



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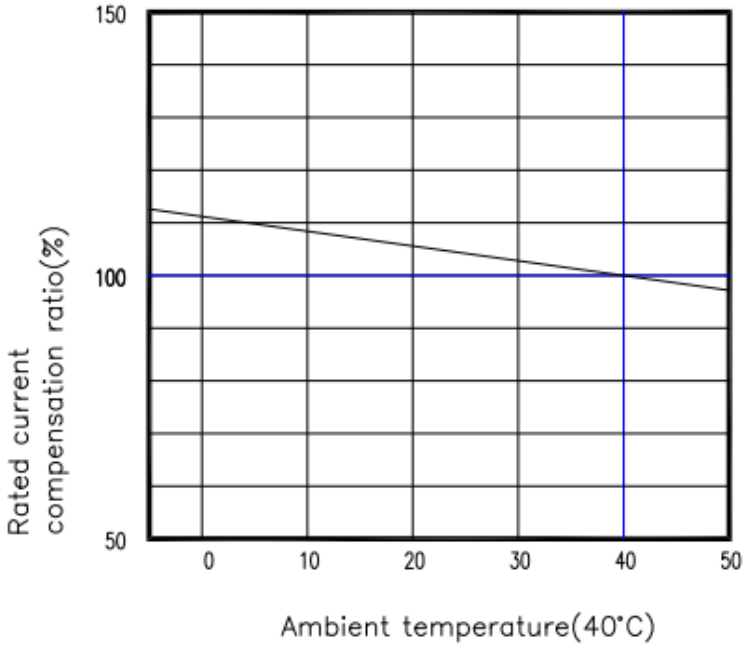
Temperature compensation factor for ambient temperature:



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Photographs:

Front view, 4P (N pole at right) with adjustable thermo-magnetic release, MCCB

Front view, 4P (N pole at left) with adjustable thermo-magnetic release, MCCB

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Front view, 4P (N pole at right) with fixed thermo-magnetic release, MCCB

Front view, 4P (N pole at left) with fixed thermo-magnetic release, MCCB

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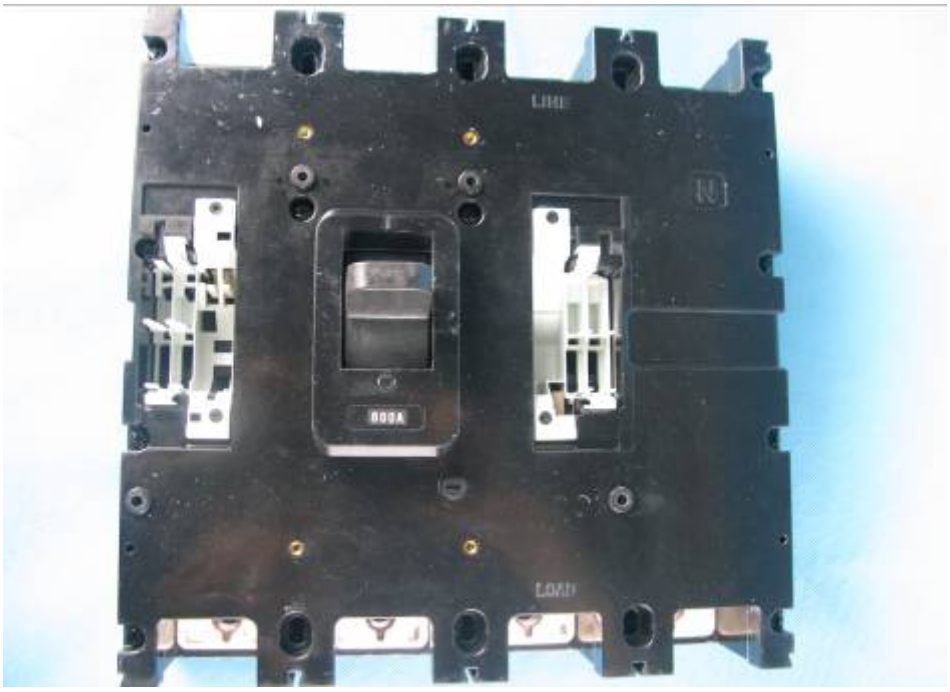
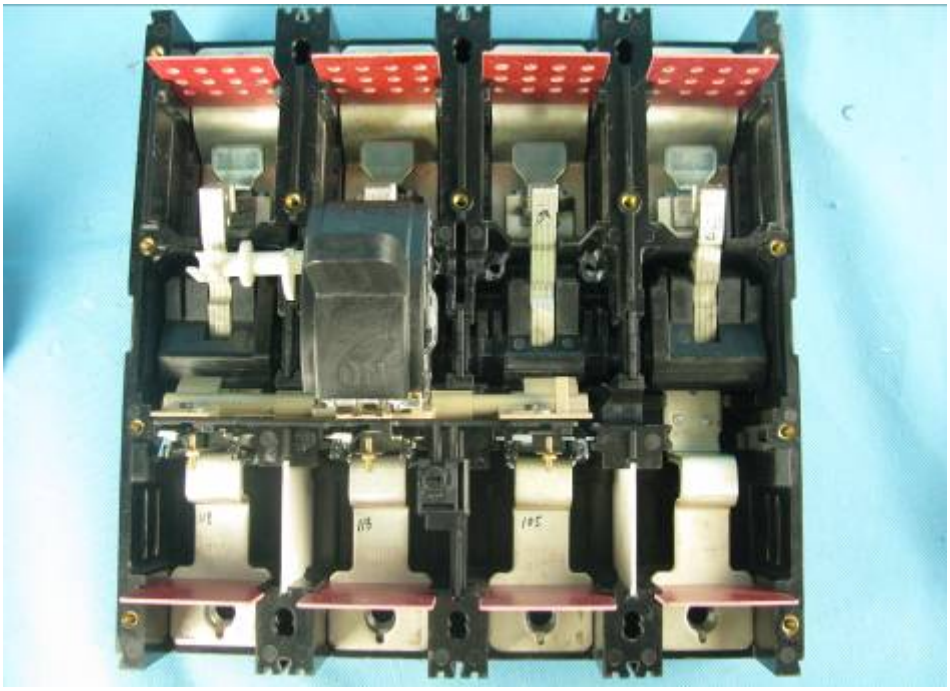
Open view, 4P, MCCB



Open view, 4P, MCCB



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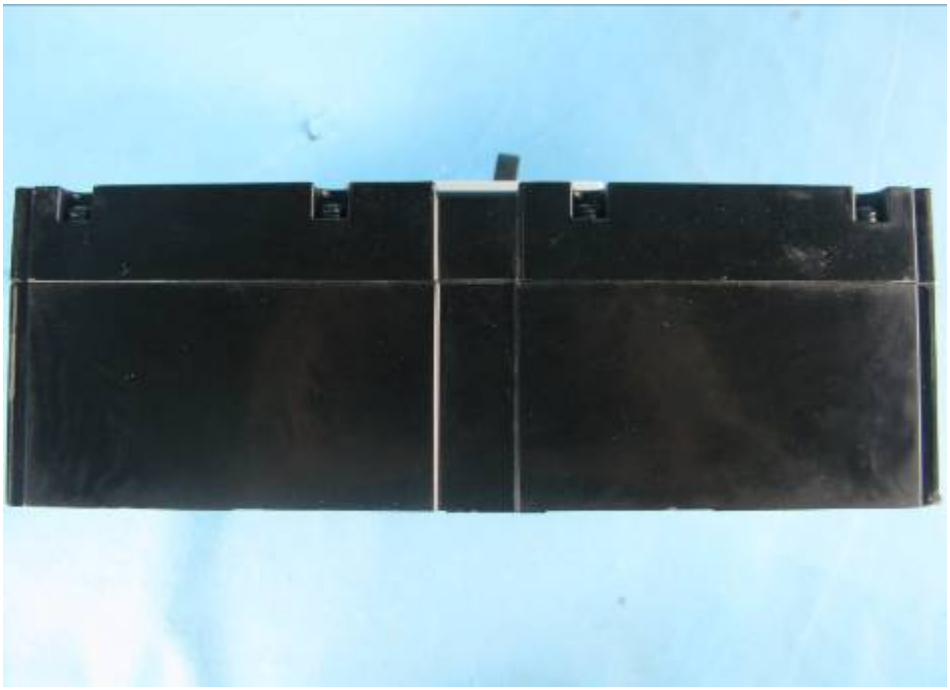
Side view, 4P, MCCB



Back view, 4P, MCCB

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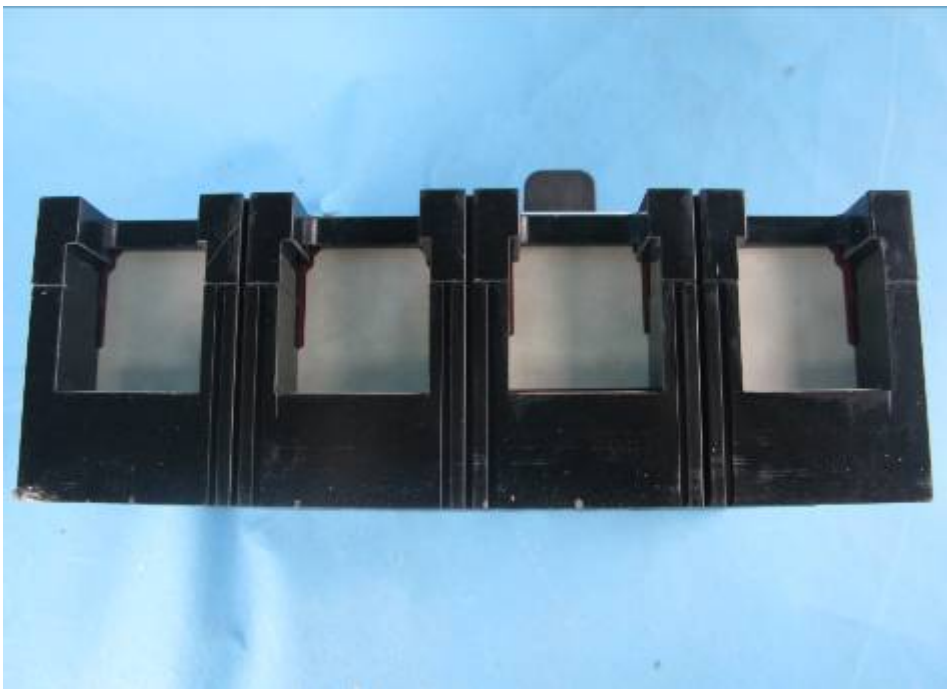
Line terminal view, 4P, MCCB



Load terminal view, 4P, MCCB

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Front view, 3P with adjustable thermo-magnetic release, MCCB

Front view, 3P with fixed thermo-magnetic release, MCCB

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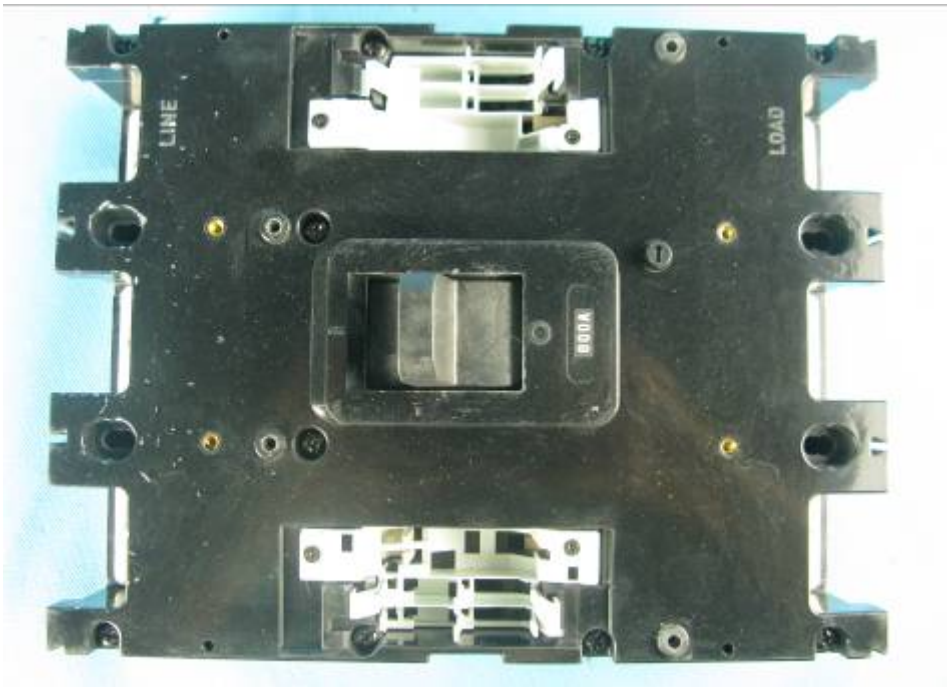
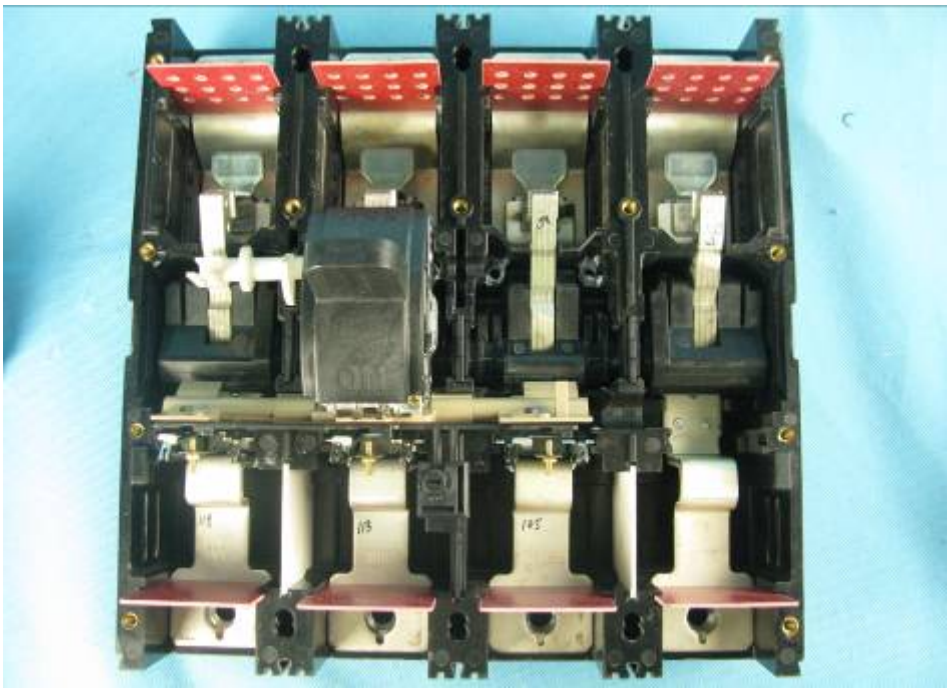
Open view, 3P, MCCB



Open view, 3P, MCCB



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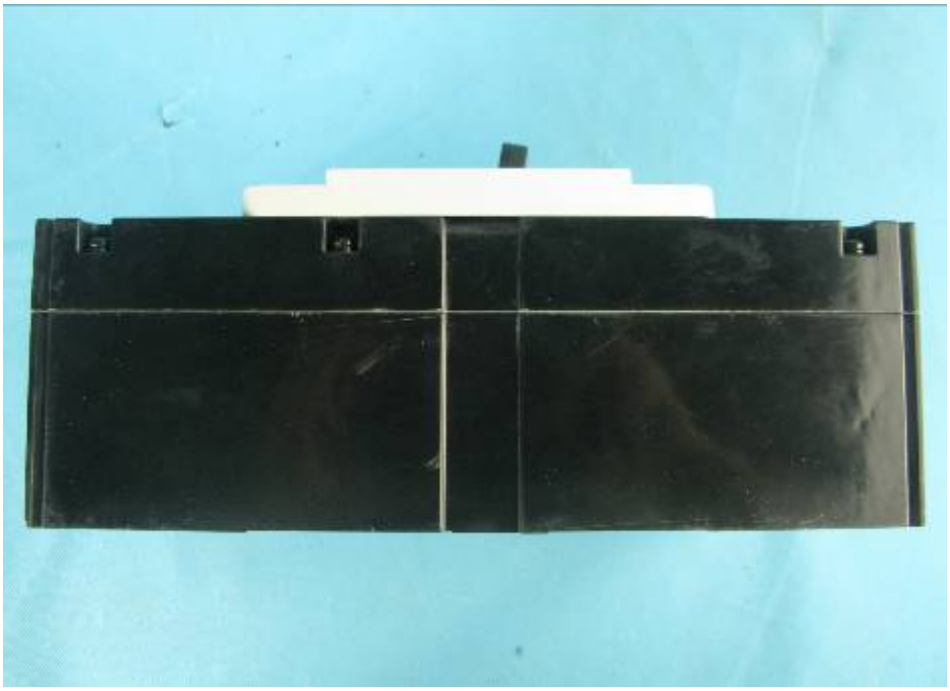
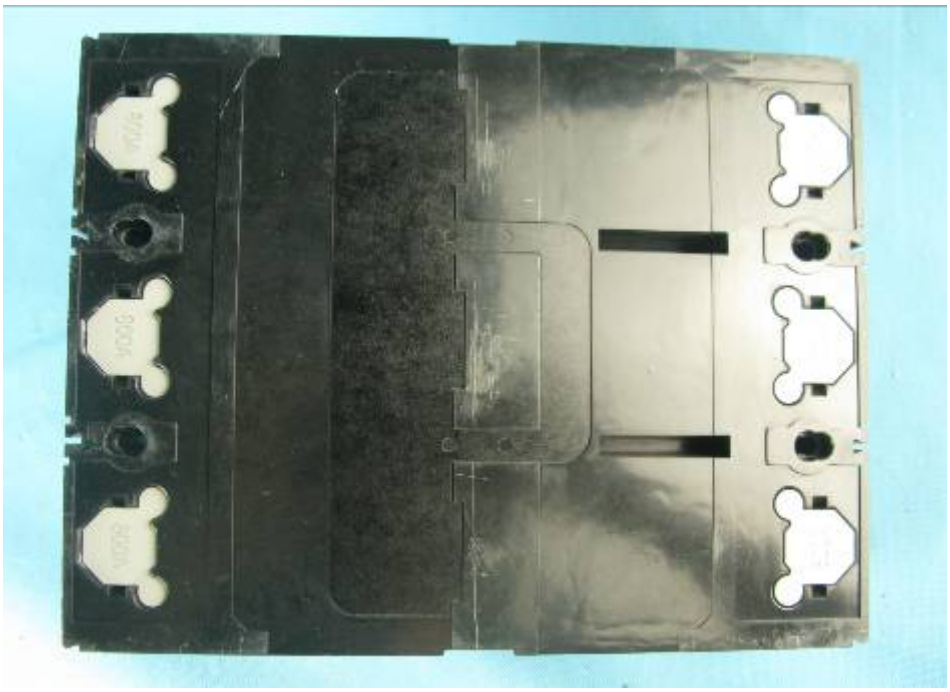
Side view, 3P, MCCB



Back view, 3P, MCCB



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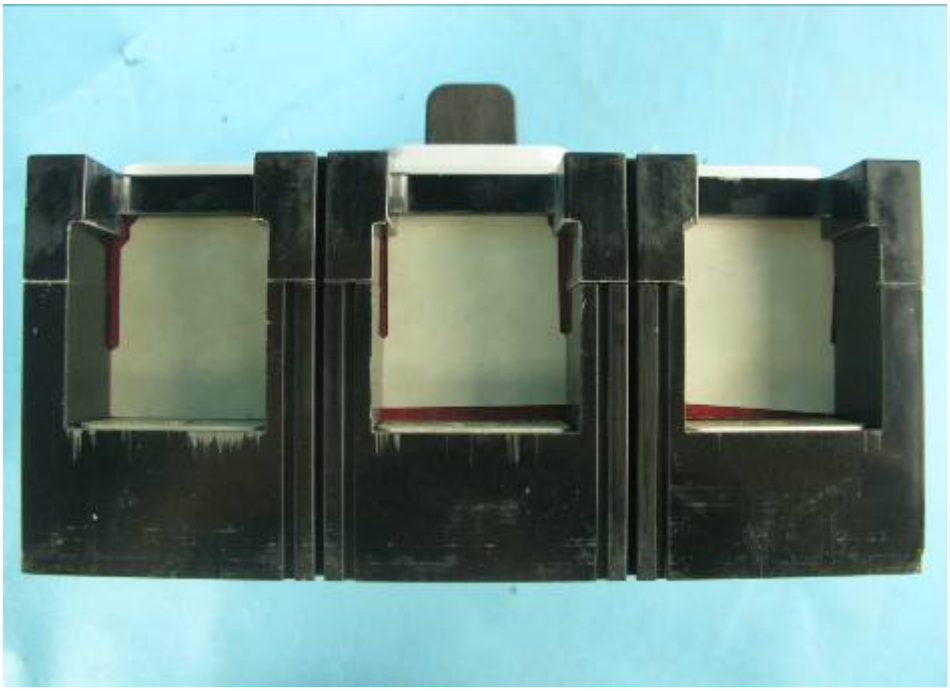
Line terminal view, 3P, MCCB



Load terminal view, 3P, MCCB

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Front view, 2P with adjustable thermo-magnetic release, MCCB

Front view, 2P with fixed thermo-magnetic release, MCCB

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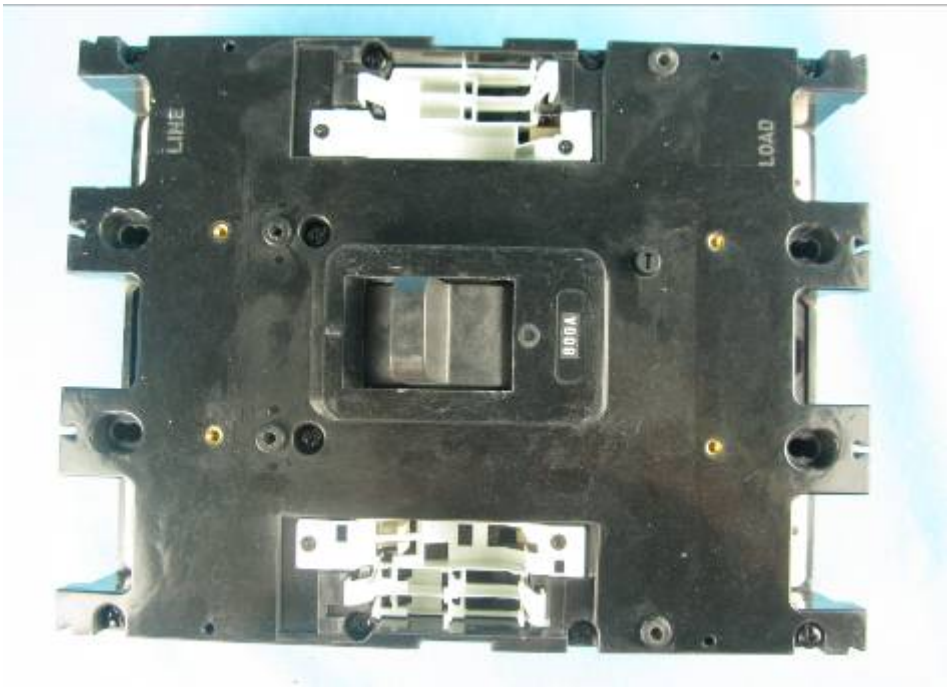
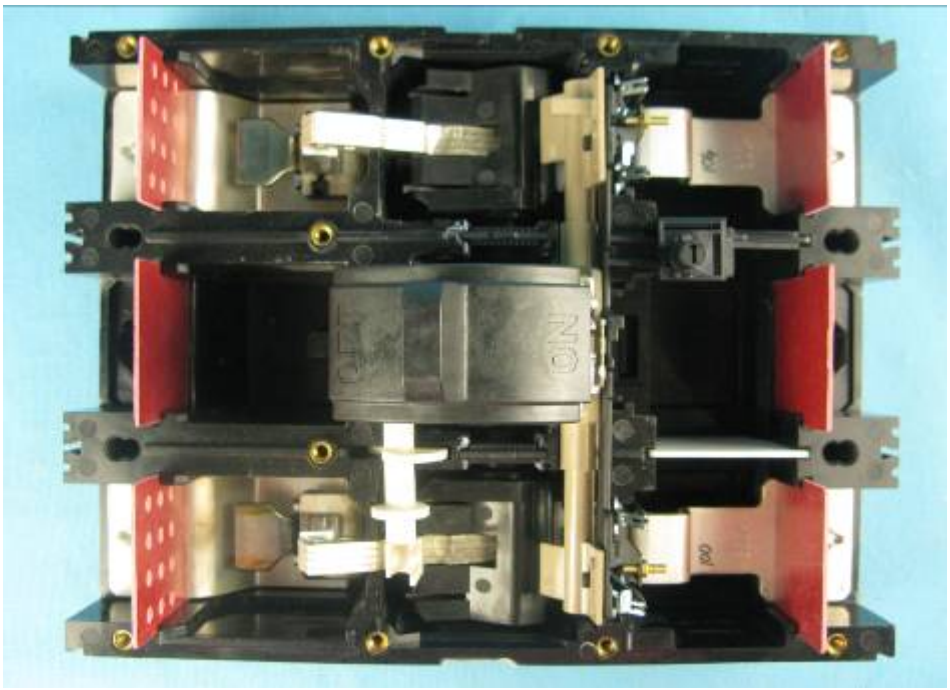
Open view, 2P, MCCB



Open view, 2P, MCCB



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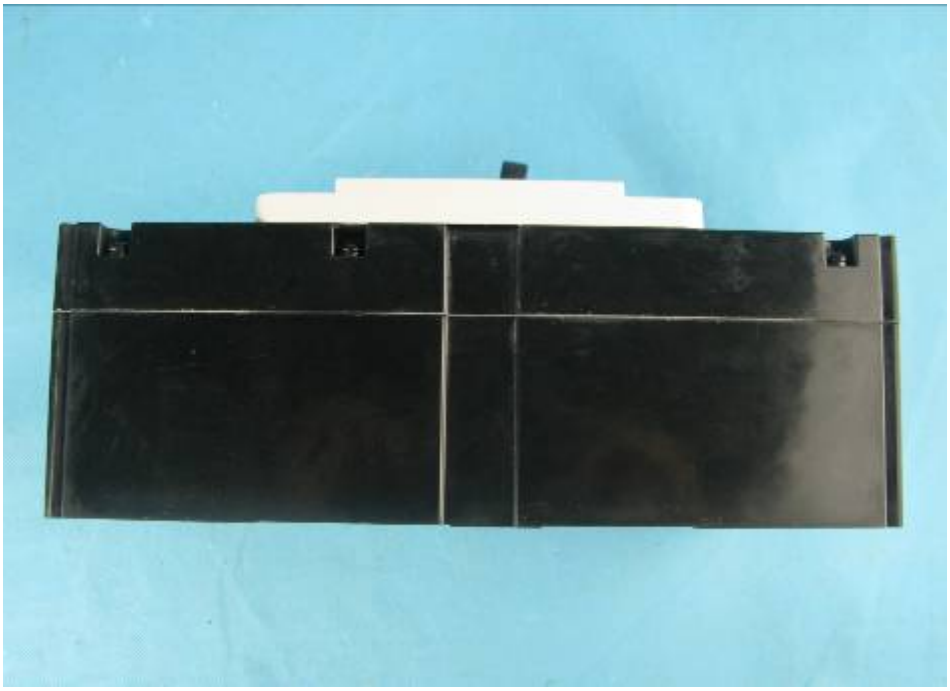
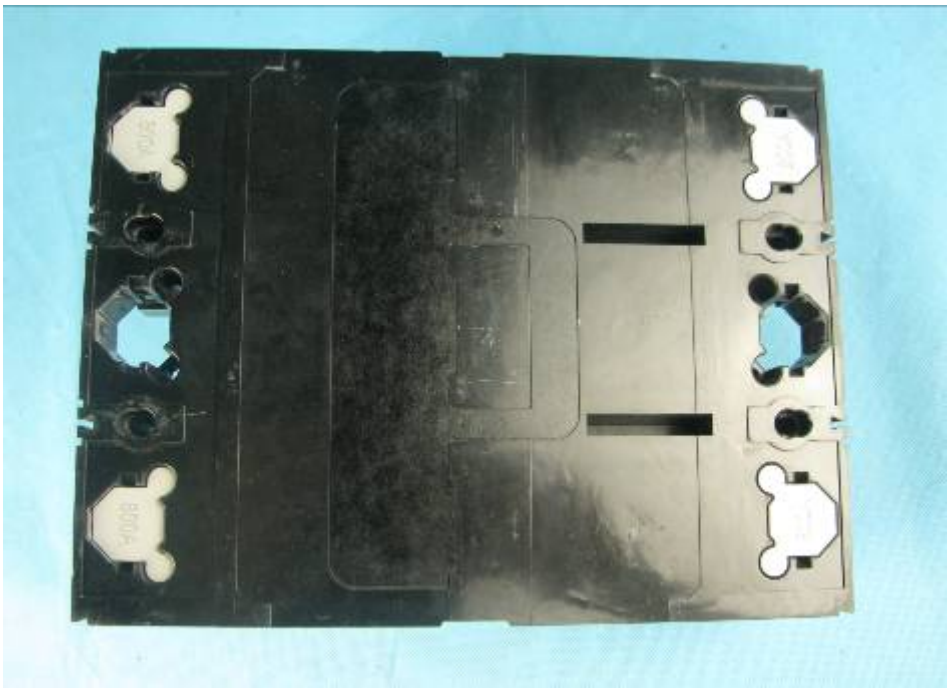
Side view, 2P, MCCB



Back view, 2P, MCCB



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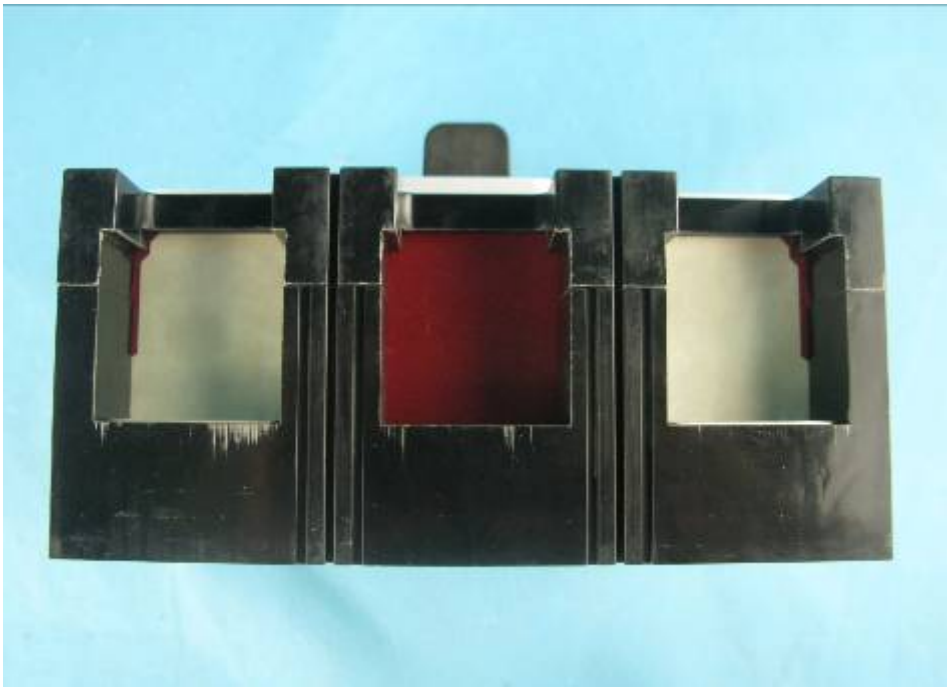
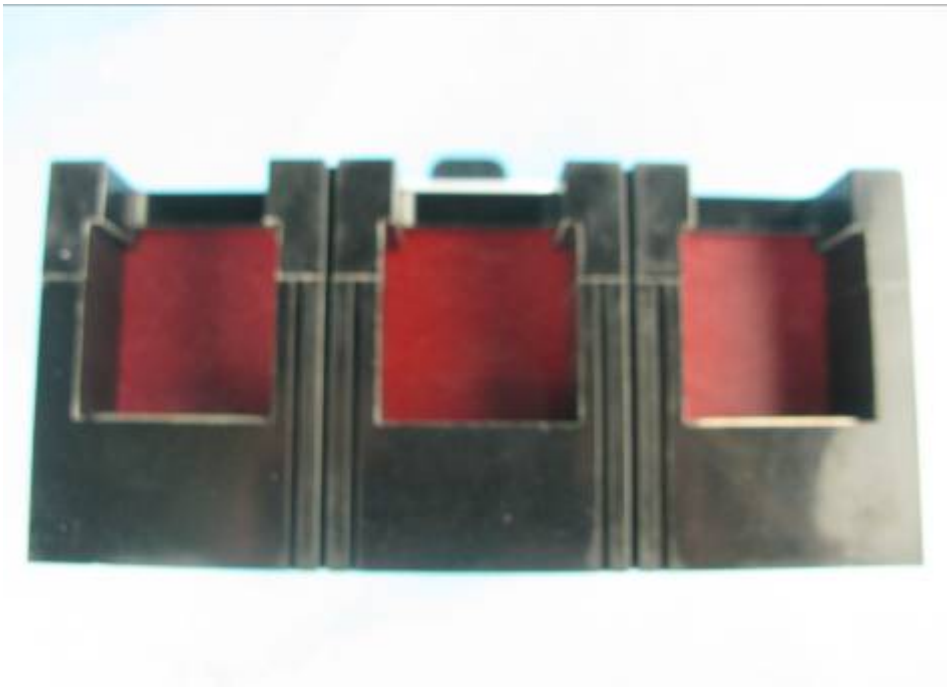
Line terminal view, 2P, MCCB



Load terminal view, 2P, MCCB



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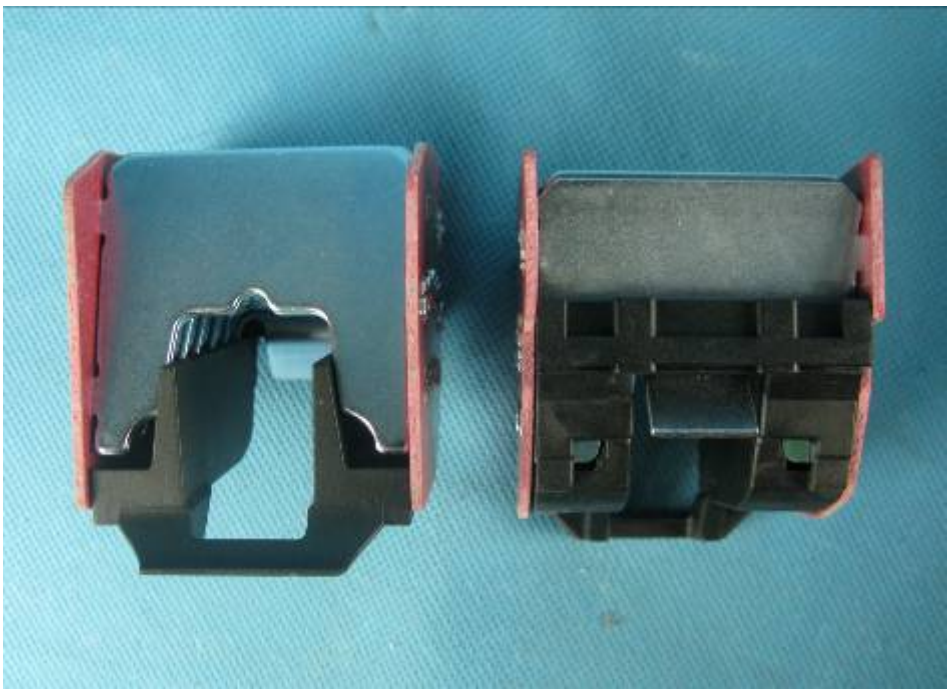
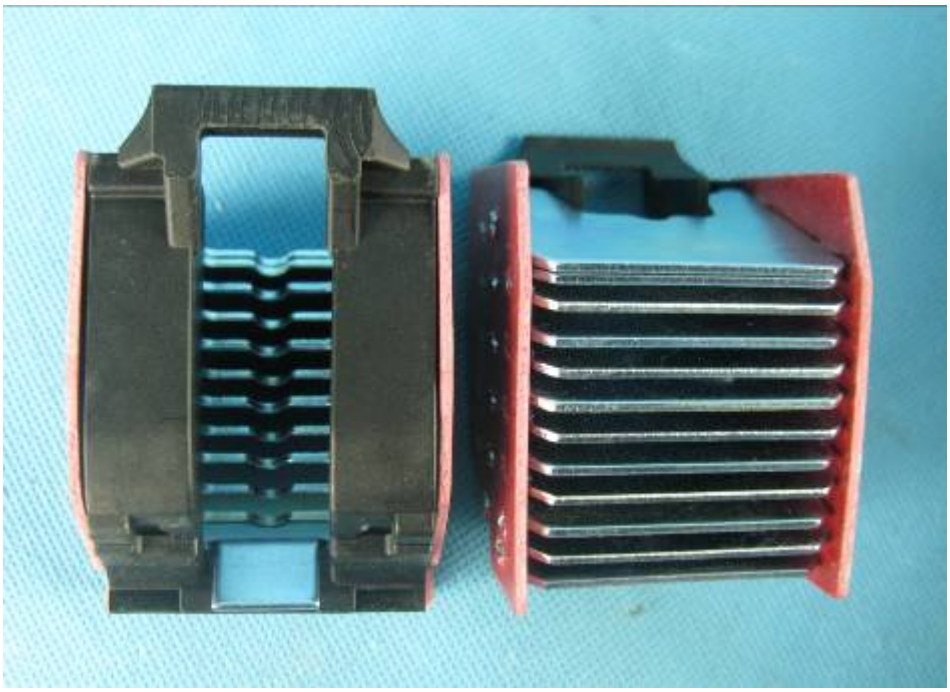
Arc chamber



Arc chamber



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Arc chamber

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Link bar between the terminal of the product and the cables (bars)

Link bar between the terminal of the product and the cables (bars)