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Report.

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70950094-TDT 3002-10

Type test on a 3 phase 145 kV GIS voltage transformer with an integrated isolation device

Manufacturer

Trench Germany GmbH



[Handwritten signature]

Arnhem, 8 February 2010

Experience you can trust.



INSPECTION REPORT

Report number TDT 3002-10
 Client Trench Germany GmbH
 Nürnberger Straße 199
 D-96050, Bamberg, Germany
 Reference PO3428218/ 19/10/2009 (70950094)
 Concerning Type tests
 Date 19 October 2009 until 22 October 2009
 Place Bamberg (Germany)
 Object 3 phase, 145 kV GIS Voltage transformer with an integrated isolation device.
 Type SUD 145/S92TM
 Manufacturer Trench Germany GmbH, Bamberg.

REQUIREMENTS

The requirements as mentioned in the standard IEC 60044-2, IEC 62271-102 and in line with IEEE C 57.13, IEEE C37.09 and client specification, based on GOST 1516-2, clause 5.

TEST PROGRAMME

The programme was specified by the client.
 For the programme reference is made to page 3.

SUMMARY AND CONCLUSION

The test results obtained relate only to the work ordered and to the material tested.
 The transformer passed all the tests successfully.



KEMA Nederland B.V.

P.G.A. Bus
 KEMA T&D Testing Services
 Managing Director

Author G.J. Veldscholten

This B-report consists of:
 104 pages, incl. 2 annexes (90 pages)

Arnhem, 8 February 2010

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PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10096 Bs

Copy No.: 0

Contents: 27 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of high-speed earthing switch (HSES), three-position switch and circuit-breaker (CB)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: July 28 - 29, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007)

IEC Publication 62271-102, Edition 1.0 (2003)

IEC Publication 62271-100, Edition 2.0 (2008)

IEC Publication 62271-203, First Edition (2003)

Client's Requirements

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Dielectric type test on auxiliary and control circuits

Test results:

The test object has passed the test stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

Management Committee

Technical Committee



Mannheim, May 20, 2011

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DAT-P-017/92-53

PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10059 Bs

Copy No.: 1

Contents: 59 Sheets

Test object: Three-pole operated three-pole metal-enclosed disconnecter of a three-position switch of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 2500 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 2500 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D DS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: May 03 - 05, 2010

Applied test specifications:

IEC Publication 62271-1 (2007)
IEC Publication 62271-102 (2003) + Corrigendum 3 (2005)
IEC Publication 62271-203 (2003)
Clients Instructions according to IEC 62271-102, sub-clause B.4.106.2

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

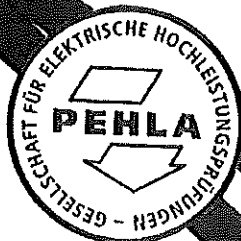
Tests performed:

Bus-transfer current switching test, performed for a bus-transfer voltage of 30 V, a bus-transfer current of 1600 A and a frequency of 50 Hz including a voltage test as a condition check.

This test is also valid for a rated frequency of 60 Hz.

Test results:

The test object has passed the test stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



Mannheim, July 30, 2010

GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

iv. Kopring
Management Committee

E. B. M. D. L.
Technical Committee



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025E0305



DAT-P-017/92-53

Siemens AG, E T HP AR R&D 2, Nonnendammallee 104, 13629 Berlin, Germany

Name: Matthias Schubert
 Department: E T HP AR R&D 2
 Telephone: +49 (30) 386-23392
 Fax: +49 (30) 386-26721
 E-mail: schubertmatthias@siemens.com

To whom it may concern

Your letter of
 Our reference: HBA11585C
 Date: June 25, 2014

Confirmation

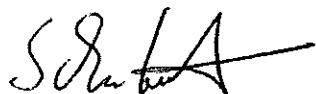
Validity of test reports for surge arrester types 3ES6 156-3PA33-6MA1, 3ES6 156-3PA33-1MA1 and 3ES6 156-3PA33-7MA1

Based on identical design, we herewith confirm, that the type test reports Pehla 14019 Bs (part of insulation withstand test on the arrester housing) performed on surge arrester type 3ES6 156-4PA43-6MA1 (Metal clad, SF₆-insulated metal oxide surge arrester (3-phase) with integrated isolating device and manual drive mechanism) and Pehla 10099 Bs-1 are valid for:

Metal clad, SF ₆ -insulated metal oxide surge arrester (3-phase) type:	
3ES6 156-3PA33-6MA1	with integrated isolating device and manual drive mechanism
3ES6 156-3PA33-1MA1	without integrated isolating device
3ES6 156-3PA33-7MA1	with integrated isolating device and motorized drive mechanism

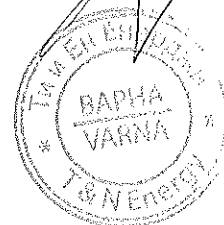
The tests were performed in accordance with IEC standard 60099-4, Edition 2.2 (2009).

Schaltwerk Hochspannung
 E T HP AR R&D2



Schubert
 (Head of Arrester Test Laboratory)
 Surge Arresters & Long Rod Insulators

ВЯРНО С
 ОРИГИНАЛ



Berlin, June 25, 2014

Siemens AG
 Energy Sector; Management: act. Randy Zwim
 Power Transmission Division; Management: Jan Mrosik
 High Voltage Products; Management: Harald Griem

Nonnendammallee 104
 13629 Berlin
 Germany

Tel.: +49 (30) 386 0

Siemens Aktiengesellschaft: Chairman of the Supervisory Board: Gerhard Cromme;
 Managing Board: Joe Kaeser, Chairman, President and Chief Executive Officer; Roland Busch, Klaus Helmrich,
 Hermann Requardt, Siegfried Russwurm, Ralf P. Thomas
 Registered offices: Berlin and Munich, Germany; Commercial registries: Berlin Charlottenburg, HRB 12300, Munich, HRB 6684
 WEEE-Reg.-No. DE 23691322

PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 14019 Bs

Copy No.: 0

Contents: 21 Sheets
Annex: 10100 Bs - 1

Test object: Metal clad, SF₆-insulated metal oxide surge arrester (3-phase)
Designation: 3ES6 156-4PA43-6MA1
Rated voltage: 156 kV Nominal discharge current: 20 kA Rated frequency: 50/60 Hz
Serial No.: K/ 35000001 and K/ 35000002
Drawing No.: 3HH 802-64421

Manufacturer: Siemens AG, E T HP AR MF
Tested for: Siemens AG, E T HP AR S 3
Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt
Date of test: January 29 - February 03, 2014

Applied test specifications:
IEC 60099-4 Ed. 2.2 (2009)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

Tests performed:

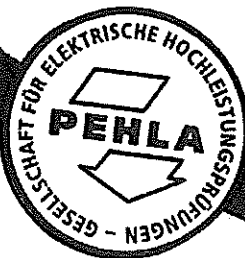
Insulation withstand tests on the arrester housing
Verification of thermal equivalency
Internal partial discharge test

ВЪРНО С
ОРИГИНАЛА



Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

S. Göttlich
Dr. S. Göttlich

Management Committee

T. Ebke
Dr. T. Ebke

Technical Committee

M. Bahr
M. Bahr

Mannheim, May 15, 2014

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D-PL-12072-04-01

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Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 13192 Bs

Copy No.: 0

Contents: 12 Sheets

Test object: Three-pole operated three-pole metal-enclosed high-speed earthing switch of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: - A Rated frequency: 50/60 Hz

Manufacturer: Siemens AG, E T HP GS DE MF B

Tested for: Siemens AG, E T HP GS R&D TS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: December 05, 2013 - January 10, 2014

Applied test specifications:

IEC Publication 62271-1, Edition 1.1 (2011)

IEC Publication 62271-102, Edition 1.2 (2013)

IEC Publication 62271-203, Edition 2.0 (2011)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

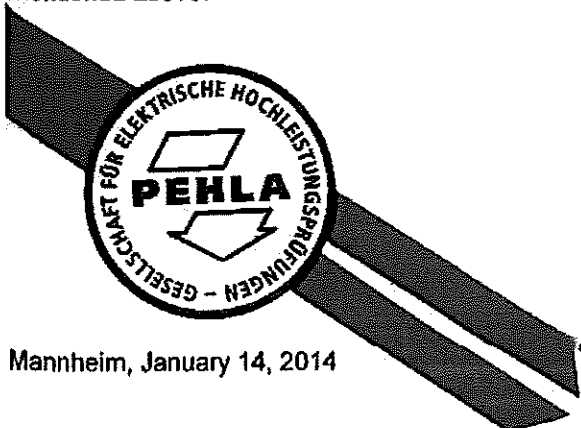
Tests performed:

Low and high temperature test at -30 °C and +55 °C



Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

R. Schiller

Management Committee

H. Grottel

Technical Committee

M. Bahr

Mannheim, January 14, 2014

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GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10128 Bs

Copy No.: 0

Contents: 12 Sheets

Annex: Test Report Rlttal No. 769/10 3 Sheets

Test object: Three-pole operated three-pole metal-enclosed high-speed earthing switch of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 40 kA - 50/60 Hz

Rated voltage: 145 kV

Rated normal current: - A

Rated frequency: 50/60 Hz

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D DS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt and by order
Qualitätssicherungs-Labor, Rittal Werk Rudolf Loh GmbH & Co. KG

Date of test: September 30 - October 04, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007)

IEC Publication 60529, Edition 2.1 (2001) + Corrigendum 3, Consolidated edition 2.1 – 2001 (2009)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

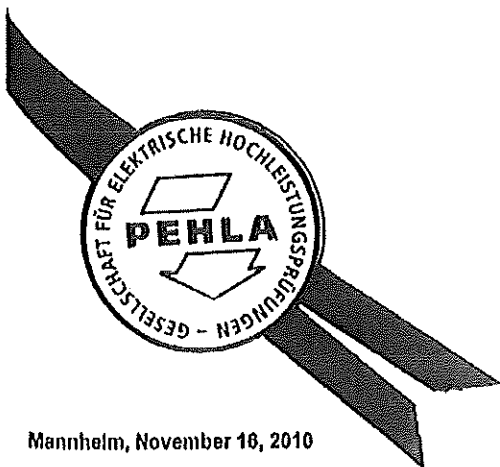
Tests performed:

Degree of Protection against access to hazardous parts and against solid foreign objects (IP 5X)

Degree of Protection against water jets (IP X5)

Test results:

The test object has passed the tests stated above with any objection. The results obtained and the performance proved of the test object complies with the requirements of the specifications mentioned above.



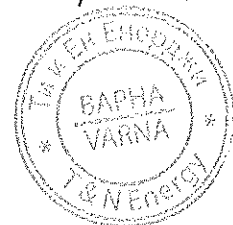
Mannheim, November 16, 2010

GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

Management Committee

Technical Committee

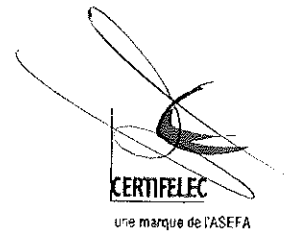
БСРНО С
ОПРГНАЈА



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DAT-P-017/02-53



Certificat de conformité / Certificate of conformity N° 020-14HT

Dé livré à / Issued to : Siemens Transmission et Distribution
1 rue de la Néva
38004 GRENOBLE

Pour le produit / For the product : Sectionneur de terre rapide triphasé à commande tripolaire d'appareillage sous enveloppe métallique à isolation gazeuse (classe E1) / *Three-pole operated three-phase high-speed earthing switch of gasinsulated metal-enclosed switchgear (GIS) (class E1)*

Référence(s) / Reference(s) : 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz

Selon dossier d'identification / According to Identification File : DI20130729 Rev C du 16/10/2013

Marque commerciale / Trademark : Siemens

Fabricant / Manufacturer : Siemens AG, Berlin, Allemagne

Site de fabrication / Place of manufacture : Siemens AG, Berlin, Allemagne

Informations complémentaires / Additional information :

- Caractéristiques assignées / *Rated characteristics :*

Tension / <i>Voltage</i>	:	145 kV
Courant de courte durée admissible / <i>Short-time withstand current</i>	:	40 kA - 3 s
Fréquence / <i>Frequency</i>	:	50/60 Hz

Document(s) de référence / Reference document(s) :

CEI 62271-102 Ed 1.2 (2013-02)

- 6.6 : Essais au courant de courte durée et à la valeur de crête du courant admissible / *Short-time withstand current and peak withstand current tests*

Caractéristiques certifiées / Certified characteristics :

Courant de courte durée admissible / <i>Short-time withstand current</i>	:	Ik = 40 kA
Valeur de crête du courant admissible / <i>Peak withstand current</i>	:	Ip = 108 kA
Durée de court-circuit / <i>Duration of short-circuit</i>	:	tk = 3 s

Document(s) pris en compte (s) / Relevant document(s) :

Rapport (s) d'essai / Test report (s) : N° 201306292_003v1 du/dated 17/01/2014

(émis par Volta L2E (F11) laboratoire homologué ASEFA / *Issued by Volta L2E (F11), as ASEFA approved laboratory*)

Ce certificat ne s'applique qu'à l'échantillon soumis à l'essai de type / *This certificate applies only to the sample submitted to the type test.*

Fontenay-aux-Roses,
Le / On : 12/02/2014

Le Président de l'ASEFA / *The Chairman of ASEFA,*


Vincent SCHUHL

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92260 Fontenay-aux-Roses - France
tél. 01 40 95 61 02
e-mail : contact@asefa-cert.com



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n° 5-0037
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Scope available on
www.cofrac.fr

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GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 14038 Bs

Copy No.: 0

Contents: 27 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of cross-modules, splitting modules, Y-module, current transformer, angle module, extension module and lateral expansion joint

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HP GS DE MF

Tested for: Siemens AG, E T HP GS R&D TS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: February 12, 2014

Applied test specifications:

IEC Publication 62271-1, Edition 1.1 (2011)
IEC Publication 62271-203, Edition 2.0 (2011) + Corrigendum 1 (2013)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

Tests performed:

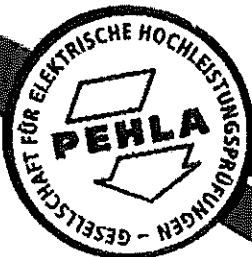
Three-phase short-time withstand current and peak withstand current tests for a peak factor of 2.7 p.u. and a duration of short-circuit of 3 s, performed at a frequency of 50 Hz.

This test is also valid for a rated frequency of 60 Hz.

ВЪРНО С
ОРИГИНАЛА

Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

R. Schiller

Management Committee

W. Mroczek

Technical Committee

M. Bahr

Mannheim, March 31, 2014

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GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 14011 Bs

Copy No.: 0

Contents: 49 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of cross-module, splitting modules, current transformers, angle module, extension module, cable module, cable disconnecter module and busbar extension

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HP GS DE MF

Tested for: Siemens AG, E T HP GS R&D TS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: January 16, 2014

Applied test specifications:

IEC Publication 62271-1, Edition 1.1 (2011)
IEC Publication 62271-102, Edition 1.1 (2012)
IEC Publication 62271-203, Edition 2.0 (2011) + Corrigendum 1 (2013)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

Tests performed:

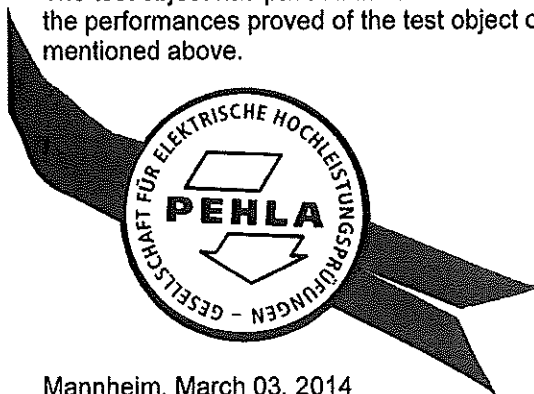
Three-phase short-time withstand current and peak withstand current tests for a peak factor of 2.7 p.u. and a duration of short-circuit of 3 s, performed at a frequency of 50 Hz.

This test is also valid for a rated frequency of 60 Hz.

Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.

ВЪРНО С
ОРИГИНАЛА



GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

S. Göttlich
Dr. S. Göttlich

Management Committee

T. Ebke
Dr. T. Ebke

Technical Committee

M. Bahr
M. Bahr

Mannheim, March 03, 2014

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PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 14002 Bs - 1

Copy No.: 0

Contents: 24 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of cross-modules, splitting modules, Y-module, current transformer, angle module, extension module, end module and lateral expansion joint

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz

Manufacturer: Siemens AG, E T HP GS DE MF
Tested for: Siemens AG, E T HP GS R&D TS
Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt
Date of test: January 13 - 17, 2014

Applied test specifications:

IEC Publication 62271-1, Edition 1.1 (2011)
IEC Publication 62271-102, Edition 1.2 (2013)
IEC Publication 62271-203, Edition 2.0 (2011)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

Tests performed:

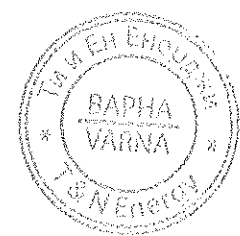
Dielectric type test including:

- Power-frequency withstand voltage test
- Power-frequency withstand voltage test, phase opposition
- Lightning impulse withstand voltage test
- Lightning impulse withstand voltage against power-frequency voltage (combined voltage) test
- Partial discharge test

Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.

ВЪРНО С
ОРИГИНАЛА



GESELLSCHAFT FÜR ELEKTRISCHE
HOCHLEISTUNGSPRÜFUNGEN

W. Czech
Management Committee

M. Wollinger
M. Wollinger
Technical Committee

J. Oemlsch
J. Oemlsch

Mannheim, January 30, 2014

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PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10116 Bs-1

Copy No.: 0

Contents: 15 Sheets

Test object: Three-pole metal-enclosed current transformer of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D DS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: September 09 - 10, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007)
IEC Publication 62271-203, First Edition (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Dielectric tests including:

- Power-frequency voltage test
- Lightning impulse voltage test
- Partial discharge test

Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



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HOCHLEISTUNGSPRÜFUNGEN

Management Committee

Technical Committee

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GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10143 Bs

Copy No.: 0

Contents: 14 Sheets

Test object: Drive and control cubicle of three-pole operated three-pole metal-enclosed circuit-breaker of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D DS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: October 20 - 21, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007)
IEC Publication 62271-100, Edition 2.0 (2008)
IEC Publication 62271-203, First Edition (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Temperature-rise test of the auxiliary and control equipment for temperature class -30 to +40°C

Test results:

The test object has passed the test stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



Mannheim, September 12, 2011

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HOCHLEISTUNGSPRÜFUNGEN

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Technical Committee

[Signature]
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PEHLA

GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10098 Bs

Copy No.: 1

Contents: 37 Sheets

Test object: Three-pole operated three-pole metal-enclosed circuit-breaker of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D TS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: July 26, 2010

Applied test specifications:

- IEC Publication 62271-1, Edition 1.0 (2007)
- IEC Publication 62271-100, Edition 2.0 (2008)
- IEC Publication 62271-203, Edition 1.0 (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

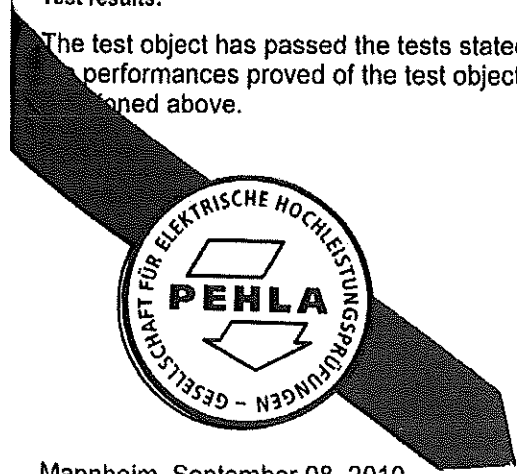
Tests performed:

Three-phase short-time withstand current and peak withstand current tests for a peak factor of 2.7 p.u. and a duration of short-circuit of 3 s, performed at a frequency of 50 Hz.

This test is also valid for a rated frequency of 60 Hz.

Test results:

The test object has passed the tests stated above without any objection. The results obtained and performances proved of the test object comply with the requirements of the specifications mentioned above.



Mannheim, September 08, 2010

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Technical Committee



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Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10096 Bs

Copy No.: 0

Contents: 27 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of high-speed earthing switch (HSES), three-position switch and circuit-breaker (CB)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: July 28 - 29, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007) IEC Publication 62271-102, Edition 1.0 (2003)
IEC Publication 62271-100, Edition 2.0 (2008) IEC Publication 62271-203, First Edition (2003)
Client's Requirements

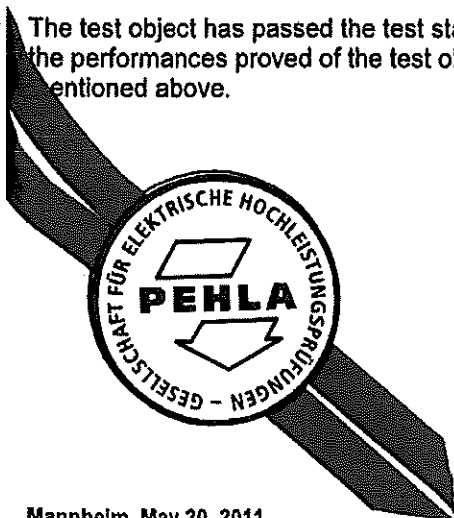
According to STL Objectives and Operating Principles PEHLA Issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Dielectric type test on auxiliary and control circuits

Test results:

The test object has passed the test stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



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Mannheim, May 20, 2011

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Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10087 Bs

Copy No.: 1

Contents: 46 Sheets

Test object: Three-pole operated three-pole metal-enclosed circuit-breaker of gas-insulated metal-enclosed switchgear (GIS)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-circuit breaking current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D TS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: July 14, 2010

Applied test specifications:

- IEC Publication 62271-1, Edition 1.0 (2007)
- IEC Publication 62271-100, Edition 2.0 (2008)
- IEC Publication 62271-101, Edition 1.0 (2006)
- IEC Publication 62271-203, Edition 1.0 (2003)

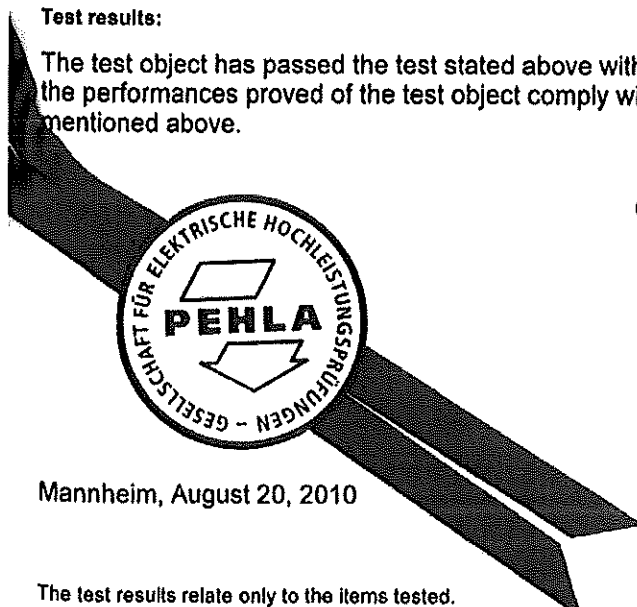
According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

Tests performed:

Short-line fault test, test duty L90 for a frequency of 50 Hz including voltage test as a condition check

Test results:

The test object has passed the test stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



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Mannheim, August 20, 2010

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GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 09080 Bs

Copy No.: 0

Contents: 11 Sheets

Annex: Test Report I IA CE DE EMC 1 / 10-E004047-BM-A01

Test object: Drive and control cubicle of three-pole metal-enclosed circuit-breaker of gas-insulated metal-enclosed switchgear (GIS), common drive

Designation: 8DN8

Control cubicle:

Serial No.: K 31256238

Drawing No.: 2HG 479 17050 001

Circuit diagram: (3)E50115-S0008-S513-B

Manufacturer: Siemens AG, E T HS, Berlin

Client: Siemens AG, E T HS TI D2, Berlin

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: November 18, 2009

Applied test specifications:

IEC 62271-1 (2007)

IEC 62271-100 (2008)

IEC 62271-203 (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Electromagnetic compatibility (EMC) tests on secondary systems:

Electrical Fast Transients/Burst immunity test

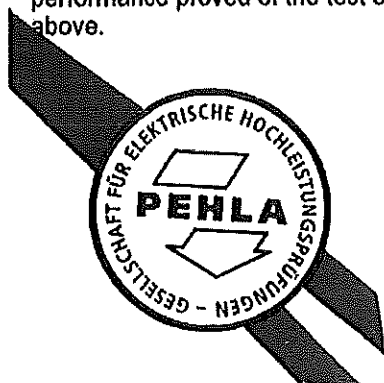
Damped Oscillatory Waves immunity test

Conducted RF-Emission (0.15 – 30 MHz),

Radiated RF-Emission (30 – 1000 MHz)

Test results:

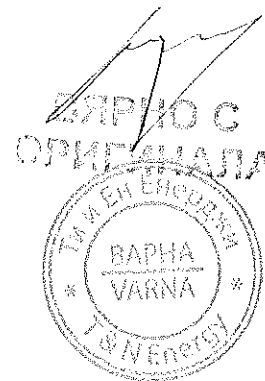
The test object has passed the tests stated above without any objection. The results obtained and the performance proved of the test object complies with the requirements of the specifications mentioned above.



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Mannheim, January 07, 2010

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REPORT OF PERFORMANCE

TDT 2520-10

APPARATUS

A three-pole operated three-pole metal-enclosed circuit-breaker of a gas-insulated metal-enclosed switchgear (GIS), incorporating one interrupter unit per pole.

TYPE 8DN8 – 145 kV – 3150 A – 40 kA – 50/60 Hz
SERIAL No. K31257439 and K31257440

CLIENT

Siemens AG, E T H S T I D T S,
Berlin, Germany

MANUFACTURER

Siemens AG, E T H S M F B,
Berlin, Germany

TESTED BY

KEMA HIGH-POWER LABORATORY
Utrechtseweg 310 - 6812 AR Arnhem - The Netherlands

DATE(S) OF TESTS

9, 11 and 14 June 2010

TEST SPECIFICATION

The tests have been carried out strictly in accordance with IEC 62271-100 sub-clauses 6.102 to 6.105, 6.106.4 and 6.106.5 (T100s and T100a with kpp 1,3 and at 50 Hz)

REMARKS

The apparatus has complied with the relevant requirements.

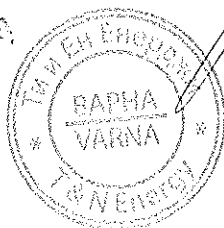
This report applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

This report consists of 122 sheets in total.

This report falls under the scope of the accreditation certificate L 020 of the Dutch Council for Accreditation. See information sheet (page 2).

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KEMA Nederland B.V.

S.A.M. Verhoeven
Director Testing, Inspections &
Certification The Netherlands

Arnhem, 7 April 2011

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GESELLSCHAFT FÜR ELEKTRISCHE HOCHLEISTUNGSPRÜFUNGEN
Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 09080 Bs

Copy No.: 0

Contents: 11 Sheets

Annex: Test Report I IA CE DE EMC 1 / 10-E004047-BM-A01

Test object: Drive and control cubicle of three-pole metal-enclosed circuit-breaker of gas-insulated metal-enclosed switchgear (GIS), common drive

Designation: 8DN8

Control cubicle:

Serial No.: K 31256238

Drawing No.: 2HG 479 17050 001

Circuit diagram: (3)E50115-S0006-S513-B

Manufacturer: Siemens AG, E T HS, Berlin

Client: Siemens AG, E T HS TI D2, Berlin

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: November 18, 2009

Applied test specifications:

IEC 62271-1 (2007)

IEC 62271-100 (2008)

IEC 62271-203 (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Electromagnetic compatibility (EMC) tests on secondary systems:

Electrical Fast Transients/Burst Immunity test

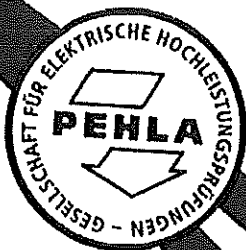
Damped Oscillatory Waves immunity test

Conducted RF-Emission (0.15 – 30 MHz),

Radiated RF-Emission (30 – 1000 MHz)

Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performance proved of the test object complies with the requirements of the specifications mentioned above.

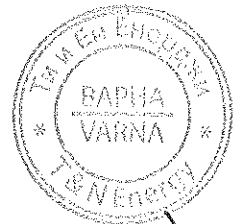


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Mannheim, January 07, 2010

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Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 14034 Bs - 1

Copy No.: 0

Contents: 30 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of cross-module, high-speed earthing switch (HSES), low-speed earthing switch (ES), splitting modules, busbar extension, current transformers, angle module, extension module, cable module, cable disconnecter module and circuit-breaker (CB)

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz

Manufacturer: Siemens AG, E T HP GS DE MF
Tested for: Siemens AG, E T HP GS R&D TS
Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt
Date of test: February 06 - 12, 2014

Applied test specifications:

IEC Publication 62271-1, Edition 1.1 (2011) IEC Publication 62271-102, Edition 1.2 (2013)
IEC Publication 62271-100, Edition 2.1 (2012) IEC Publication 62271-203, Edition 2.0 (2011)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

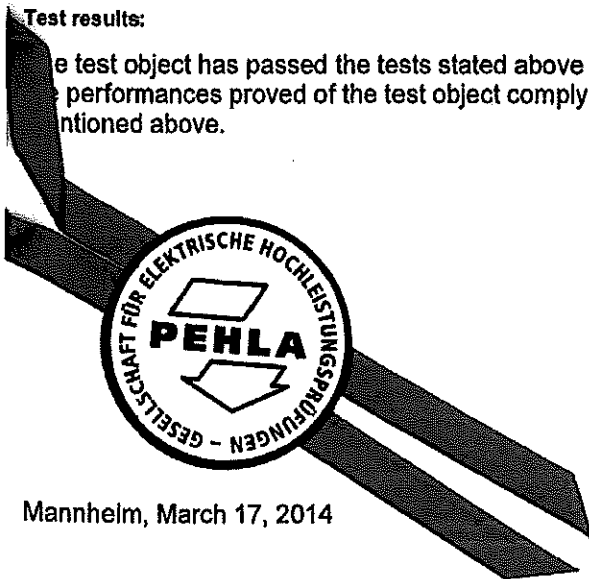
Tests performed:

Dielectric type test including:

- Power-frequency withstand voltage test
- Power-frequency withstand voltage test, phase opposition
- Lightning impulse withstand voltage test
- Lightning impulse withstand voltage against power-frequency voltage (combined voltage) test
- Partial discharge test

Test results:

The test object has passed the tests stated above without any objection. The results obtained and performances proved of the test object comply with the requirements of the specifications mentioned above.



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HOCHLEISTUNGSPRÜFUNGEN

W. Czoch
Management Committee
M. Wollinger
Technical Committee
M. Bahr

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Test Document

Report No.: 10148 Bs-1

Copy No.: 0

Contents: 25 Sheets

Test object: Three-pole metal-enclosed switchgear unit of gas-insulated metal-enclosed switchgear (GIS) consisting of circuit-breaker (CB), cross module, cable module, high-speed earthing switch (HSES), low speed earthing switch (ES), splitting modules, Y-module, extension module, angle module and current transformers

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: November 15 - 18, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007)

IEC Publication 62271-102, Edition 1.0 (2003)

IEC Publication 62271-100, Edition 2.0 (2008)

IEC Publication 62271-203, First Edition (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

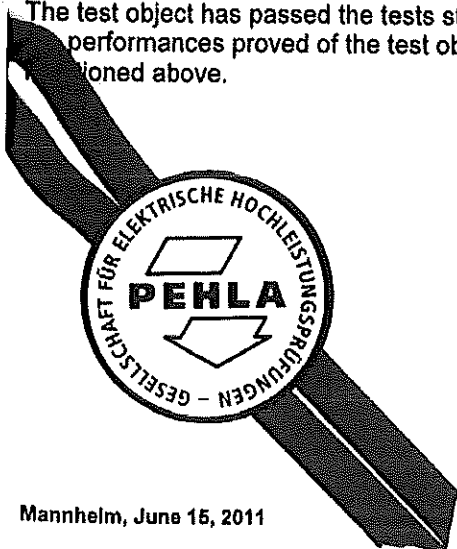
Tests performed:

Dielectric type tests including:

- Power-frequency voltage test
- Lightning impulse voltage test
- Partial discharge test

Test results:

The test object has passed the tests stated above without any objection. The results obtained and performances proved of the test object comply with the requirements of the specifications mentioned above.



Mannheim, June 15, 2011

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Member of the SHORT-CIRCUIT TESTING LIAISON (STL)

Test Document

Report No.: 10068 Bs

Copy No.: 1

Contents: 30 Sheets

Test object: Three pole metal-enclosed switchgear units of gas-insulated metal-enclosed switchgear (GIS) consisting of cross module, cable module, extension modules, splitting modules, angle module, axial compensator, lateral compensator, reducer module

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D DS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: June 10, 2010

Applied test specifications:

IEC Publication 62271-1 (2007)
IEC Publication 62271-102 (2003) + Corrigendum 3 (2005)
IEC Publication 62271-203 (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned test specifications and the STL Guides wherever applicable.

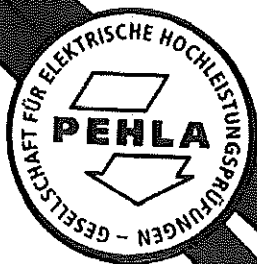
Tests performed:

Short-time withstand current and peak withstand current tests for a peak factor of 2.7 p.u. and a duration of short-circuit of 3 s, performed at a frequency of 50 Hz.

This test is also valid for a rated frequency of 60 Hz.

Test results:

The test object has passed the tests stated above without any objection. The results obtained and performances proved of the test object comply with the requirements of the specifications stated above.



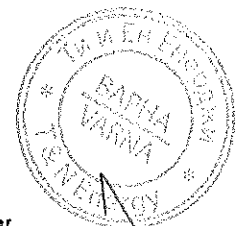
Mannheim, July 23, 2010

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Test Document

Report No.: 10002 Bs-1

Copy No.: 0

Contents: 18 Sheets

Test object: Three-pole metal-enclosed switchgear units of gas insulated metal enclosed switchgear (GIS) consisting of cross module, extension module, splitting modules, cable module, reducer modules, angle module, axial compensator and lateral compensator

Designation: 8DN8 - 145 kV - 3150 A - 40 kA - 50/60 Hz
Rated voltage: 145 kV Rated normal current: 3150 A Rated frequency: 50/60 Hz
Rated short-time withstand current: 40 kA

Manufacturer: Siemens AG, E T HS MF B

Client: Siemens AG, E T HS TI D DS

Testing station: PEHLA-Testing Laboratory Berlin-Siemensstadt

Date of test: January 13 - 14, 2010

Applied test specifications:

IEC Publication 62271-1, Edition 1.0 (2007)

IEC Publication 62271-203, First Edition (2003)

According to STL Objectives and Operating Principles PEHLA issues a Test Document following exclusively the above mentioned standards and the STL Guides wherever applicable.

Tests performed:

Dielectric tests including:

- Power-frequency voltage test
- Lightning impulse voltage test
- Partial discharge test

Test results:

The test object has passed the tests stated above without any objection. The results obtained and the performances proved of the test object comply with the requirements of the specifications mentioned above.



Mannheim, February 17, 2010

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