CENTRE OF TESTING SERVICE INTERNATIONAL

OPERATE ACCORDING TO ISO/IEC 17025

EMC TEST REPORT

TEST REPORT NUMBER : CNB3110609-02236-E

CENTRE OF TESTING SERVICE CO., LTD.
Building F, Dachuang industrial park, No.379, Zhongshan Dadao,
Guangzhou, China.

TEST REPORT

EN 60947- 1: 2007/IEC 60947-1-2004

Low-voltage switchgear and controlgear---Part 1: General rules
only for EMC

Report Reference No.	CNB3110609-02236-E
Date of issue	16 June 2011
Testing Laboratory Name.....	**CENTRE OF TESTING SERVICE CO., LTD.**
Address.....	Building F, Dachuang industrial park, No.379, Zhongshan Dadao, Guangzhou, China.
Testing location/ procedure.....	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's name	Ningbo Hairisen hydraulic Co., Ltd.
Address.....	Hezhou Road No.6 Linyu Industry No.2 in Zhenhai of Ningbo, Zhejiang, China
Test specification:	
Standard	**EN 60947- 1: 2007/IEC 60947-1-2004**
Test Report Form No.....	CTSEMC-1.0
TRF Originator.....	CENTRE OF TESTING SERVICE CO., LTD.
Master TRF	Dated 2009-01

Test item description.	Solenoid Directional Valve
Trade Mark.....	/
Manufacturer	Ningbo Hairisen hydraulic Co., Ltd.
Model/Type reference	DSG-02
Ratings	N/A
Result	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Violet Lee / File administrators	Tom Xiao / Technique principal	Vincent yao / Manager

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See Reverse For Terms And Conditions of Service

EMC -- T E S T R E P O R T

Test Report No. : CNB3110609-02236-E	16 June 2011 Date of issue

Type / Model.....	DSG-02
EUT.....	Solenoid Directional Valve
Applicant.....	Ningbo Hairisen hydraulic Co., Ltd.
Address.....	Hezhou Road No.6 Linyu Industry No.2 in Zhenhai of Ningbo, Zhejiang, China
Telephone.....	+86-574-86369955
Fax.....	+86-574-86369955
Contact.....	/
Manufacturer.....	Ningbo Hairisen hydraulic Co., Ltd.
Address.....	Hezhou Road No.6 Linyu Industry No.2 in Zhenhai of Ningbo, Zhejiang, China
Telephone.....	+86-574-86369955
Fax.....	+86-574-86369955
Contact.....	/
Factory.....	Ningbo Hairisen hydraulic Co., Ltd.
Address.....	Hezhou Road No.6 Linyu Industry No.2 in Zhenhai of Ningbo, Zhejiang, China
Telephone.....	+86-574-86369955
Fax.....	+86-574-86369955
Contact.....	/

Test Result according to the standards on page 3: **Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

EN 60947-1:2007/IEC 60947-1-2004 Low-voltage switchgear and controlgear Part 1: General rules
Only for EMC

2 SUMMARY

2.1 GENERAL REMARKS

Date of receipt of test sample	09 June 2011
Testing commenced on	11 June 2011
Testing concluded on	11 June 2011

2.2 FINAL ASSESSMENT

The EMC requirements pertaining to the technical standards and tested operation modes are

■ - fulfilled.

□ - **not** fulfilled.

The equipment under test

■ - fulfils the EMC requirements cited on page 3.

□ - **does not** fulfil the EMC requirements cited on page 3.

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3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage: ■ N/A ☐ 115V/60Hz
☐ Other (Specified blank below)

3.2 Short description of the Equipment under Test (EUT)

Number of tested samples: 1
Serial number: Prototype

3.3 EUT operation mode

The equipment under test was operated during the measurement under the following conditions:

☐ - Standby
☐ - Test programme (H - Pattern)
☐ - Test programme (colour bar)
☐ - Operating mode 2500 U/min. (1 cylinder)
☐ - Operating mode 1500 U/min. (> 1 cylinder)
☐ - Ignition on , Motor off
☐ - Speed 50 km/h
■ - Test program (customer specific)

Operating Mode: **ON**

Emissions tests : According to IEC/EN 60947-1, searching for the highest disturbance.

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3.4 EUT configuration

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurement:

Not Applicable

3.5 Performance level

The test results shall be classified in terms of the loss of function or degradation of performance of the equipment under test, relative to a performance level defined by its manufacturer or the requestor of the test, or agreed between the manufacturer and the purchaser of the product.

3.6 Definition related to the performance level

■ based on the used product standard
□ based on the declaration of the manufacturer, requestor or purchaser

Criterion A:
Definition: normal performance within limits specified by the manufacturer, requestor or purchaser:

Criterion B:
Definition: temporary loss of function or degradation of performance which ceases after the disturbance ceases, and from which the equipment under test recovers its normal performance, without operator intervention:

Criterion C:
Definition: temporary loss of function or degradation of performance, the correction of which requires operator intervention:

Criterion D:
Definition: loss of function or degradation of performance, which is not recoverable, owing to damage to hardware or software, or loss of data:

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4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Building F, Dachuang industrial park, No.379, Zhongshan Dadao, Guangzhou, China

Tel：+86-20-85543113 (32 lines) Fax：+86-20-38780406

4.2 Test facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L3394

CENTRE OF TESTING SERVICE CO., LTD. has been assessed and proved to be in compliance with CNAS-CL01: 2006 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

IC-Registration No.: 8374

The 3m Alternate Test Site of CENTRE OF TESTING SERVICE CO., LTD. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 8374 on June 24, 2009 .

FCC-Registration No.: 971995

CENTRE OF TESTING SERVICE CO., LTD. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration No.971995, July 21, 2009.

4.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35 ° C
Humidity:	25~75 %
Atmospheric pressure:	86~106 kPa

4.4 Definitions of symbols used in this test report

■ - The black square indicates that the listed condition, standard or equipment is applicable for this report.

□ - The empty square indicates that the listed condition, standard or equipment is **not** applicable for this report.

4.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the CTS quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.6 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conduction disturbance	150kHz~30MHz	±1.22dB	(1)
Power disturbance	30MHz~300MHz	±1.38dB	(1)
Radiation emission (3m)	30MHz~300MHz	±3.14dB	(1)
	300MHz~1000MHz	±3.18dB	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

4.7 Test Description

4.7.1 Description of Standards and Results

EMISSION			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	EN 55022:2006+A1:2007	Class B	PASS
Conducted disturbance at telecommunication port	EN 55022:2006+A1:2007	Class B	N/A
Radiated disturbance	EN 55022:2006+A1:2007	Class B	PASS
Harmonic current emissions	EN 61000-3-2:2006+A1:2009+A2:2009 IEC61000-3-2 A2-2009	Class A	N/A
Voltage fluctuations & flicker	EN 61000-3-3:2008 IEC 61000-3-3-2008	--------	N/A

IMMUNITY			
Description of Test Item	**Basic Standard**	**Performance Criteria**	**Results**
Electrostatic discharge (ESD)	IEC 61000-4-2:2008	B	PASS
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2010	A	PASS
Electrical fast transient (EFT)	IEC 61000-4-4:2007	B	N/A
Surge (Input a.c. power ports)	IEC 61000-4-5:2009	B	N/A
Surge (Telecommunication ports)		B	N/A
Radio-frequency, Continuous conducted disturbance	IEC 61000-4-6:2008	A	N/A
Power frequency magnetic field	IEC 61000-4-8:2009	A	N/A
Voltage dips, >95% reduction	IEC 61000-4-11:2010	B	N/A
Voltage dips, 30% reduction		B	N/A
Voltage interruptions		C	N/A
N/A is an abbreviation for Not Applicable.			

5 TEST CONDITIONS AND RESULTS

5.1 Conducted disturbance

For test instruments and accessories used see section 6 part **6.3**.

5.1.1 Description of the test location

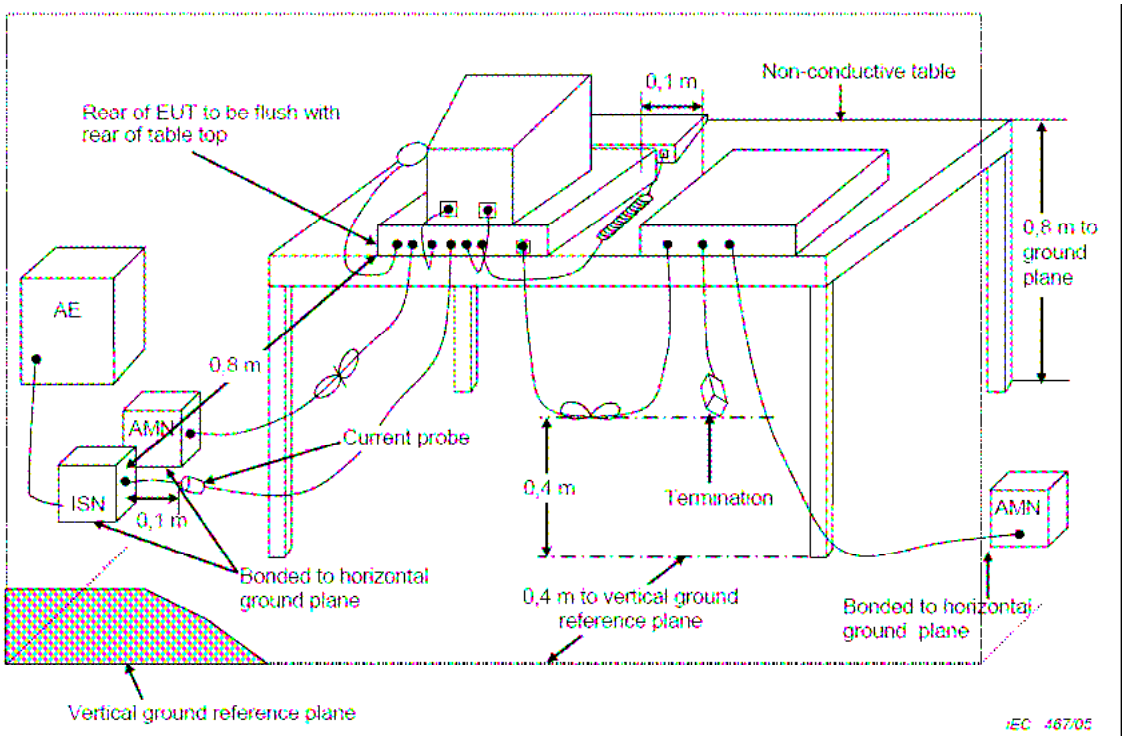
Test location: Shielded room

5.1.2 Description of the test set-up

5.1.2.1 Operating Condition

The EUT is engraving during the test, and the results of the maximum emanation are recorded

5.1.2.2 Block Diagram of Test Setup



5.1.3 Limits disturbance

Frequency			Maximum RF Line Voltage (dBμV)	
			Quasi-peak Level	Average Level
150kHz	~	500kHz	66 ~ 56 *	56 ~ 46 *
500kHz	~	5MHz	56	46
5MHz	~	30MHz	60	50

Note: (1) The tighter limit shall apply at the edge between two frequency bands.

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5.1.4 Test result

Frequency Range	Passed	Failed	Number of rechecks
150 kHz - 30 MHz	☒	☐	0

Test by: **Peason**
Test date: **2011-06-15**

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5.2 Radiated disturbance (electric field)

For test instruments and accessories used see section 6 part **6.1**.

5.2.1 Description of the test location

Test location : Semi-Anechoic chamber

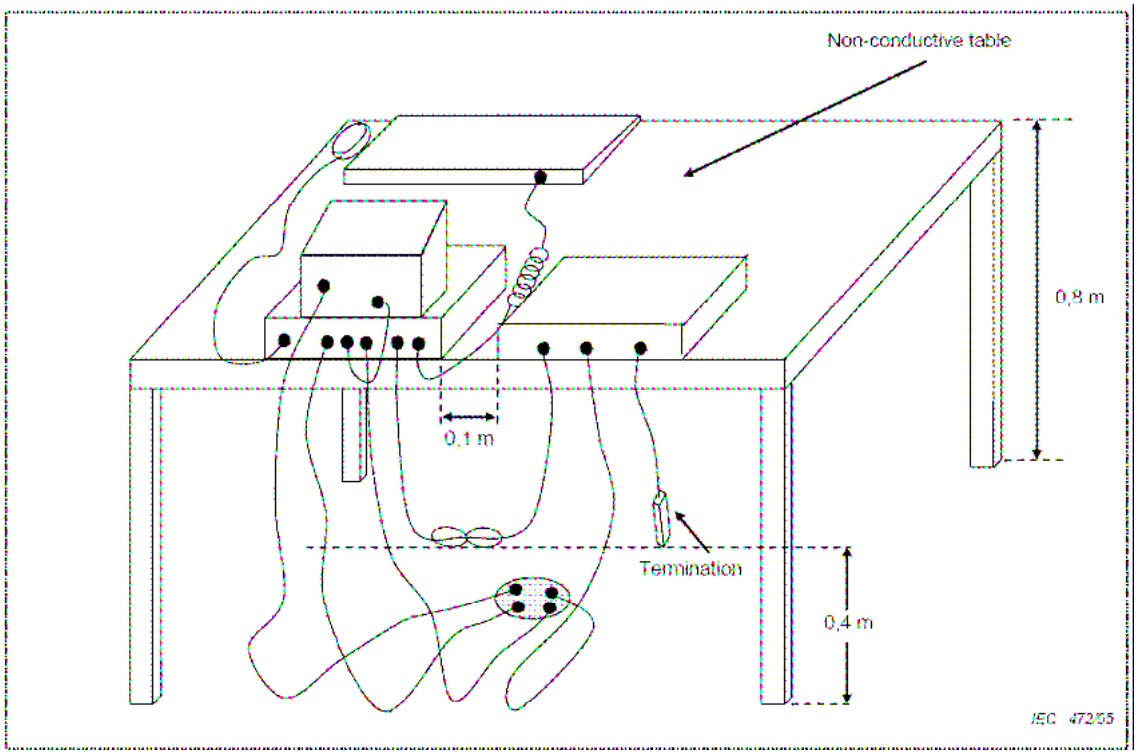
Test disturbance: 3 Meter

5.2.2 Description of the test set-up

5.2.2.1 Operating Condition

The EUT is engraving during the test, and the results of the maximum emanation are recorded

5.2.2.2 Block Diagram of Test Setup



5.2.3 Limits of disturbance (Class B)

Frequency (MHz)	Distance (Meters)	Field Strengths Limits (dBμV/m)
30 ~ 230	3	40
230 ~ 1000	3	47

Note: (1) The tighter limit shall apply at the edge between two frequency bands.
(2) Distance refers to the distance in meters between the test instrument antenna and the closest point of any part of the E.U.T.

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5.2.4 Test result

Frequency Range / Polarization	Passed	Failed	Number of rechecks
30 MHz - 200 MHz / vertical	☒	☐	0
30 MHz - 200 MHz / horizontal	☒	☐	0
200 MHz - 1000 MHz /vertical	☒	☐	0
200 MHz - 1000 MHz / horizontal	☒	☐	0

Test by: **Peason**
Test date: **2011-06-15**

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5.3 Electrostatic discharge

For test instruments and accessories used see section 6 part **6.6**.

5.3.1 Description of the test location

Test location :	Test location no. 2
Power supply:	N/A
Test condition:	Ambient Temperature: 24℃, Humidity:56%
Date of test :	15 June 2011
Operator :	**Peason**

5.3.2 Severity of levels electrostatic discharge

5.3.2.1 Severity level: Contact discharge at ±4KV air discharge at ±8KV

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1	2	2
2	4	4
3	6	8
4	8	15
X	Special	Special

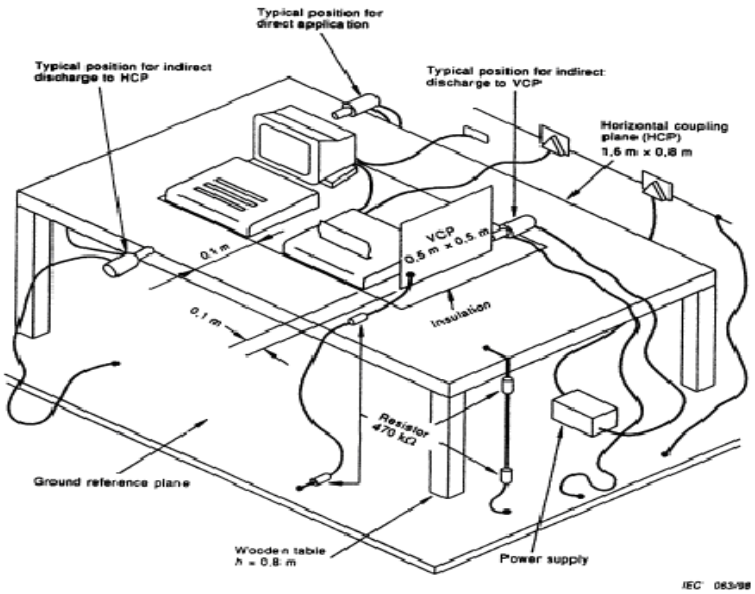
5.3.2.2 Performance criterion: B

5.3.3 Description of the test set-up

5.3.3.1 Operating Condition

The EUT is engraving during the test, and the results of the maximum emanation are recorded

5.3.3.2 Block Diagram of Test Setup



5.3.4 Test specification:

Contact discharge voltage:	■ 2 kV ■ 4 kV	
Air discharge voltage:	■ 2 kV ■ 4 kV ■ 8 kV	
Discharge impedance:	■ 330 Ω / 150 pF	
Discharge factor:	■ ≥ 1 sec.	
Number of discharges:	■ ≥ 10	
Type of discharge:	Direct discharge	■ Air discharge
		■ Contact discharge
	Indirect discharge	■ Contact discharge
Polarity:	■ Positive	■ Negative
Discharge location:	■see photo documentation of the test set-up	
	■all external locations accessible by hand	
	■horizontal plate (HCP)	
	■vertical coupling plate (VCP)	

5.3.5 Test result

The requirements are **Fulfilled** Performance Criterion: **B**

Remarks: During the test no deviation was detected to the selected operation mode(s).

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5.4 Radiated, radio-frequency, electromagnetic field

For test instruments and accessories used see section 6 part **6.7**.

5.4.1 Description of the test location

Test location :	GTEM chamber
Power supply:	N/A
Test condition:	Ambient Temperature: 24℃, Humidity:56%
Date of test :	15 June 2011
Operator :	**Peason**

5.4.2 Severity levels of radiated, Radio-frequency, electromagnetic field

5.4.2.1 Severity level: 3V/m

Level	Field strenght(V/m)
1	1
2	3
3	10
X	Special

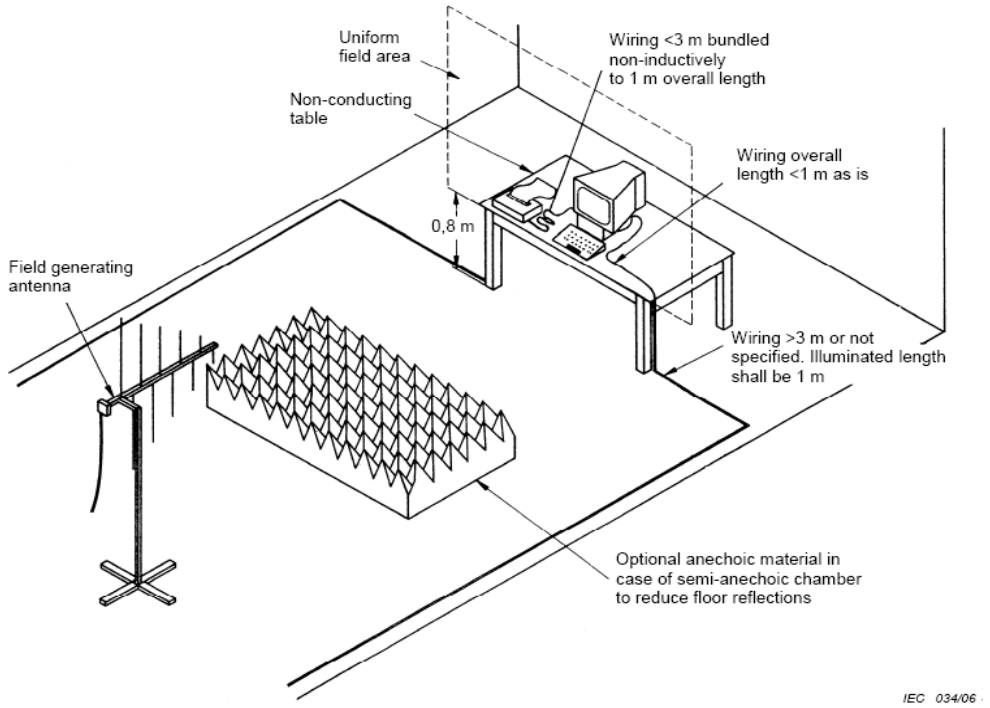
5.4.2.2 Performance criterion: A

5.4.3 Description of the test set-up

5.4.3.1 Operating Condition

The EUT is engraving during the test, and the results of the maximum emanation are recorded

5.4.3.2 Block Diagram of Test Setup



5.4.4 Test specification:

Frequency range:	■ 80 MHz to 1000 MHz
Field strength:	■ 3 V/m
EUT - antenna separation:	■ 3 m
Modulation:	■ AM: 80 % ■ sinusoidal 1000Hz
Frequency step:	■ 1 % with 3 s dwell time
Antenna polarisation:	■ horizontal ■ vertical

5.4.5 Test result

The requirements are **Fulfilled** Performance Criterion: **A**

Remarks: During the test no deviation was detected to the selected operation mode(s).

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6 USED TEST EQUIPMENT

6.1

Radiated disturbance (electric field)					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	100868	2010/12
2	Biconical Antenna	ROHDE & SCHWARZ	HK116	100221	2010/12
3	Log per Antenna	ROHDE & SCHWARZ	HL223	100226	2010/12
4	Log per Antenna	ROHDE & SCHWARZ	HL050	100186	2010/12
5	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2010/12

6.2

Power Disturbance					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESVS10	842885/001	2010/12
2	Absorbing clamp	ROHDE & SCHWARZ	MDS 21	03466	2010/12
3	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2010/12

6.3

Conducted Disturbance					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMI Test Receiver	ROHDE & SCHWARZ	ESHS10	842884/012	2010/12
2	Artificial Mains	ROHDE & SCHWARZ	ESH3-Z5	832479/025	2010/12
3	Pulse Limiter	ROHDE & SCHWARZ	ESHSZ2	100301	2010/12
4	EMI Test Software	ROHDE & SCHWARZ	ESK1	N/A	2010/12

6.4

Harmonic Current					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Harmonic And Flicker Analyzer	EMC Partner	HAR1H01B	HAR1000-48	2010/12

6.5

Voltage fluctuation and Flicker					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Harmonic And Flicker Analyzer	EMC Partner	HAR1H01B	HAR1000-48	2010/12

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6.6

Electrostatic Discharge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	ESD Simulator	Schlöder	SESD 200	0302016	2010/12

6.7

RF Field Strength Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMY 01	843215/014	2010/12
2	AMPLIFIER	KALMUS	713FC	7385-1	2010/12
3	EMS Test Software	ROHDE & SCHWARZ	ESK1	N/A	2010/12

6.8

Electrical Fast Transient/Burst					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMC test system Transient-1000	EMC Partner	TRA1H01B	HAR1000-78	2010/12
2	Coupling Clamp	EMC Partner	SFT 410	0302015	2010/12

6.9

Surge					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMC test system Transient-1000	EMC Partner	TRA1H01B	HAR1000-78	2010/12

6.10

Conducted Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	RF generator / amplifier	Schlöder	CDG 6000	HU906007	2010/12
2	CDN	Schlöder	CDN M3	A3003008	2010/12
3	CDN	Schlöde	CDN T2	A3010005	2010/12
4	EM injection clamp	Liithi	EM101	35670	2010/12
5	EMS Test Software	ROHDE & SCHWARZ	ESK1	N/A	2010/12

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6.11

Power Frequency Magnetic Field Susceptibility					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	Power frequency mag-field generator System	EM TEST	EMS61000-8K	409001	2010/12

6.12

Voltage Dips					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMC test system Transient-1000	EMC Partner	TRA1H01B	HAR1000-78	2010/12

6.13

Voltage Short Interruptions					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	EMC test system Transient-1000	EMC Partner	TRA1H01B	HAR1000-78	2010/12

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7 External and Internal Photos of the EUT

External view front

External view base

External view-side1

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External view-side2

Internal view

Label

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8 Manufacturer/ Approval holder Declaration

The following identical model(s):

DSG-03,DSG-04,4WE4,4WE6,4WE10

Belong to the tested device:

Product description: **Solenoid Directional Valve**
Model name: **DSG-02**

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