



Power &  
Automation

# RAPPORTO DI PROVE COMBINATORE DI MESSA A TIERRA

LOCOMOTIVA E401

CODICE: B.20.92.104.51

EDIZIONE: A

Pag. 1 di 3

## CONTROLLO EDIZIONE

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Pag. 2 di 3

IL RAPPORTO DI TIPO DEI COMPONENTI È STATO REALIZZATO D'ACCORDO A QUANTO INDICATO NEI DOCUMENTI ALLEGATI.

ALLEGATO 1: Doc. SPII. RELAZIONE SU TEST MECCANICI

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ALLEGATO 2: Doc. SPII. SPECIFICA DI TEST

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ALLEGATO 5: Doc. SPII. Sovratemperatura

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ALLEGATO 7: Doc. SPII. Prova della forza di azionamento

Codice: D346004

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ALLEGATO 8: Doc. SPII. Prova funzionale

Codice: D346005

Revisione: 00

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ALLEGATO 9: Doc. SPII. Misura della resistenza dei contatti A.T.

Codice: D346006

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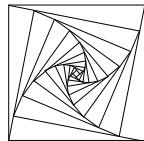
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Pag. 3 di 3

ALLEGATO 10: Doc. SPII. Prove dielettriche  
Codice: D346007  
Revisione: 00  
Data: 29/10/2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 1 di 117

Masate, 4 Febbraio 2016

## COPERTINA

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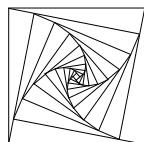
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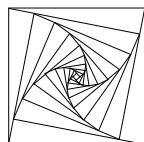
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 2 di 117

## 1. INDICE

1. INDICE	2
2. DESCRIZIONE DELL'HARDWARE	3
2.1 CAMPIONI	3
2.2 FIXTURE	3
3. SCOPO DELLA SESSIONE DI PROVE	4
3.1 SPECIFICHE	4
3.1.1 PROFILO DEI TEST	5
3.2 SEQUENZA DEI TEST	8
4. DESCRIZIONE DELLE PROVE	9
4.1 PREPARAZIONE DELL'HARDWARE	9
4.2 PROCEDURE DI MONTAGGIO DEGLI ACCELEROMETRI	9
4.3 STRATEGIE GENERALI DI CONTROLLO E MISURA. CARATTERIZZAZIONE DEI TEST POINT (T.P.).	9
4.4 FOTOGRAFIE	10
4.4.1 HARDWARE SETUP SULL'ASSE Z	10
4.4.2 HARDWARE SETUP SULL'ASSE Y	11
4.4.3 HARDWARE SETUP SULL'ASSE X	12
4.4.4 POLVERE SUL CAMPIONE A FINE TEST	13
5. TEST HISTORY	14
6. CONCLUSIONI	17
7. ATTREZZATURE UTILIZZATE	17



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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 3 di 117

## 2. DESCRIZIONE DELL'hardware

### 2.1 CAMPIONI

Gli oggetti da sottoporre alle prove sono descritti nel seguito:

EUT: EARTHING SWITCH E402A CAF

Tipo: D344640

S/N: A1506999

DWG N.: D344639

Codice Centrotecnica: P21672

Dimensioni dell'oggetto:

Lunghezza: 381 mm

Larghezza: 300 mm

Altezza: 430 mm

Massa: 59 kg

### 2.2 FIXTURE

Per interfacciare gli oggetti con l'armatura dello shaker e con la slip table durante i test, è stata utilizzata la seguente fixture:

Fixture n. 69

Tipo : Expander

Materiale : Magnesio

Dimensioni:

Lunghezza : 750 mm

Larghezza : 750 mm

Altezza : 268 mm

Massa : 73 kg

Montaggio : 29 viti M8

Fixture n. 157

Tipo : Piastra

Materiale : Alluminio

Dimensioni:

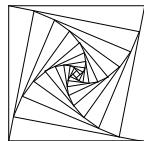
Lunghezza : 240 mm

Larghezza: 335 mm

Altezza : 20 mm

Massa : kg

Montaggio : viti M8



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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 4 di 117

### 3. SCOPO DELLA SESSIONE DI PROVE

Questa prova viene effettuata per sottoporre il campione alle specifiche descritte nel seguito, in accordo con il programma del Cliente.

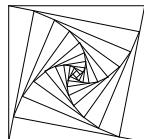
#### 3.1 SPECIFICHE

NORMA DI RIFERIMENTO	PROFILI
CEI EN 61373 2010 Ed.2 CAT.1 – CLASS B <sup>(1)(3)</sup>	Initial and final measure <sup>(2)</sup> IM/FM
	Random endurance E.
	Shock test SH.

<sup>(1)</sup> In accordo con la richiesta del cliente il test sarà eseguito applicando i livelli più alti di vibrazioni e shock descritti in IEC 61373 for Category 1 – Class B, profile di vibrazione vertical e profilo di shock longitudinale

<sup>(2)</sup> In accordo con la norma di riferimento le initial and final measures saranno eseguite applicando il profilo "random endurance"

<sup>(3)</sup> In accordo con la richiesta del cliente random functional test non sarà eseguito



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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 5 di 117

### 3.1.1 PROFILO DEI TEST

#### E) RANDOM ENDURANCE VIBRATION – PROFILO VERTICALE

##### Profile Parameters

Profile Acceleration RMS:	5.581423 m/s <sup>2</sup>
Profile Velocity RMS:	0.063741 m/s
Profile Displacement RMS:	1.279999 mm
Profile Expected Acceleration (Peak):	16.744270 m/s <sup>2</sup>
Profile Expected Velocity (Peak):	0.191224 m/s
Profile Expected Displacement (Peak-Peak):	7.679991 mm-mm

RMS Limits:	Calculated based on table
High Abort:	7.883968 m/s <sup>2</sup> (3.00 dB)
High Alarm:	6.633535 m/s <sup>2</sup> (1.50 dB)
Profile:	5.581423 m/s <sup>2</sup>
Low Alarm:	4.696182 m/s <sup>2</sup> (-1.50 dB)
Low Abort:	3.951345 m/s <sup>2</sup> (-3.00 dB)

##### Profile Table:

Frequency Hz	Acceleration (m/s <sup>2</sup> ) <sup>2</sup> /Hz	Slope dB/Oct	High Abort dB	High Alarm dB	Low Alarm dB	Low Abort dB
5.0	0.964	0	3.00	1.50	-1.50	-3.00
20.0	0.964	-6	3.00	1.50	-1.50	-3.00
150.0	0.0173757		3.00	1.50	-1.50	-3.00

##### Schedule Parameters

0:0:30 at Level -12.0 dB

0:0:20 at Level -9.0 dB

0:0:15 at Level -6.0 dB

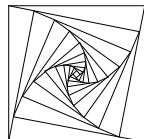
0:0:15 at Level -3.0 dB

05: 0:0 at Level 0.0 dB

Save All Panes

Auto-Save Signals

Quick Report



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Rev. 0

Pag. 6 di 117

**Control Parameters**

**Test Parameters**

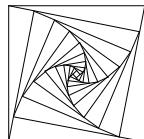
Number of Spectral Lines:	200
Max. Test Frequency:	150.00 Hz
Measurement Strategy:	Single Channel
Line Abort Ratio:	0.10
Line Abort Number:	20
Averaging Number:	77
Drive Limit:	2.00 Volts
Sigma Clip Number:	3.00
Data Points/Frame:	512
Frame Time:	1.365333 Seconds
Sampling Rate:	375 Hz
DOF:	154
dT:	0.002667 Seconds
dF:	0.732422 Hz

**Pre-test Parameters**

Method of Acquiring the Loop Frequency Response Function:	Measure During Pre-Test
Initial Peak Drive:	0.008000 Volts
Ramp-Up Rate:	Fast
Response Level Goal:	-12.00 dB
Maximum Peak Drive:	0.700000 Volts

**Preferences Parameters**

Abort Rate	20 (dB/Second)
Level Log Change Rate	20 (dB/Second)
On-Line Level Change	10 (%)
Resume from Abort	Active
Automatic disable the Low-abort checking for Control Signal during notching	Yes
Enable float profile display	No



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Rev. 0

Pag. 7 di 117

## SH) SHOCK TEST – PROFILO LONGITUDINALE

### Profile Parameters

Pulse Type:	Half Sine
Amplitude:	50.00 m/s <sup>2</sup>
Pulse Width:	30.00 ms
Main Pulse Tails:	IEC 60068-2-27 Standard
Compensation Template:	Displacement Optimum
Abort Setting:	IEC 60068-2-27 Standard

### Schedule Parameters

5 Pulses at Level -12.00 dB  
3 Pulses at Level -9.00 dB  
2 Pulses at Level -6.00 dB  
1 Pulses at Level -3.00 dB  
3 Pulses at Level 0.00 dB  
Auto-Save Signals  
Save All Panes  
Quick Report

### Control Parameters

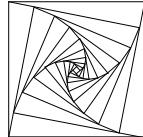
Test Parameters	
Block Size:	Auto
Averaging Number:	4
Drive Limit:	2.00 Volts
Pulse Interval:	5.000 seconds
Point Abort Ratio:	0.10
Low-Pass Filter Type:	Apply filter using user-defined cutoff frequency
Filter Cutoff Frequency:	300.000000Hz
Data Points/Frame:	2048
Frame Time:	0.682667 Seconds
Sampling Rate:	3000 Hz
dT:	0.000333333 Seconds
Maximum Analysis Frequency:	1318.36 Hz
SRS Analysis:	Disable

### Pre-test Parameters

Method of Acquiring the Loop Frequency Response Function:	Measure during close-loop pre-test
Initial Peak Drive:	0.008000 Volts
Ramp-Up Rate:	Fast
Response Level Goal:	-20.00 dB
Maximum Peak Drive:	0.700000 Volts

### Preferences Parameters

Abort Rate	20 (dB/Second)
Level Log Change Rate	20 (dB/Second)
On-Line Level Change	10 (%)
Resume from Abort	Active



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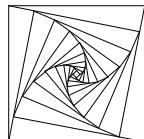
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Pag. 8 di 117

### 3.2 SEQUENZA DEI TEST

<u>ASSE*</u>	<u>INITIAL MEASURE</u> <u>IM</u>	<u>ENDURANCE</u> <u>E</u>	<u>SHOCK TEST</u> <u>SH</u>	<u>FINAL MEASURE</u> <u>FM</u>
Z	X			
		X		
			UP	
			DOWN	
				X
Y	X			
		X		
			UP	
			DOWN	
				X
X	X			
		X		
			UP	
			DOWN	
				X

\* Vedi paragrafo 4.3 per la corrispondenza degli assi.



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**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 9 di 117

## 4. DESCRIZIONE DELLE PROVE

### 4.1 PREPARAZIONE DELL'HARDWARE

Il campione è stato montato sulla piastra n.157 con 6 viti M8.  
Per eseguire i test sull'asse Z, la piastra con il campione è stata montata sull'expander n.69, il quale è stato precedentemente montato sull'armatura dello shaker V850; mentre per eseguire i test sugli assi X e Y la piastra con il campione è stata montata direttamente sulla slip table dello shaker V850.

Condizioni ambientali misurate all'inizio del test::

Temperatura: 24.2 °C +/- 1°C  
Umidità relativa : 42.7 %+/- 5%

### 4.2 PROCEDURE DI MONTAGGIO DEGLI ACCELEROMETRI

Gli accelerometri sono stati fissati mediante colla cianoacrilica o mediante appositi bolli biadesivi.

La procedura di montaggio degli accelerometri è in accordo con la normativa UNI ISO 5348 "Montaggio meccanico degli accelerometri".

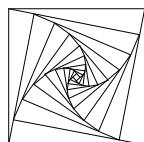
### 4.3 STRATEGIE GENERALI DI CONTROLLO E MISURA. CARATTERIZZAZIONE DEI TEST POINT (T.P.).

Durante i test sono stati impiegati un accelerometro monoassiale per mantenere il controllo dei livelli di vibrazione e due accelerometri monoassiali per acquisire i livelli di vibrazione dell' unità.

La seguente tabella, insieme alle fotografie del paragrafo 4.4, chiarisce la disposizione del Test Point per i test effettuati.

Input	Type	Analysis	mv/(EU)	Weighting	Coupling	I.D.	Label
1	Control	Filter	9.5800mv/(m/s <sup>2</sup> )	1.0000	ICP	TP1-Z-CTRL-FIXTURE BASE TP4-XY-CTRL-FIXTURE / SLIP TABLE	CPA 74
2	Monitor	Filter	1.0100mv/(m/s <sup>2</sup> )	1.0000	ICP	TP2-Z/Y/X-MEASURE-EUT KEY BLOCK SIDE	CPA 98
3	Monitor	Filter	1.0100mv/(m/s <sup>2</sup> )	1.0000	ICP	TP3-Z/Y/X-MEASURE-EUT BACK SIDE	CPA 120

\* Si veda il seguente paragrafo 7 per la corrispondenza tra prove svolte e numerazione dei run.



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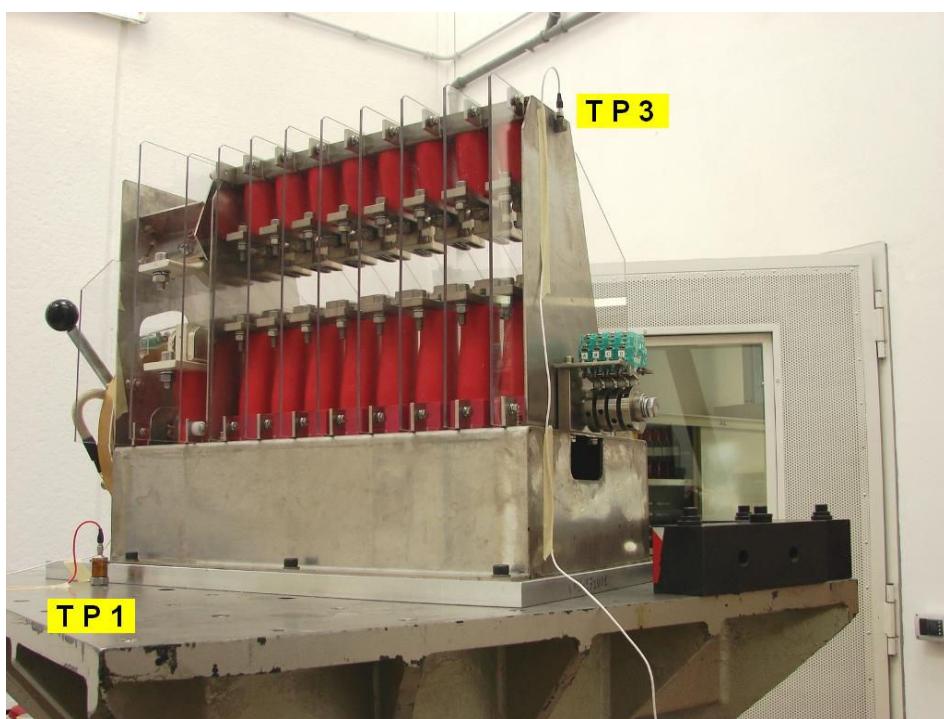
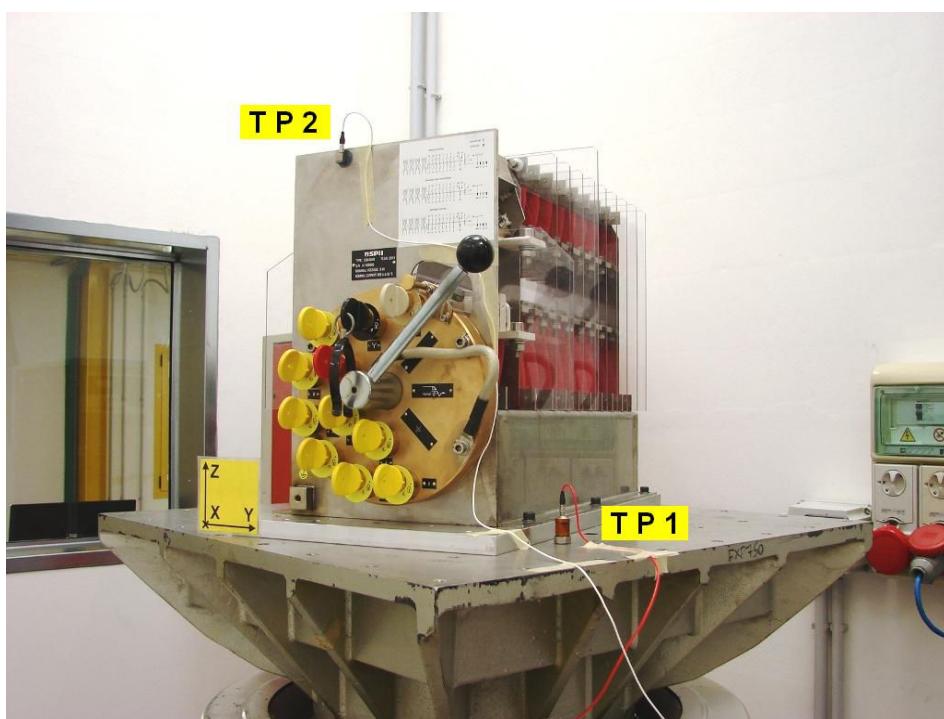
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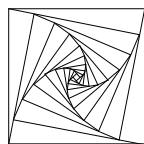
Rev. 0

Pag. 10 di 117

## 4.4 FOTOGRAFIE

### 4.4.1 HARDWARE SETUP SULL'ASSE Z





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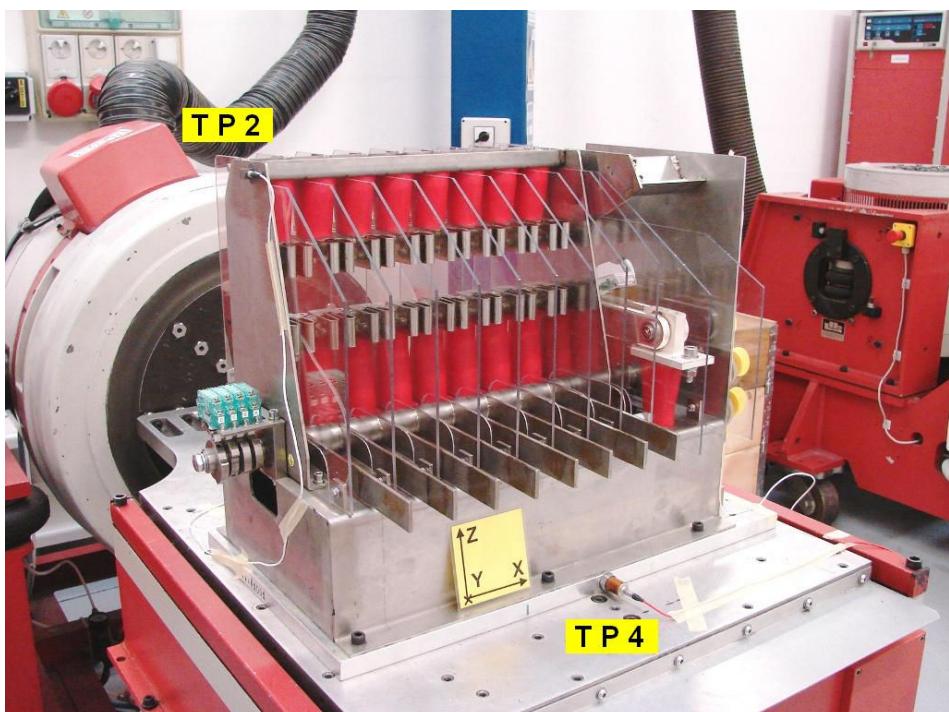
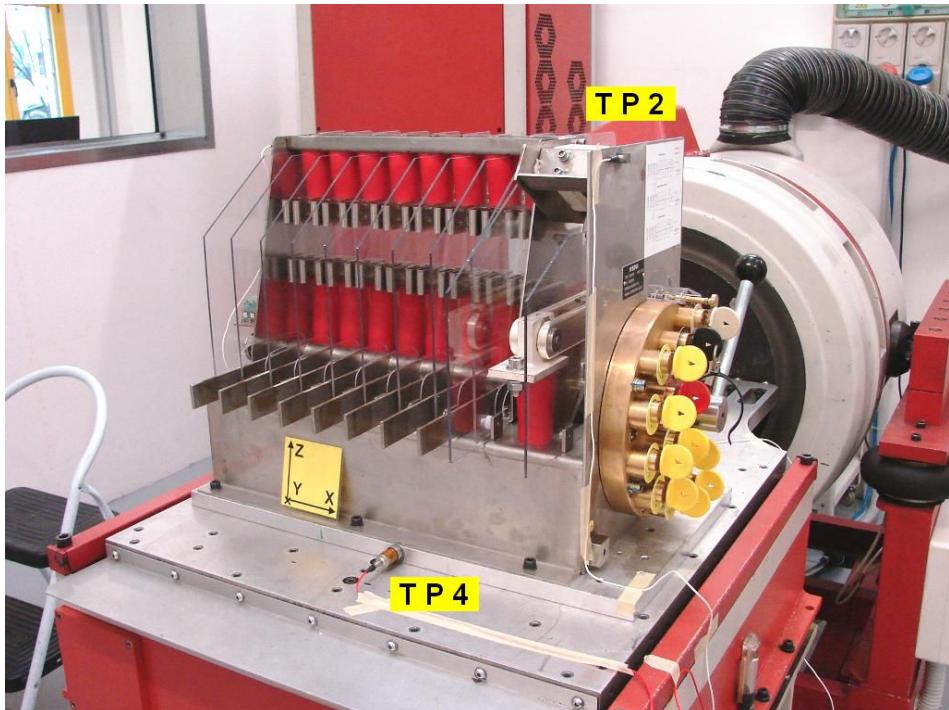
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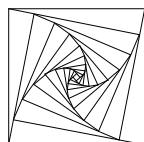
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Rev. 0

Pag. 11 di 117

#### 4.4.2 HARDWARE SETUP SULL'ASSE Y





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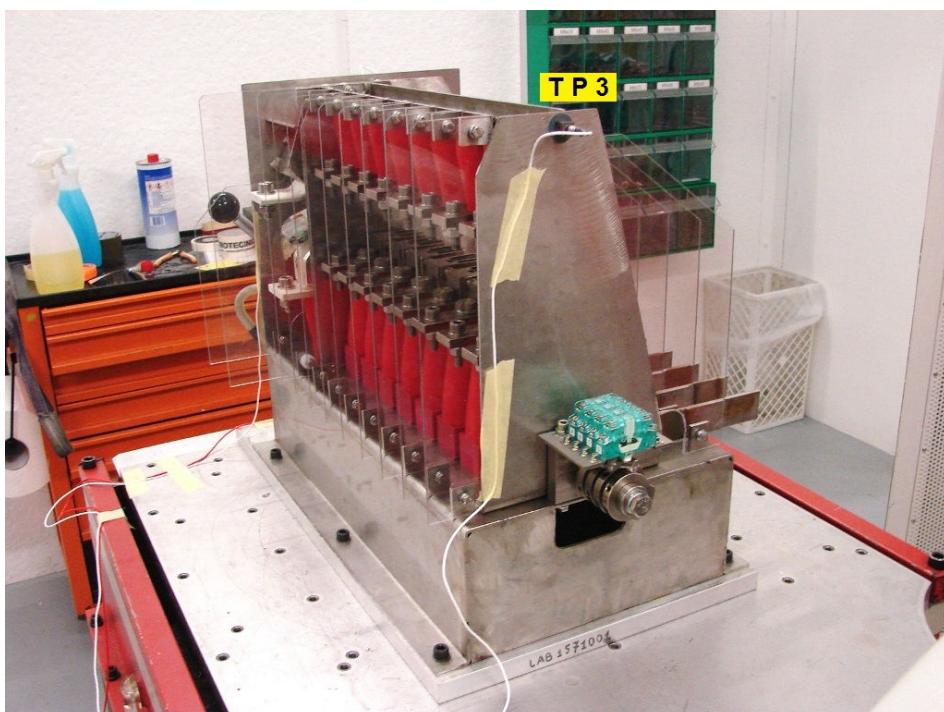
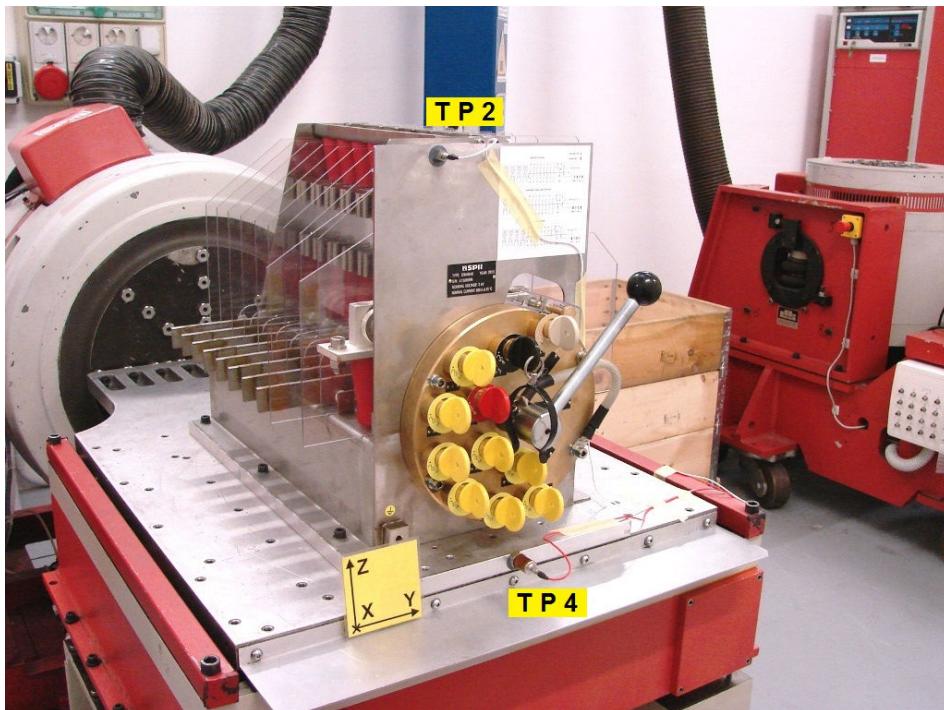
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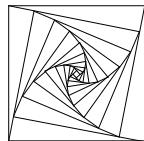
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Rev. 0

Pag. 12 di 117

#### 4.4.3 HARDWARE SETUP SULL'ASSE X





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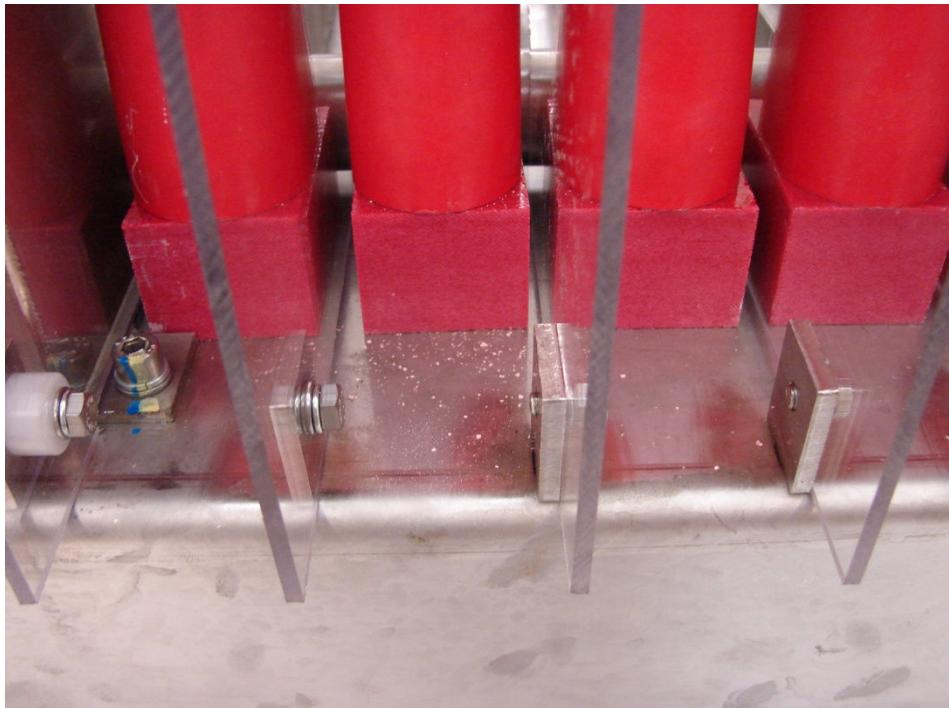
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**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

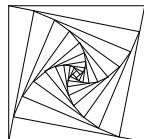
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 13 di 117

#### 4.4.4 POLVERE SUL CAMPIONE A FINE TEST





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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

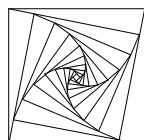
Pag. 14 di 117

## 5. TEST HISTORY

DATA	ORA	RUN	PROFILO TEST	NOTE
21 Set '15	09.30			Arrivo del cliente
	09.45			Montaggio dell'expander sull'armatura dello shaker
	10.02			Montaggio della piastra n.157 sull'expander
	10.27			Montaggio del campione sulla piastra
	11.01			Setup degli accelerometri in TP1, TP2 e TP3
	11.16			Programmazione del controllore
	11.18	01	IM	Inizio dell'initial measurements sull'asse verticale (Z)
	11.23			Analisi dei grafici
	11.25			Programmazione del controllore
	11.28	02	E	Inizio della random endurance sull'asse verticale (Z)
	16.31			Controllo visivo del campione
	16.47			Programmazione del controllore
	16.49	03	SH	Inizio del test di shock sull'asse verticale (Z) – Direzione UP – Profilo dell'asse longitudinale
	16.53	04	SH	Inizio del test di shock sull'asse verticale (Z) – Direzione DOWN – Profilo dell'asse longitudinale
	16.55			Controllo visivo del campione
	16.56			Programmazione del controllore
	16.57	05	FM	Inizio del final measurements sull'asse verticale (Z)
	17.03			Analisi dei grafici
	17.05			Controllo visivo e rimozione del campione
	17.18			Rimozione della fixture
	17.30			Fine della giornata
22 Set '15	09.00			Rimozione dell'expander
	09.10			Rotazione dello shaker
	09.18			Montaggio della piastra n.157 sulla slip table
	09.21			Montaggio del campione sulla piastra
	09.30			Setup degli accelerometri in TP4, TP2 e TP3

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

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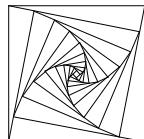
Rev. 0

Pag. 15 di 117

DATA	ORA	RUN	PROFILO TEST	NOTE
22 Set '15	09.38			Programmazione del controllore
	09.40	06	IM	Inizio dell'initial measurements sull'asse trasversale (Y) – Profilo endurance sull'asse verticale
	09.45			Analisi dei grafici
	09.47			Programmazione del controllore
	09.48	07	E	Inizio della random endurance sull'asse trasversale (Y) – Profilo endurance sull'asse verticale
	14.52			Controllo visivo del campione
	15.01			Programmazione del controllore
	15.02	08	SH	Inizio del test di shock sull'asse trasversale (Y) – Direzione UP – Profilo dell'asse longitudinale
	15.06	09	SH	Inizio del test di shock sull'asse trasversale (Y) – Direzione DOWN – Profilo dell'asse longitudinale
	15.07			Controllo visivo del campione
	15.09			Programmazione del controllore
	15.10	10	FM	Inizio del final measurements sull'asse trasversale (Y) – Profilo endurance sull'asse verticale
	15.15			Analisi dei grafici
	15.18			Controllo visivo e rimozione del campione
	15.42			Rotazione della fixture sulla slip table
	16.01			Montaggio del campione sulla piastra
	16.32			Setup degli accelerometri in TP4, TP2 e TP3
	17.00			Fine della giornata
23 Set '15	09.00			Programmazione del controllore
	09.09	11	IM	Inizio dell'initial measurements sull'asse longitudinale (X) – Profilo endurance sull'asse verticale
	09.13			Analisi dei grafici
	09.15			Programmazione del controllore
	09.16	12	E	Inizio della random endurance sull'asse longitudinale (X) – Profilo endurance sull'asse verticale
	14.20			Controllo visivo del campione

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

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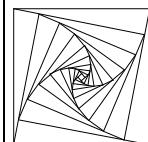
Rev. 0

Pag. 16 di 117

DATA	ORA	RUN	PROFILO TEST	NOTE
23 Set '15	14.42			Programmazione del controllore
	14.43	13	SH	Inizio del test di shock sull'asse trasversale (Y) – Direzione UP – Profilo dell'asse longitudinale
	14.45	14	SH	Inizio del test di shock sull'asse trasversale (Y) – Direzione DOWN – Profilo dell'asse longitudinale
	14.47			Controllo visivo del campione
	14.48			Programmazione del controllore
	14.49	15	FM	Inizio del final measurements sull'asse trasversale (Y) – Profilo endurance sull'asse verticale
	14.54			Analisi dei grafici
	15.12			Controllo visivo e rimozione del campione dalla fixture: polvere sulla base del campione (vedi par. 4.4.4)
	15.34			Rimozione delle fixture
	16.00			Fine dei test

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

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Rev. 0

Pag. 17 di 117

## 6. CONCLUSIONI

*Dopo essere stati sottoposti ai test ambientali come descritto in questo documento, da una ispezione visiva non sono stati evidenziati danneggiamenti meccanici sul campione*

EUT: *EARTHING SWITCH E402A CAF*

Tipo: *D344640*

S/N: *A1506999*

DWG N.: *D344639*

## 7. ATTREZZATURE UTILIZZATE

### Shaker

LDS V850-440T air cooled / LDS SPA 56/32 K v3 V850

### Strumentazione di controllo

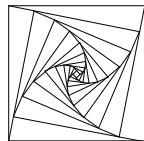
Dactron LaserUSB Shaker Controller S/N 6857009 – Ver. 8.1

ULTIMA CALIBRAZIONE	:	14/04/2015
DATA SCADENZA	:	04/2016
CALIBRATO DA	:	Belotti Sistemi s.a.s.
CERTIFICATO N.	:	2015-0259

### Chiave dinamometria

BETA MOD. 606/6 S/N 7603008

ULTIMA CALIBRAZIONE	:	20/03/2013
DATA SCADENZA	:	03/2016
CALIBRATO DA	:	STI Lat 172
CERTIFICATO N.	:	C0033/13



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**EARTHING SWITCH E402A CAF**  
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**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 18 di 117

Accelerometri

ETICHETTA	COSTRUTTORE	MODELLO	NUMERO SERIE	SENSIBILITÀ	MASSA g	DATA CALIB.	CERTIF. NUMERO
74	WILCOXON	726T	5636	9.58 mV/(m/s <sup>2</sup> )	34	12/01/20 15	29727
98	BRUEL&KJAER	4508 001	30289	1.01 mV/(m/s <sup>2</sup> )	4.8	12/01/20 15	29725
120	BRUEL & KJAER	4508 001	30552	1.01 mV/(m/s <sup>2</sup> )	4.8	23/09/20 14	28888

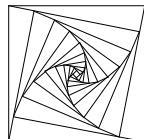
Tutti gli accelerometri sono calibrati da:

CENTROTECNICA S.r.l.  
CENTRO LAT N. 111

Termoigrometro

PCE MOD. PCE-THB 40 S/N Q755479

ULTIMA CALIBRAZIONE : 30/10/2013  
DATA SCADENZA : 10/2016  
CALIBRATO DA : Camar  
RAPP. TARATURA N : 13-RU-045



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**RELAZIONE SU TEST MECCANICI**  
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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 19 di 117

Tolleranza sull'ampiezza di vibrazione

Le incertezze di misura definite in questo documento sono state determinate in accordo ai documenti ISO/IEC Guide 98 e EA-4/02.

Il calcolo è stato effettuato come incertezza estesa ottenuta moltiplicando l'incertezza standard per il fattore di copertura  $k=2$  corrispondente ad un livello di confidenza di circa 95%.

L'incertezza calcolata per l'accelerazione è 10%.

Moti trasversali

I moti trasversali dello shaker sono stati misurati e sono in accordo con i requisiti di IEC 60068-2-6:2009-11 par 4.1.2.1, IEC 60068-2-64:2008 par 4.3 and IEC 60068-2-27:2008 di seguito riportati:

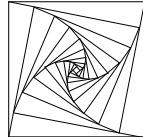
vibrazione sinusoidale – non superiore al 50% dell'ampiezza specificata fino a 500Hz e al 100% fino 2000 Hz

vibrazione random – non superiore a -3db rispetto al valore specificato fino a 500 Hz e a 0 db fino a 2000 Hz

valore rms non superiore al 50% del valore specificato

shock test - no superior al 30% del valore specificato

In caso di oggetti molto grandi i valori sopra indicati potrebbero dover essere verificati durante i test.



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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 20 di 117

## **ALLEGATI**

### TEST SULL'ASSE VERTICALE (Z)

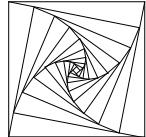
- 1.1 - INITIAL MEASUREMENTS - PROFILO ENDURANCE VERTICALE
- 1.2 - ENDURANCE TEST - PROFILO VERTICALE
- 1.3 - SHOCK TEST - UP DIRECTION - PROFILO LONGITUDINALE
- 1.4 - SHOCK TEST - DOWN DIRECTION - PROFILO LONGITUDINALE
- 1.5 - FINAL MEASUREMENTS - PROFILO ENDURANCE VERTICALE

### TEST SULL'ASSE TRASVERSALE (Y)

- 2.1 - INITIAL MEASUREMENTS - PROFILO ENDURANCE VERTICALE
- 2.2 - ENDURANCE TEST - PROFILO VERTICALE
- 2.3 - SHOCK TEST - UP DIRECTION - PROFILO LONGITUDINALE
- 2.4 - SHOCK TEST - DOWN DIRECTION - PROFILO LONGITUDINALE
- 2.5 - FINAL MEASUREMENTS - PROFILO ENDURANCE VERTICALE

### TEST SULL'ASSE LONGITUDINALE (X)

- 3.1 - INITIAL MEASUREMENTS - PROFILO ENDURANCE VERTICALE
- 3.2 - ENDURANCE TEST - PROFILO VERTICALE
- 3.3 - SHOCK TEST - UP DIRECTION - PROFILO LONGITUDINALE
- 3.4 - SHOCK TEST - DOWN DIRECTION - PROFILO LONGITUDINALE
- 3.5 - FINAL MEASUREMENTS - PROFILO ENDURANCE VERTICALE



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 21 di 117

## **ALLEGATO 1.1**

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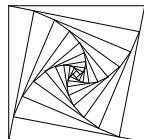
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE VERTICALE (Z)**

**INITIAL MEASUREMENTS - PROFILO**  
**ENDURANCE VERTICALE**  
**(7 PLOTS)**



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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 22 di 117

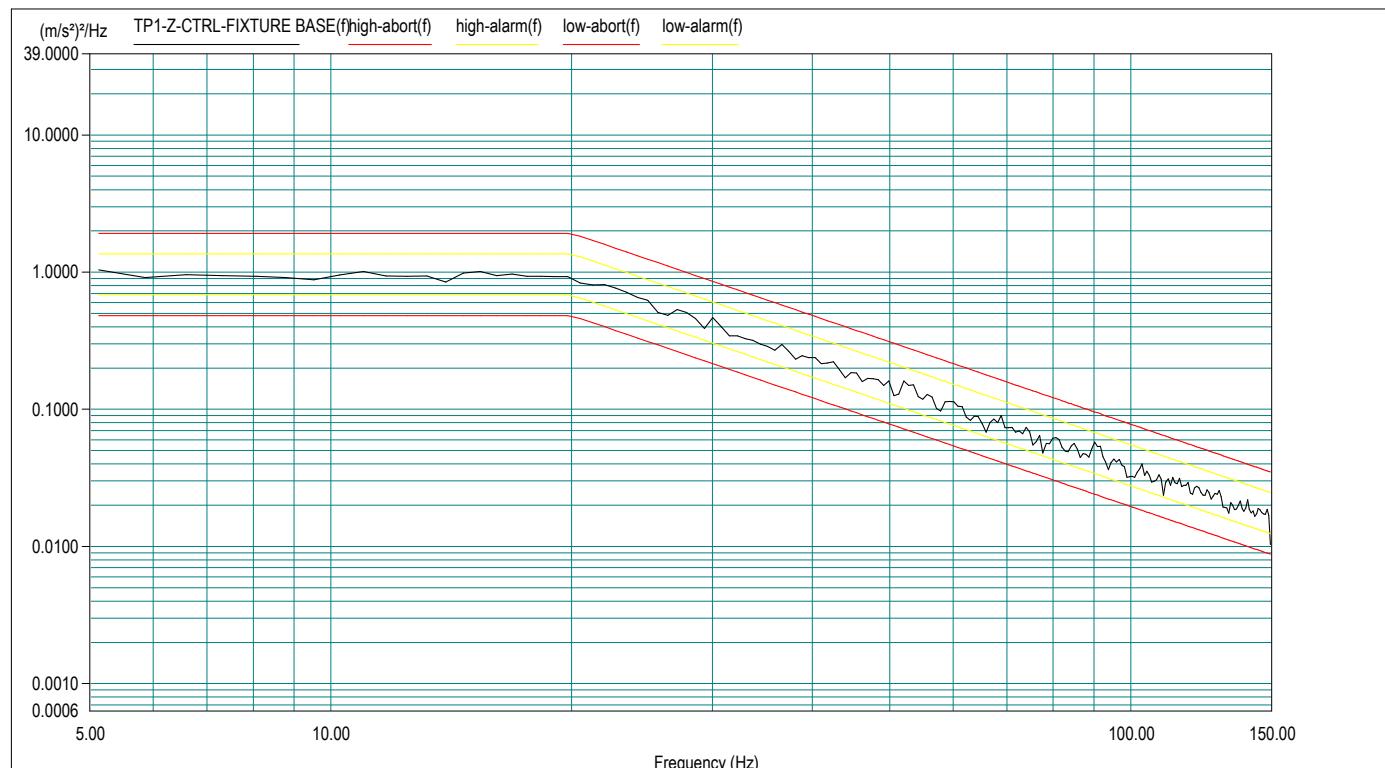
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Profile Name: RUN 01 INITIAL MEASURE ON ASSE VERTICALE (Z)

Test Type: Random

Run

Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54



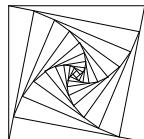
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Control RMS: 5.569189 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626909 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 11:23:24 AM, Monday, September 21, 2015

Report created at 11:23:27 , lunedì, settembre 21, 2015



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Rev. 0

Pag. 23 di 117

Project File Name: VERTCAIL Z - INITIAL MEASURE.prj

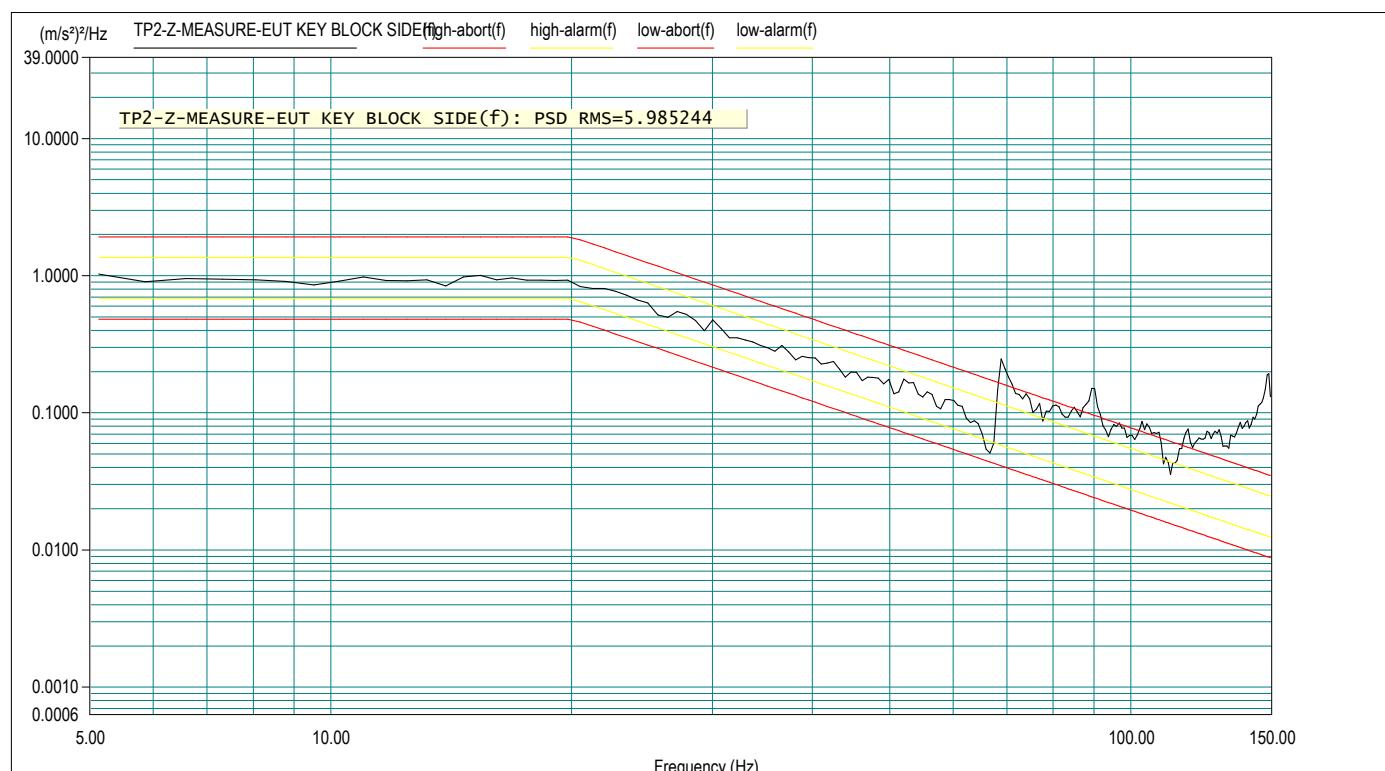
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Test Type:

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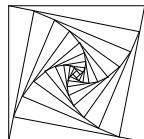
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Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54



Data saved at 11:23:24 AM, Monday, September 21, 2015

Report created at 11:23:27 , lunedì, settembre 21, 2015



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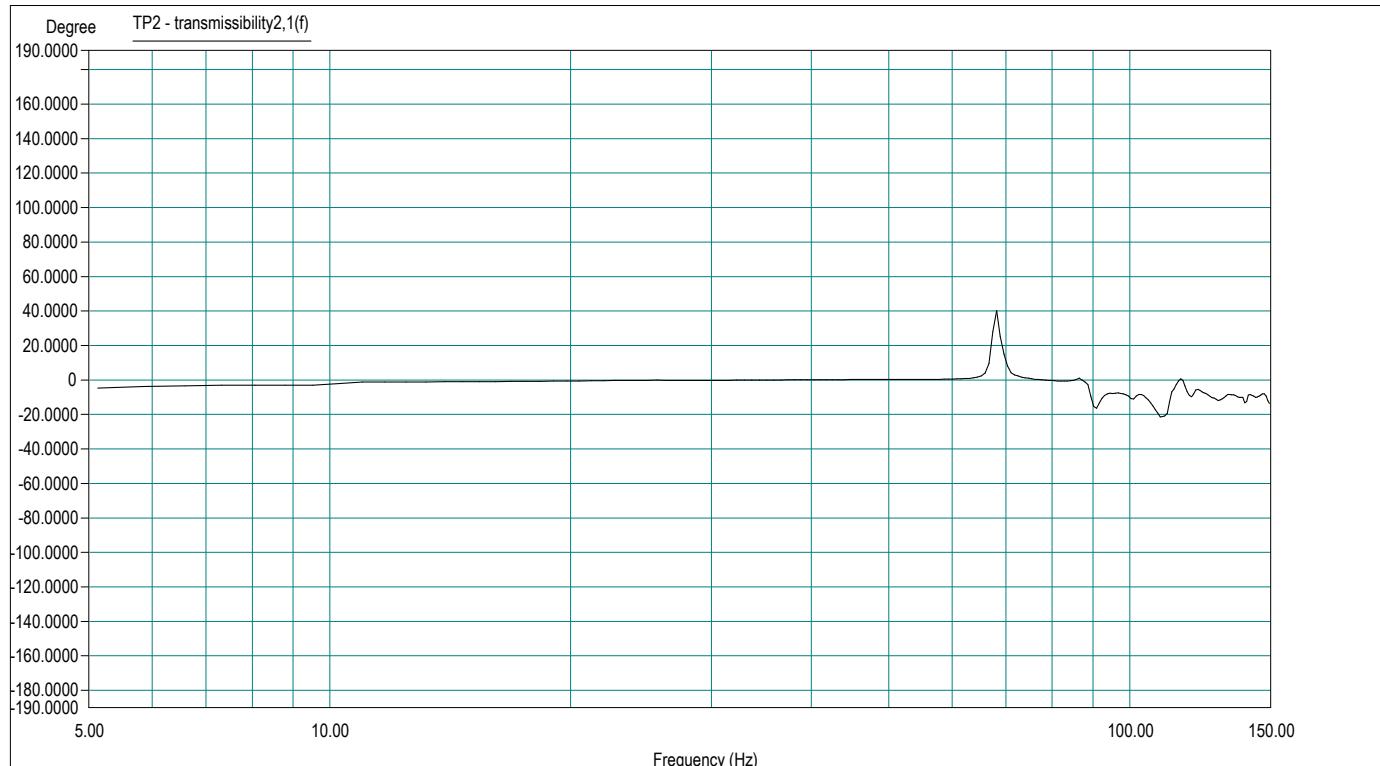
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 24 di 117

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Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54

Test Type: Random Run



Level: 0 dB

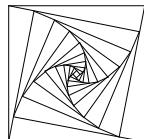
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1.365333 Seconds

Demand RMS: 5.626909 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 11:23:24 AM, Monday, September 21, 2015

Report created at 11:23:28 , lunedì, settembre 21, 2015



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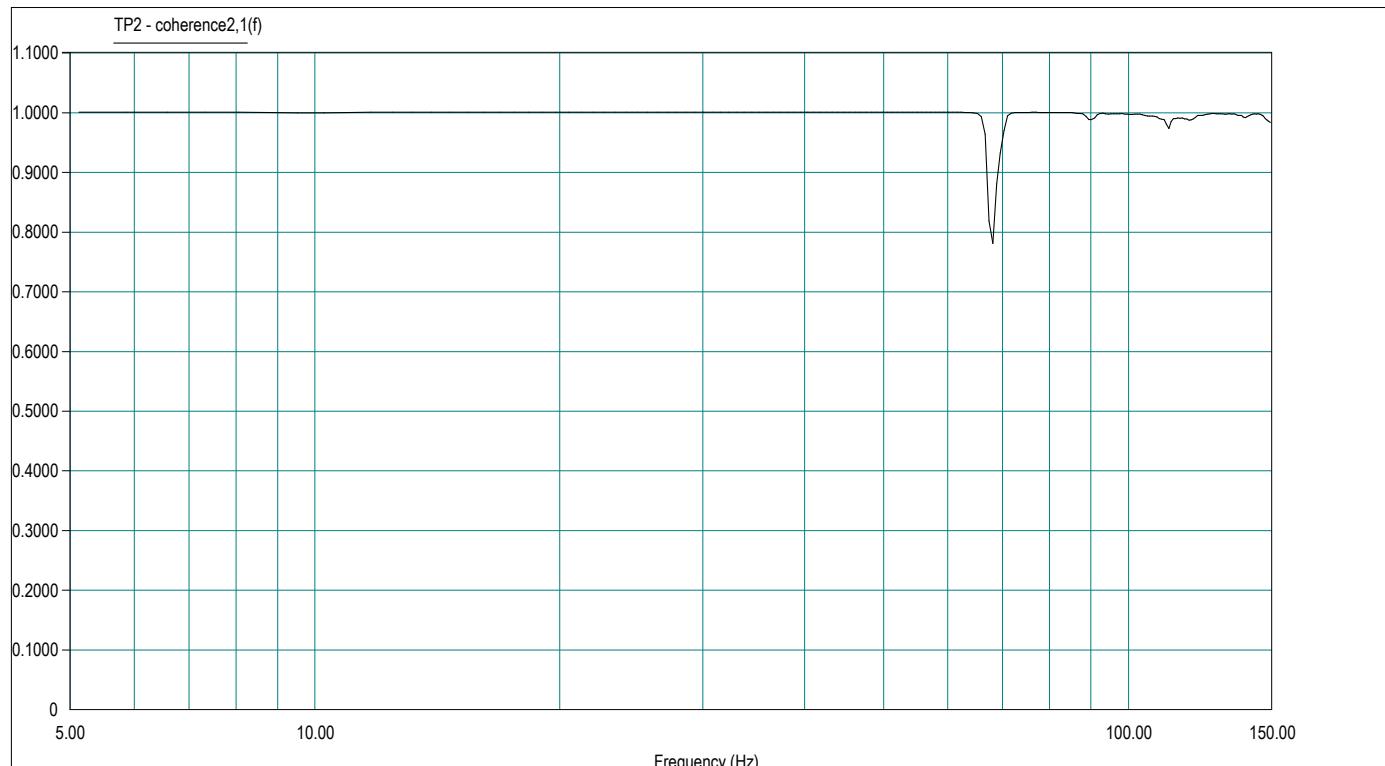
Pag. 25 di 117

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Profile Name: RUN 01 INITIAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54

Test Type:

Random

Run



Level: 0 dB

Control RMS: 5.569189 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626909 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

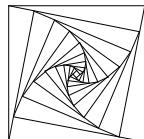
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DOF: 154

dF:

Data saved at 11:23:24 AM, Monday, September 21, 2015

Report created at 11:23:28 , lunedì, settembre 21, 2015



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Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 26 di 117

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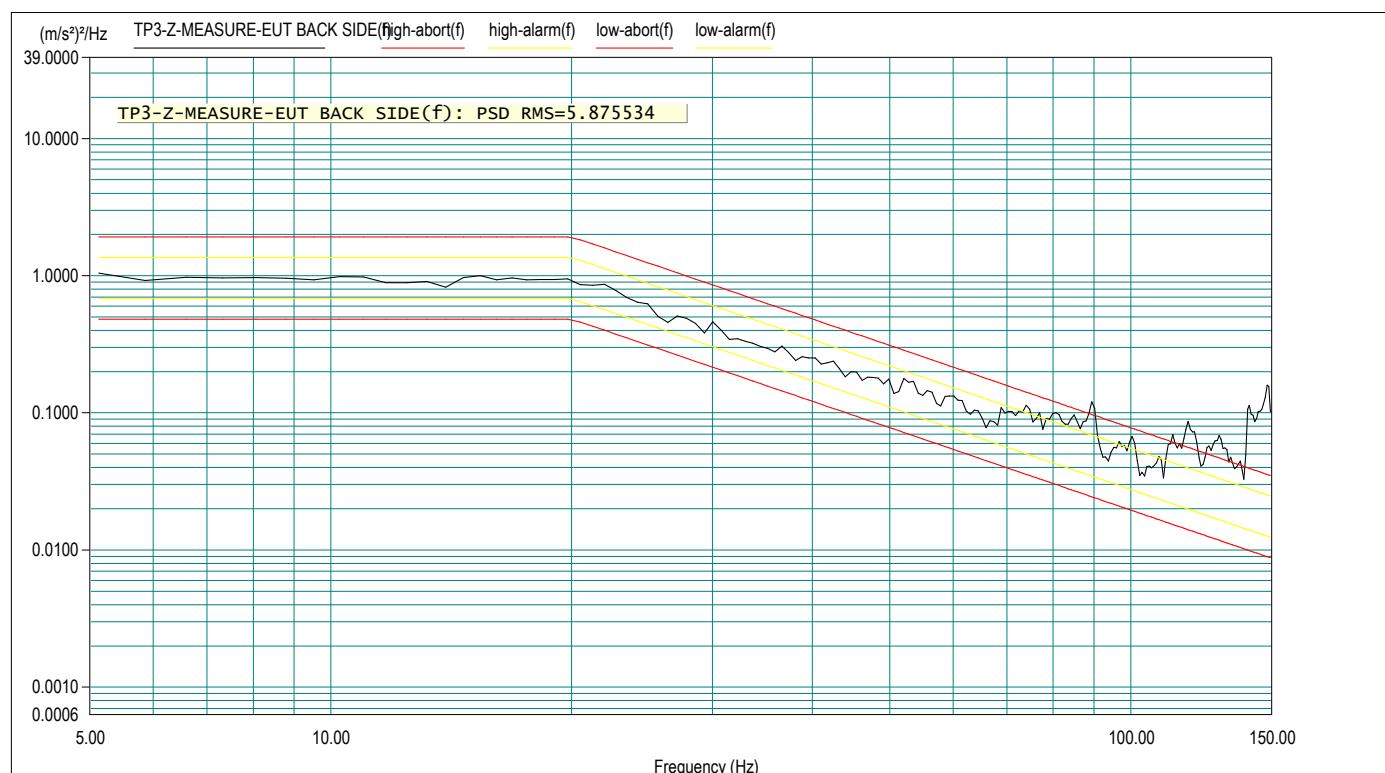
Profile Name: RUN 01 INITIAL MEASURE ON ASSE VERTICALE (Z)

Test Type:

Random

Run

Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54



Level: 0 dB

Control RMS: 5.569189 m/s<sup>2</sup>  
1.365333 Seconds

Demand RMS: 5.626909 m/s<sup>2</sup>  
0.732422 Hz

Full Level Elapsed Time:

00:02:00

Lines: 200

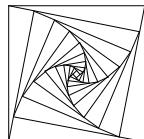
Frame Time:

1.365333 Seconds

DOF: 154

dF:

Data saved at 11:23:24 AM, Monday, September 21, 2015 Report created at 11:23:28 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

Rev. 0

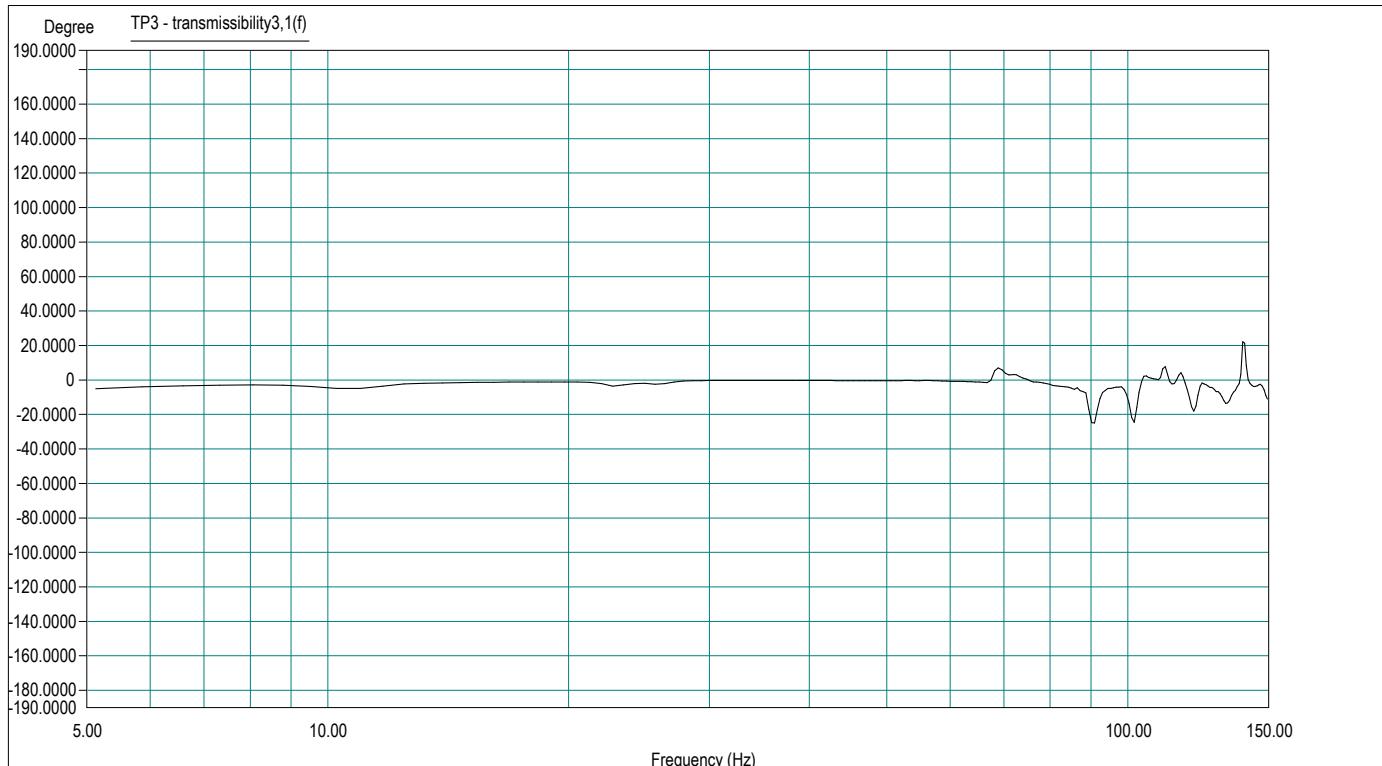
Pag. 27 di 117

Project File Name: VERTCAIL Z - INITIAL MEASURE.prj  
Profile Name: RUN 01 INITIAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54

Test Type:

Random

Run



Level: 0 dB

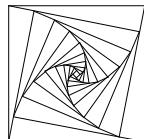
Control RMS: 5.569189 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626909 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 11:23:24 AM, Monday, September 21, 2015

Report created at 11:23:29 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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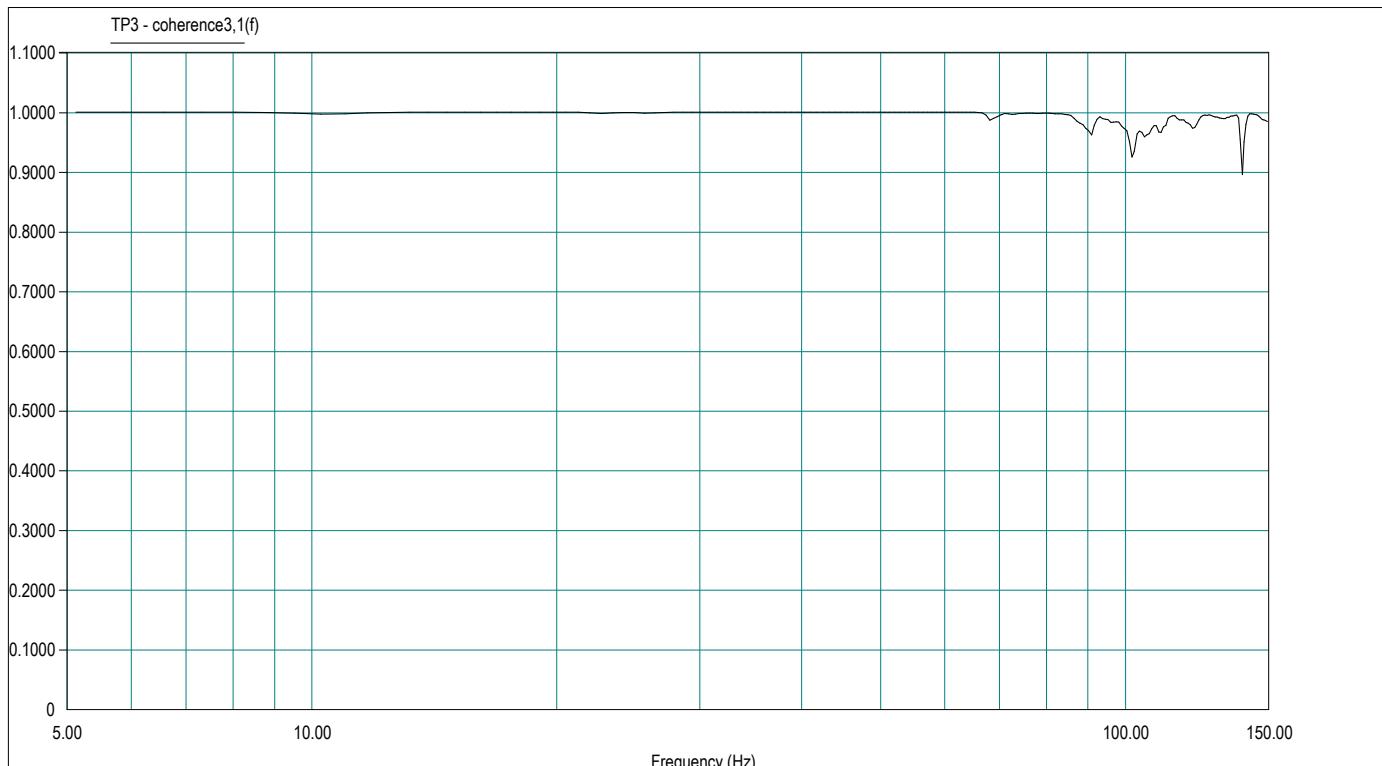
Pag. 28 di 117

Project File Name: VERTCAIL Z - INITIAL MEASURE.prj  
Profile Name: RUN 01 INITIAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 01 I.M. - Z Sep 21, 2015 11-18-54

Test Type:

Random

Run



Level: 0 dB

Control RMS: 5.569189 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626909 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

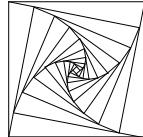
00:00:00

DOF: 154

dF:

Data saved at 11:23:24 AM, Monday, September 21, 2015

Report created at 11:23:29 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 29 di 117

## **ALLEGATO 1.2**

**EARTHING SWITCH E402A CAF**

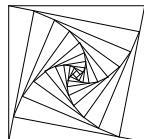
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE VERTICALE (Z)**

**ENDURANCE TEST - PROFILO**  
**VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

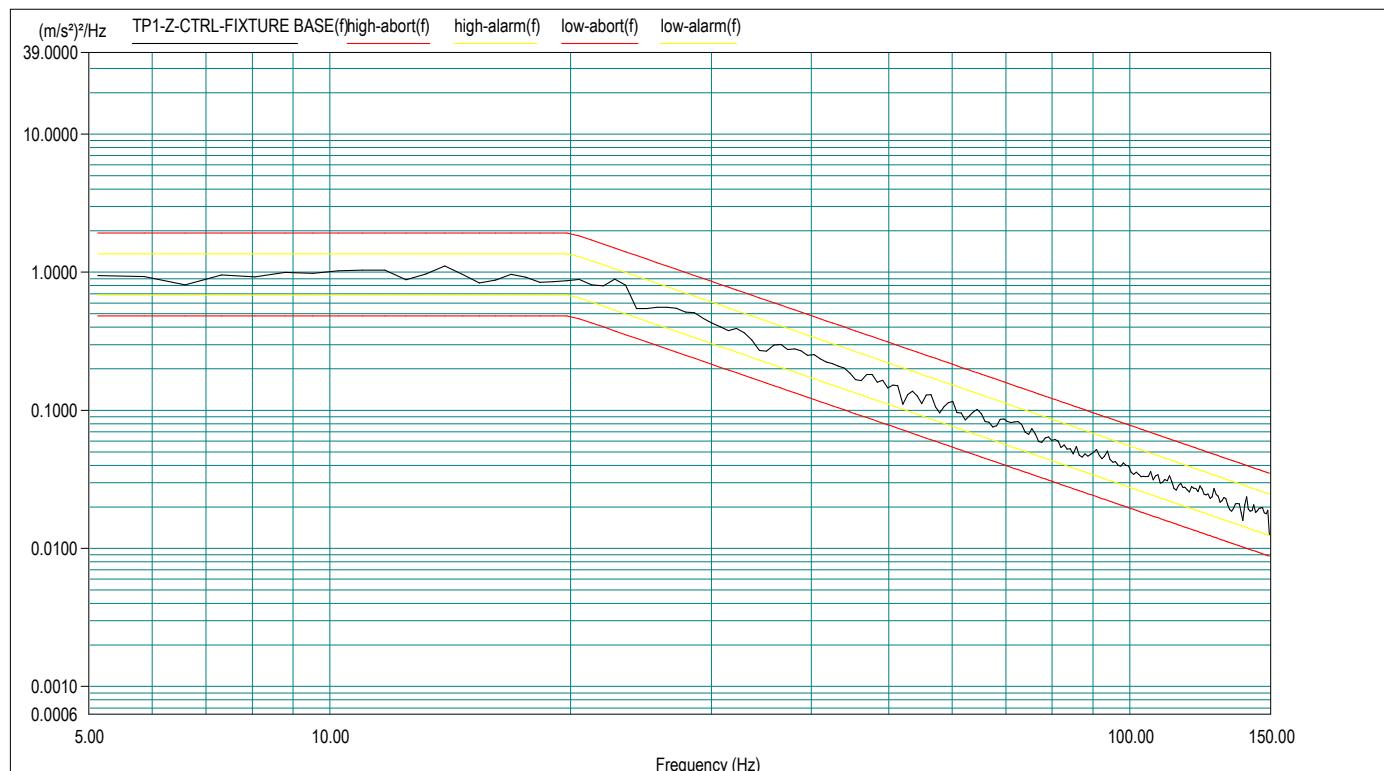
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 30 di 117

Project File Name: VERTICAL Z - ENDURANCE.prj  
Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z)  
Run Folder: .\RUN 02 ENDURANCE Z Sep 21, 2015 11-28-08

Test Type: Random



Level: 0 dB

Control RMS: 5.605435 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:

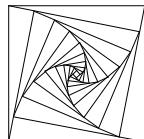
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:

0.732422 Hz

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:21 , lunedì, settembre 21, 2015



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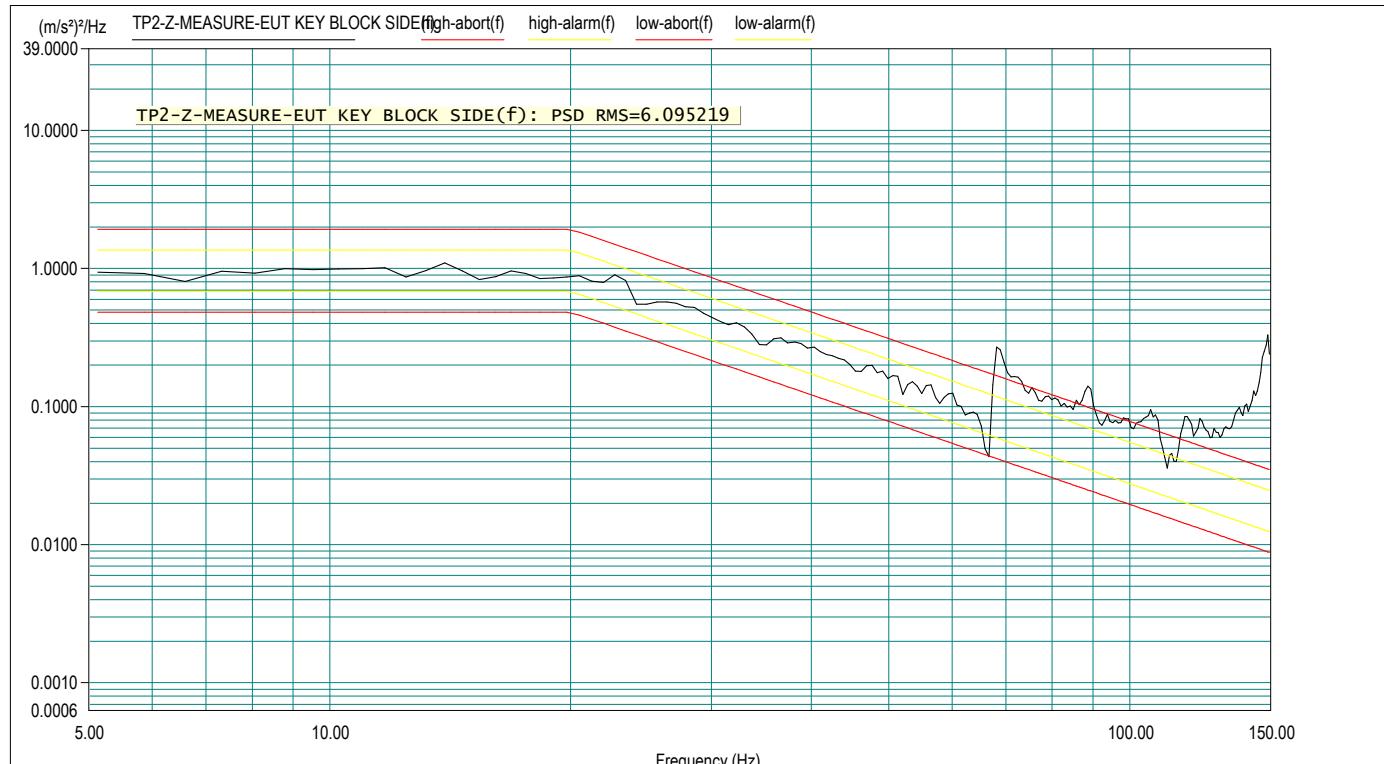
**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 31 di 117

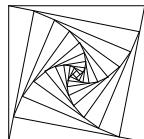
Project File Name: VERTICAL Z - ENDURANCE.prj  
Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z) Test Type: Random  
Run Folder: .IRUN 02 ENDURANCE Z Sep 21, 2015 11-28-08



Level: 0 dB  
Control RMS: 5.605435 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:22 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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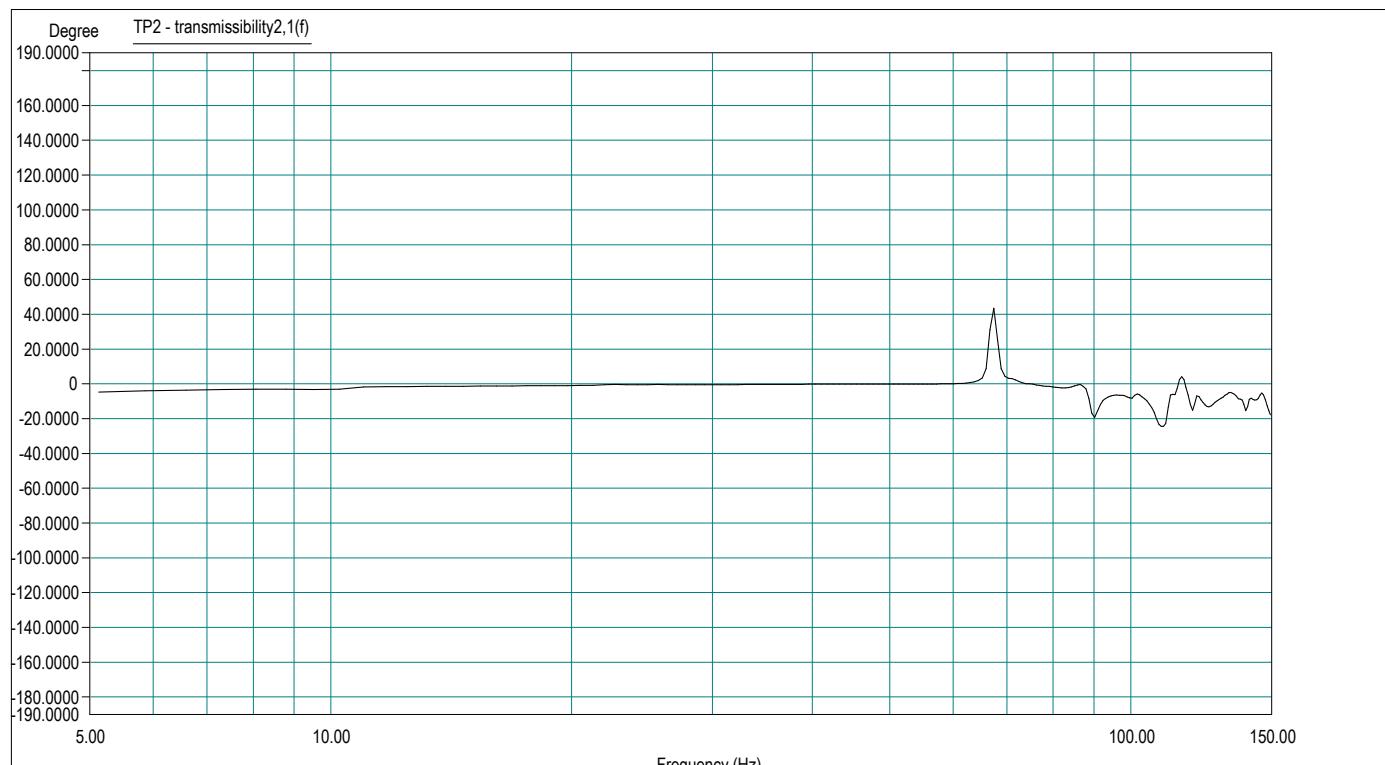
Pag. 32 di 117

Project File Name: VERTICAL Z - ENDURANCE.prj

Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z)

Test Type: Random

Run Folder: .\RUN 02 ENDURANCE Z Sep 21, 2015 11-28-08



Level: 0 dB

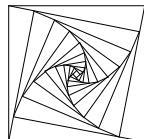
Control RMS: 5.605435 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:22 , lunedì, settembre 21, 2015



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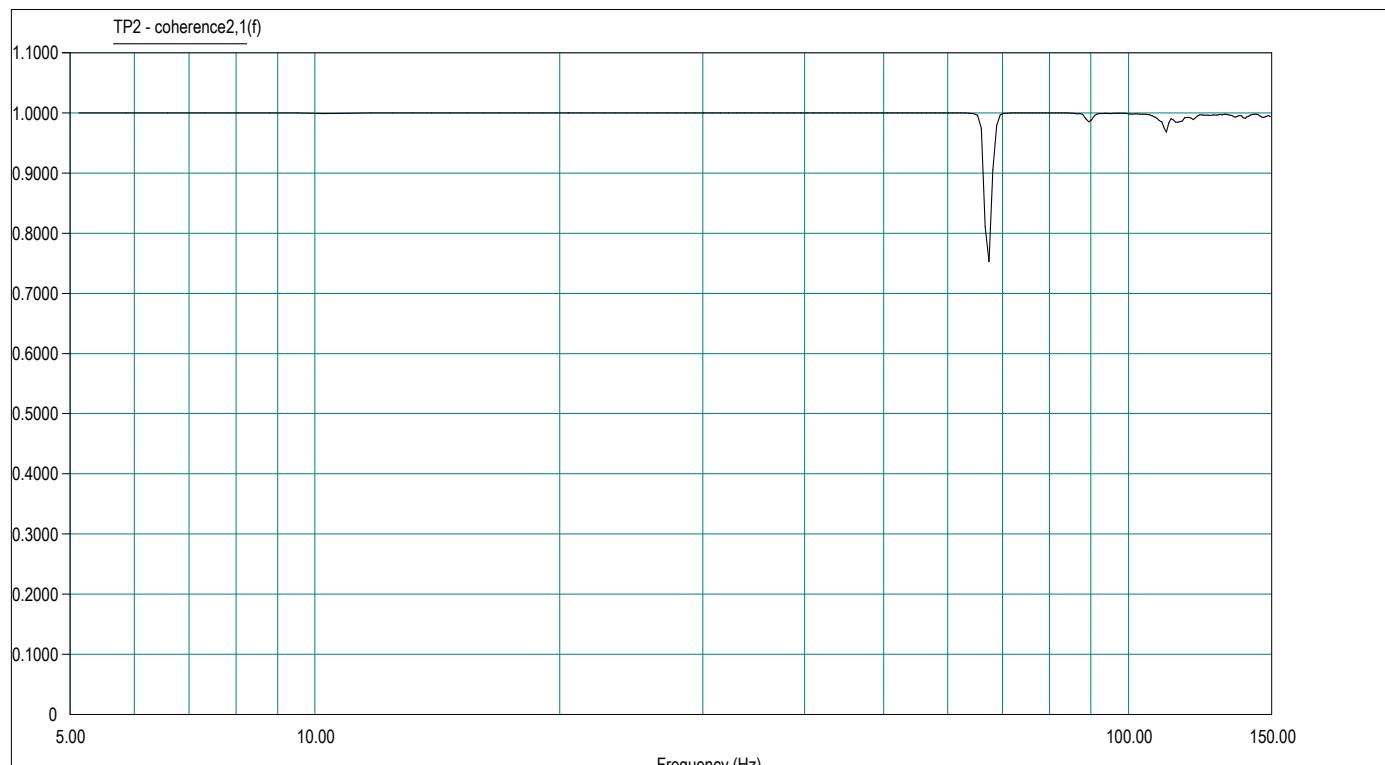
**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 33 di 117

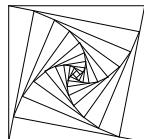
Project File Name: VERTICAL Z - ENDURANCE.prj  
Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z) Test Type: Random  
Run Folder: .\RUN 02 ENDURANCE Z Sep 21, 2015 11-28-08



Level: 0 dB  
Control RMS: 5.605435 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:22 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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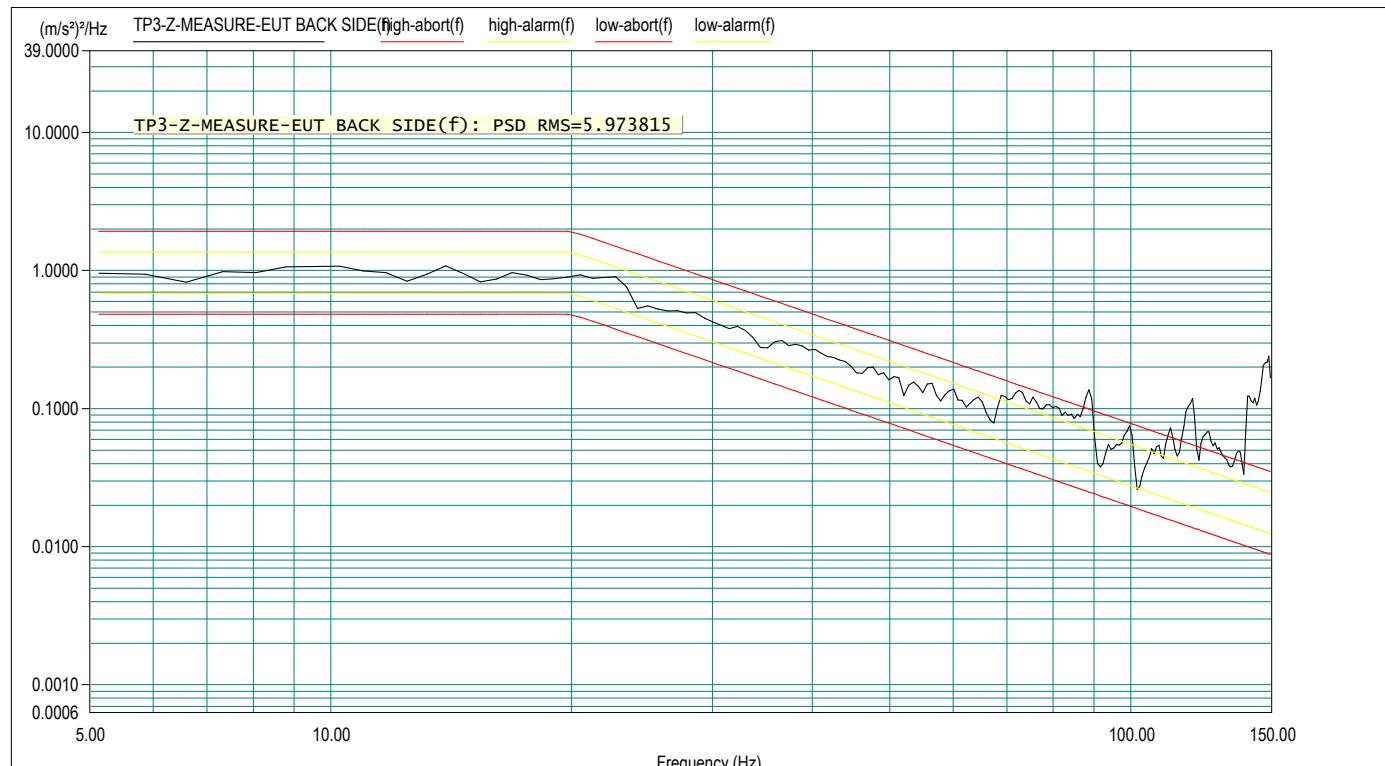
Pag. 34 di 117

Project File Name: VERTICAL Z - ENDURANCE.prj

Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z)

Test Type: Random

Run Folder: .\RUN 02 ENDURANCE Z Sep 21, 2015 11-28-08



Level: 0 dB

Control RMS: 5.605435 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

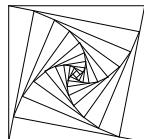
00:00:00

DOF: 154

dF:

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:23 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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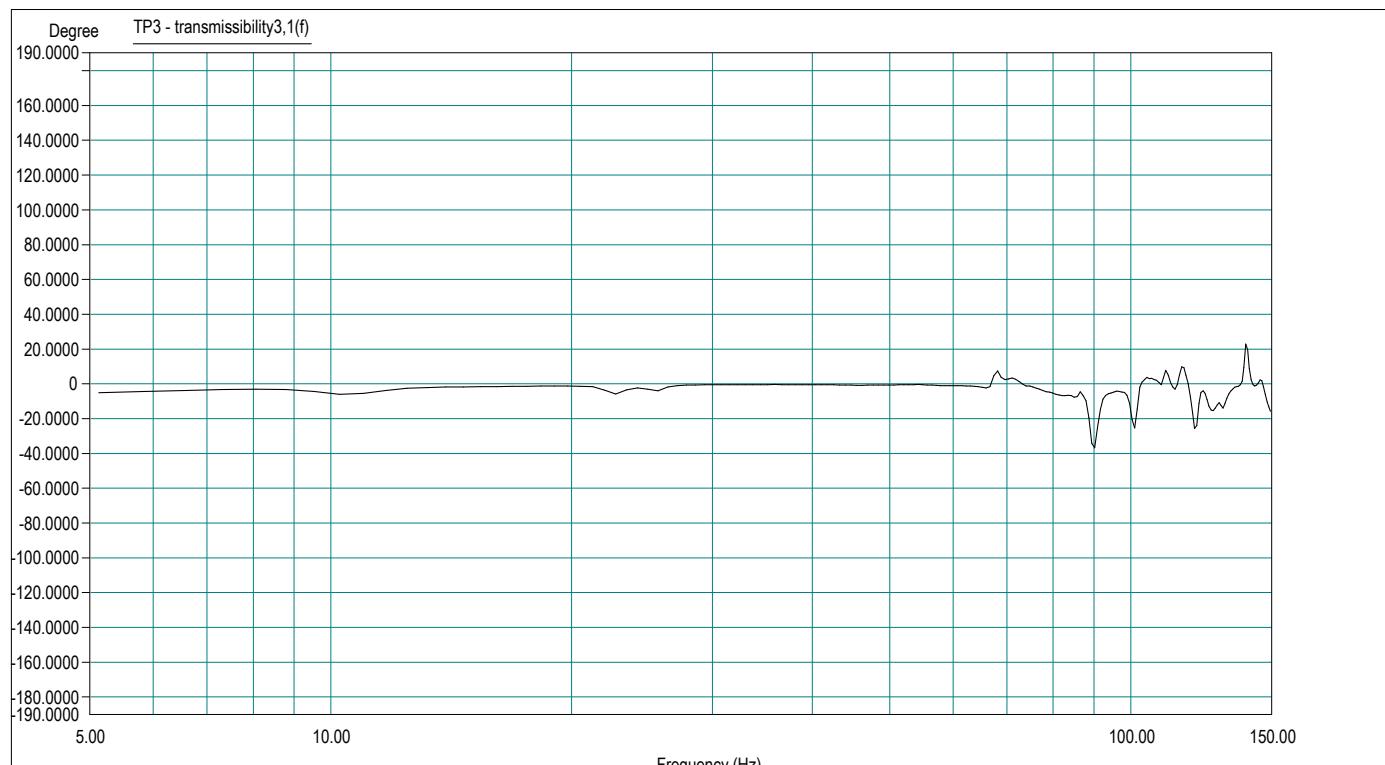
Pag. 35 di 117

Project File Name: VERTICAL Z - ENDURANCE.prj

Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z)

Test Type: Random

Run Folder: .\RUN 02 ENDURANCE Z Sep 21, 2015 11-28-08



Level: 0 dB

Control RMS: 5.605435 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

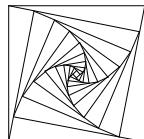
00:00:00

DOF: 154

dF:

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:23 , lunedì, settembre 21, 2015



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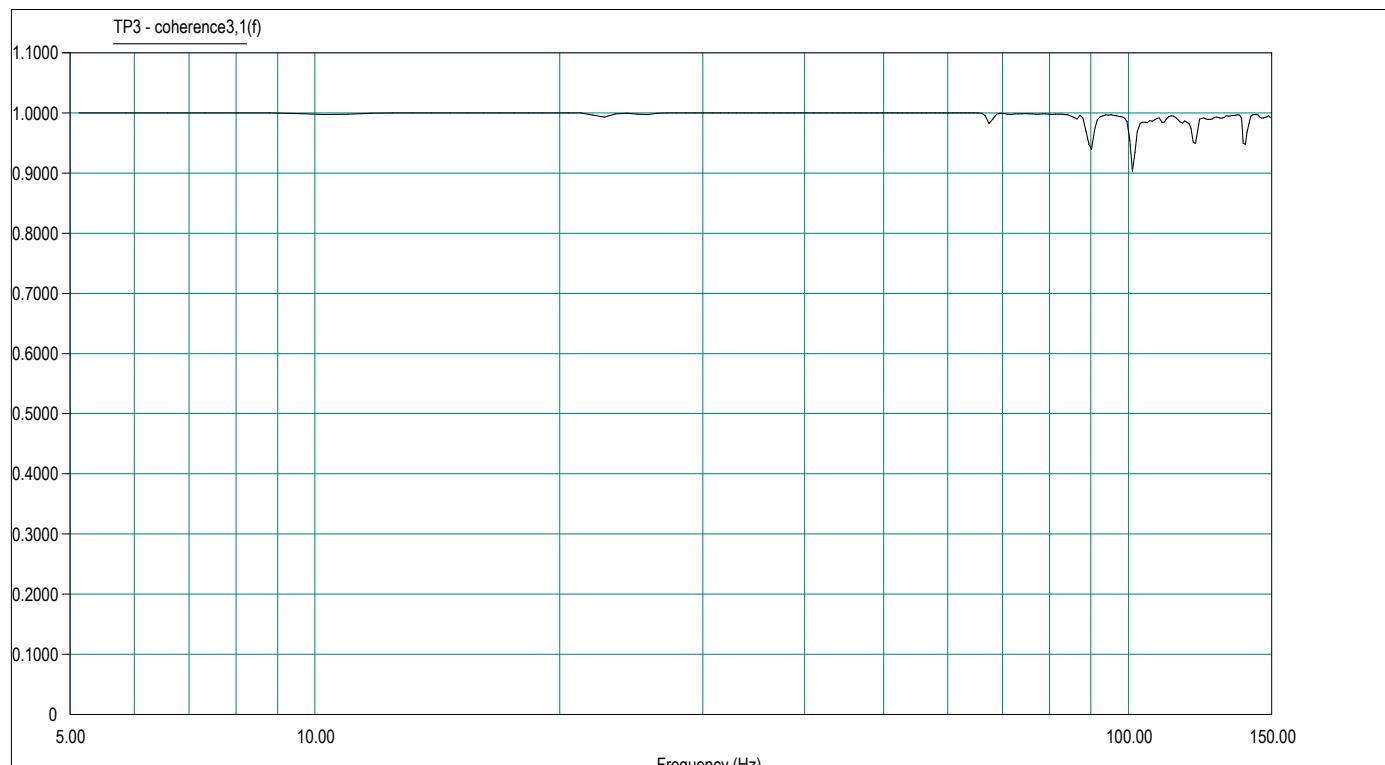
**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Pag. 36 di 117

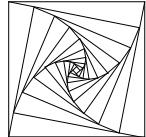
Project File Name: VERTICAL Z - ENDURANCE.prj  
Profile Name: RUN 02 RANDOM ENDURANCE TEST ASSE VERTICALE (Z) Test Type: Random  
Run Folder: .\RUN 02 ENDURANCE Z Sep 21, 2015 11-28-08



Level: 0 dB  
Control RMS: 5.605435 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 04:30:11 PM, Monday, September 21, 2015

Report created at 04:30:24 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Pag. 37 di 117

## **ALLEGATO 1.3**

**EARTHING SWITCH E402A CAF**

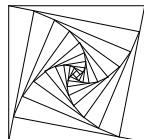
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE VERTICALE (Z)**

**SHOCK TEST - UP DIRECTION -**  
**PROFILO LONGITUDINALE**  
**(3 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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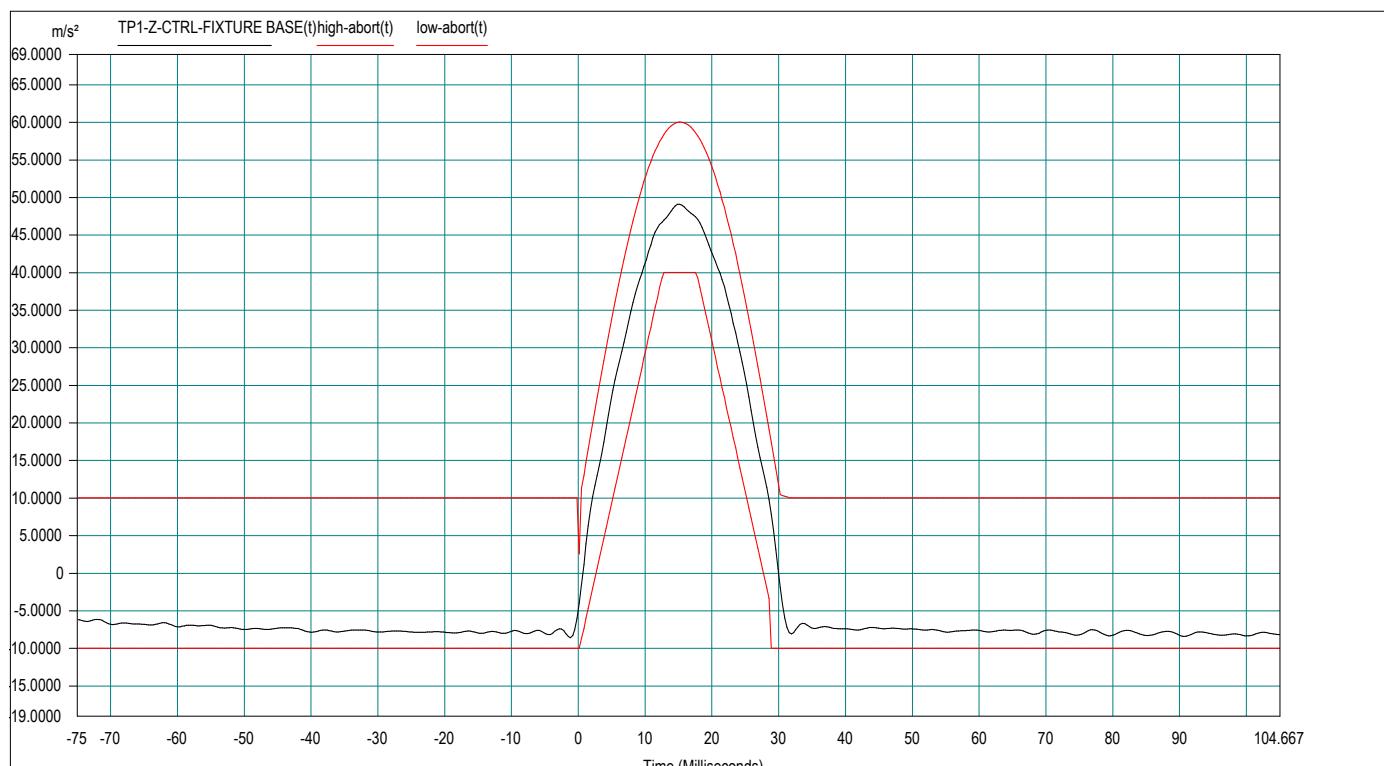
Pag. 38 di 117

Project File Name: VERTICAL Z - SHOCK.prj

Profile Name: RUN 03 SHOCK TEST ON ASSE VERTICALE (Z) - UP DIRECTION - PROFILO LONGITUDINALE

Test

Type: Classical Shock Run Folder: .\RUN 03 SHOCK Z - UP Sep 21, 2015 16-49-42



Level: 0 dB Block Size: 2048

Elapsed Pulses: 15

Frame Time: 0.682667 Seconds Control Peak: 49.088360

Control RMS: 8.696640 Full Level Elapsed Pulses:

3

dT: 0.000333 Seconds Demand Peak: 50.000000

Demand RMS: 8.770651 Remaining Pulses: 0

Pulse Type: Half Sine Amplitude: 50.000000

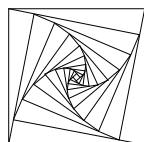
Pulse Width: 29.999999 ms

Data saved at 04:51:01 PM, Monday, September 21, 2015

Report created at 04:51:02 , lunedì, settembre 21, 2015

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1

La riproduzione del presente documento è ammessa in copia conforme integrale. La riproduzione conforme parziale è ammessa soltanto a seguito di autorizzazione scritta di Centrotecnica, da riportare con il numero di riferimento dell'autorizzazione stessa.



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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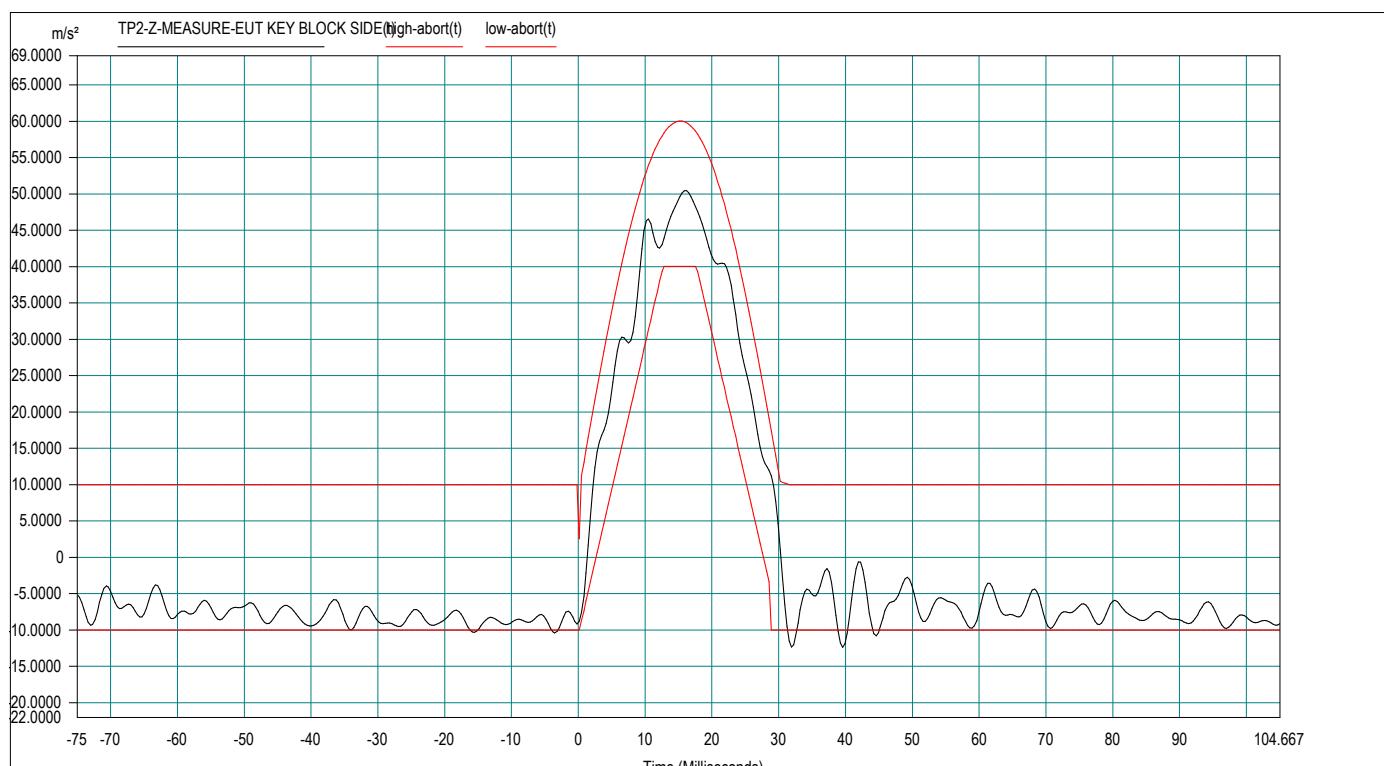
Rev. 0

Pag. 39 di 117

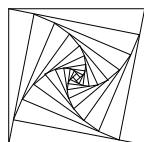
Project File Name: VERTICAL Z - SHOCK.prj

Profile Name: RUN 03 SHOCK TEST ON ASSE VERTICALE (Z) - UP DIRECTION - PROFILO LONGITUDINALE  
Type: Classical Shock Run Folder: .\RUN 03 SHOCK Z - UP Sep 21, 2015 16-49-42

Test



Level: 0 dB Block Size: 2048 Elapsed Pulses: 15  
Frame Time: 0.682667 Seconds Control Peak: 49.088360 Control RMS: 8.696640 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms  
Data saved at 04:51:01 PM, Monday, September 21, 2015 Report created at 04:51:03 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

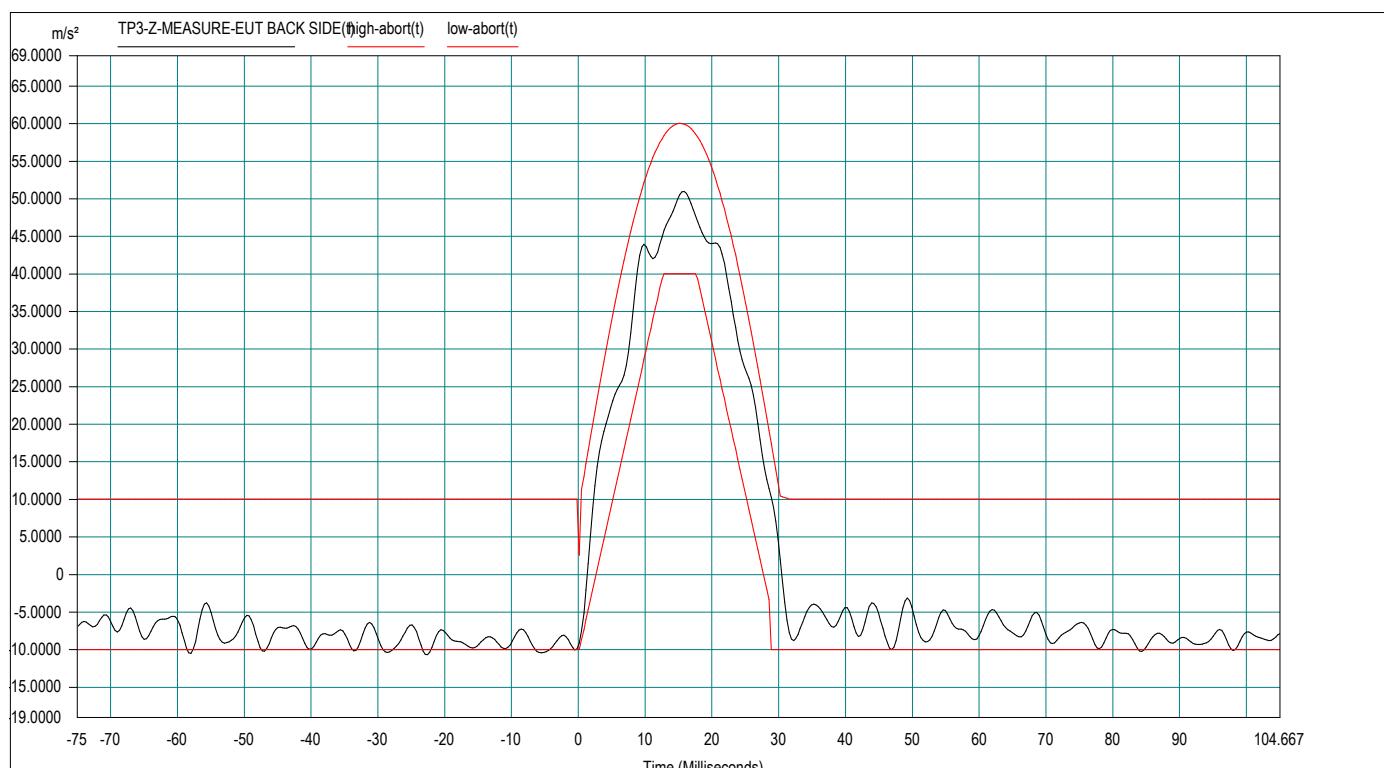
Rev. 0

Pag. 40 di 117

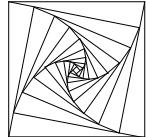
Project File Name: VERTICAL Z - SHOCK.prj

Profile Name: RUN 03 SHOCK TEST ON ASSE VERTICALE (Z) - UP DIRECTION - PROFILO LONGITUDINALE  
Type: Classical Shock Run Folder: .\RUN 03 SHOCK Z - UP Sep 21, 2015 16-49-42

Test



Level: 0 dB Block Size: 2048 Elapsed Pulses: 15  
Frame Time: 0.682667 Seconds Control Peak: 49.088360 Control RMS: 8.696640 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms  
Data saved at 04:51:01 PM, Monday, September 21, 2015 Report created at 04:51:03 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 41 di 117

## **ALLEGATO 1.4**

**EARTHING SWITCH E402A CAF**

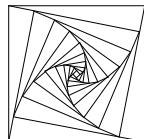
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE VERTICALE (Z)**

**SHOCK TEST - DOWN DIRECTION -**  
**PROFILO LONGITUDINALE**  
**(3 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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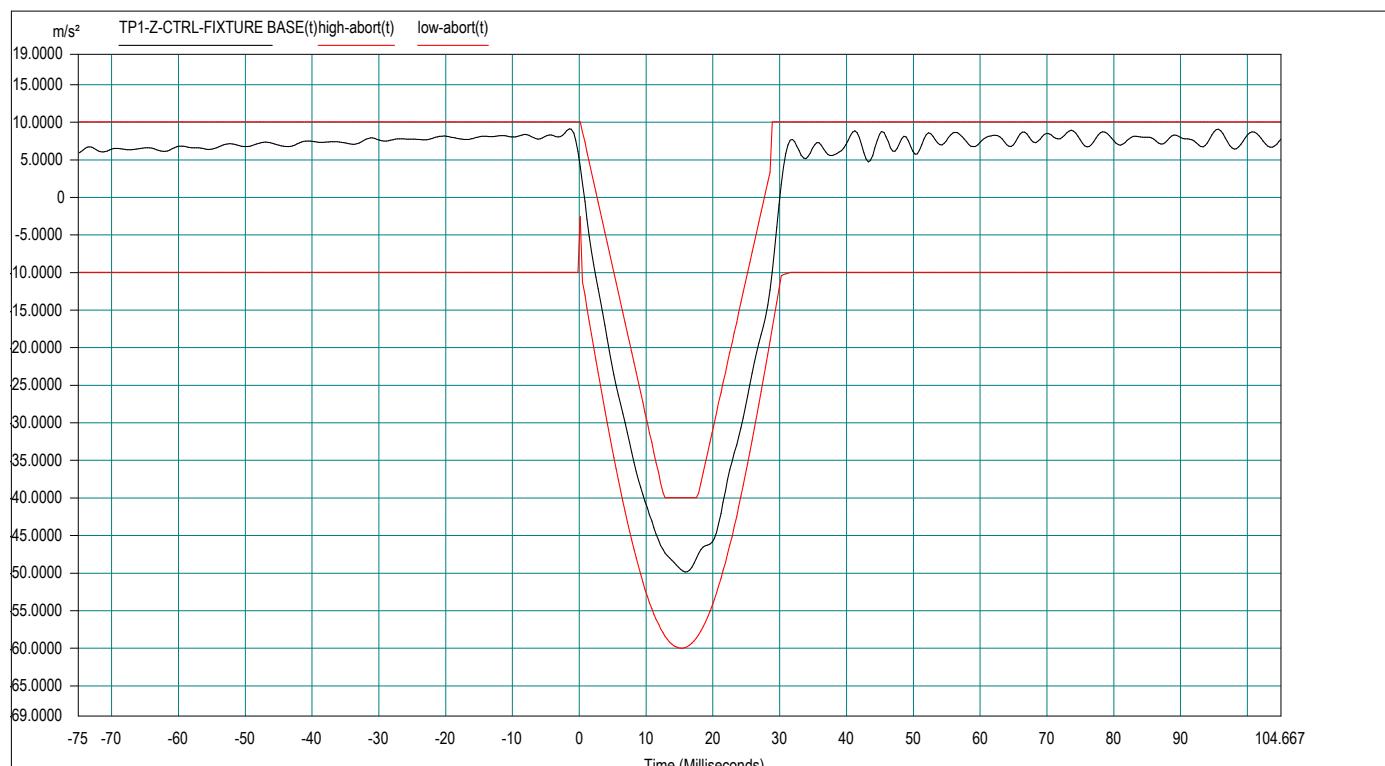
Pag. 42 di 117

Project File Name: VERTICAL Z - SHOCK.prj

Profile Name: RUN 04 SHOCK TEST ON ASSE VERTICALE (Z) - DOWN DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 04 SHOCK Z - DOWN Sep 21, 2015 16-53-05



Level: 0 dB Block Size: 2048

Elapsed Pulses: 19

Frame Time: 0.682667 Seconds Control Peak: 49.865845 Control RMS: 8.733629 Full Level Elapsed Pulses:

3

dT: 0.000333 Seconds Demand Peak: 50.000000

Demand RMS: 8.770651 Remaining Pulses: 0

Pulse Type: Half Sine Amplitude: 50.000000

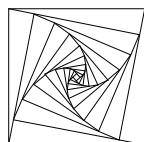
Pulse Width: 29.999999 ms

Data saved at 04:54:50 PM, Monday, September 21, 2015

Report created at 04:54:55 , lunedì, settembre 21, 2015

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

La riproduzione del presente documento è ammessa in copia conforme integrale. La riproduzione conforme parziale è ammessa soltanto a seguito di autorizzazione scritta di Centrotecnica, da riportare con il numero di riferimento dell'autorizzazione stessa.



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

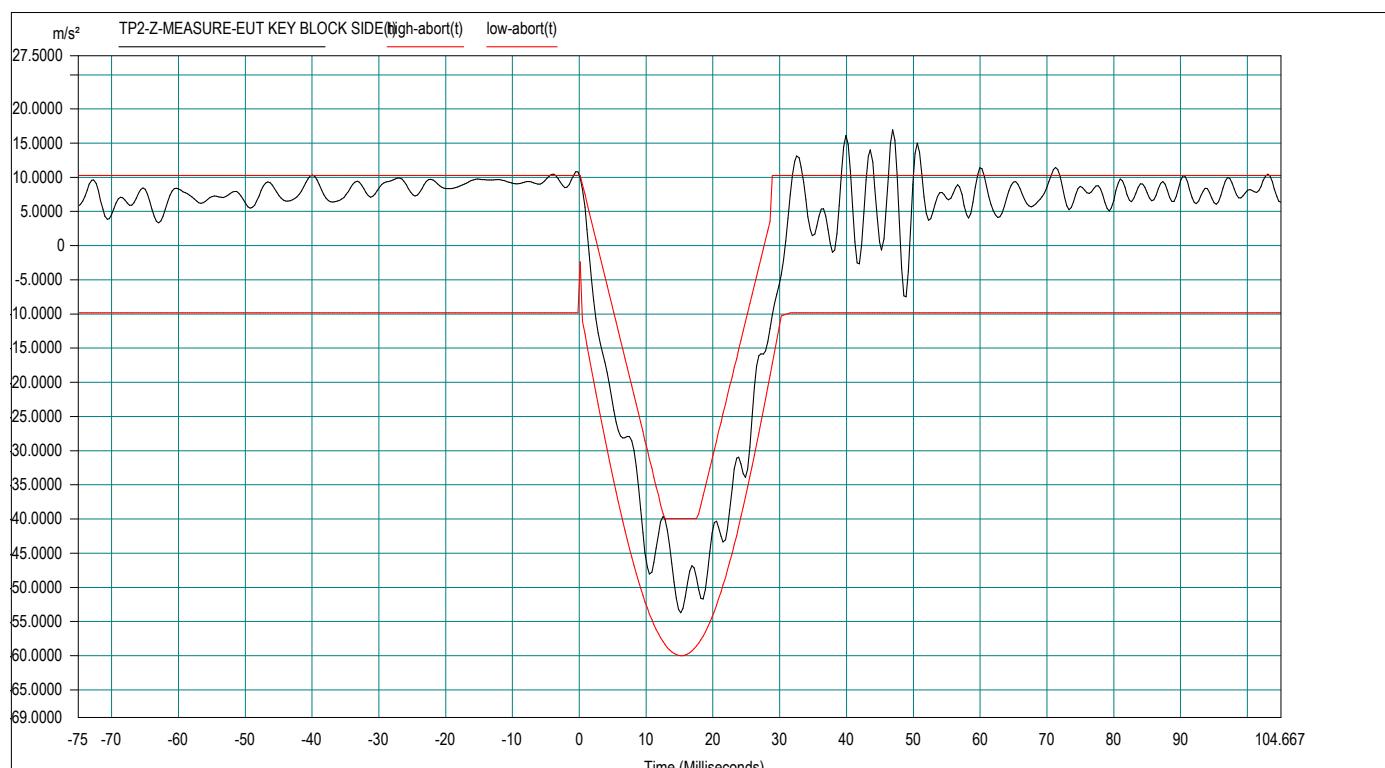
Pag. 43 di 117

Project File Name: VERTICAL Z - SHOCK.prj

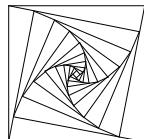
Profile Name: RUN 04 SHOCK TEST ON ASSE VERTICALE (Z) - DOWN DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 04 SHOCK Z - DOWN Sep 21, 2015 16-53-05



Level: 0 dB Block Size: 2048 Elapsed Pulses: 19  
Frame Time: 0.682667 Seconds Control Peak: 49.865845 Control RMS: 8.733629 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms  
Data saved at 04:54:50 PM, Monday, September 21, 2015 Report created at 04:54:56 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
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Rev. 0

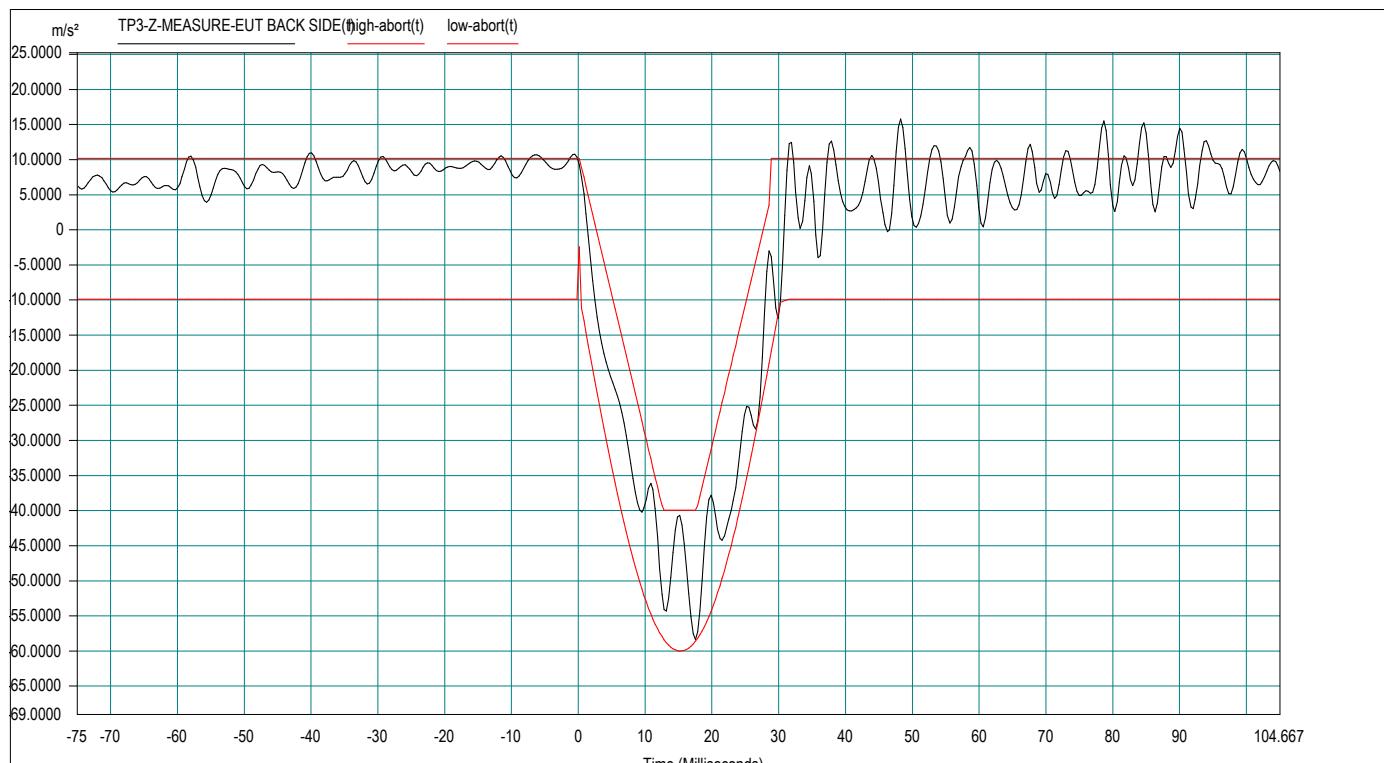
Pag. 44 di 117

Project File Name: VERTICAL Z - SHOCK.prj

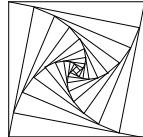
Profile Name: RUN 04 SHOCK TEST ON ASSE VERTICALE (Z) - DOWN DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 04 SHOCK Z - DOWN Sep 21, 2015 16-53-05



Level: 0 dB Block Size: 2048 Elapsed Pulses: 19  
Frame Time: 0.682667 Seconds Control Peak: 49.865845 Control RMS: 8.733629 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms  
Data saved at 04:54:50 PM, Monday, September 21, 2015 Report created at 04:54:56 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 45 di 117

## **ALLEGATO 1.5**

**EARTHING SWITCH E402A CAF**

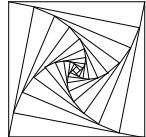
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE VERTICALE (Z)**

**FINAL MEASUREMENTS - PROFILO**  
**ENDURANCE VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 46 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj

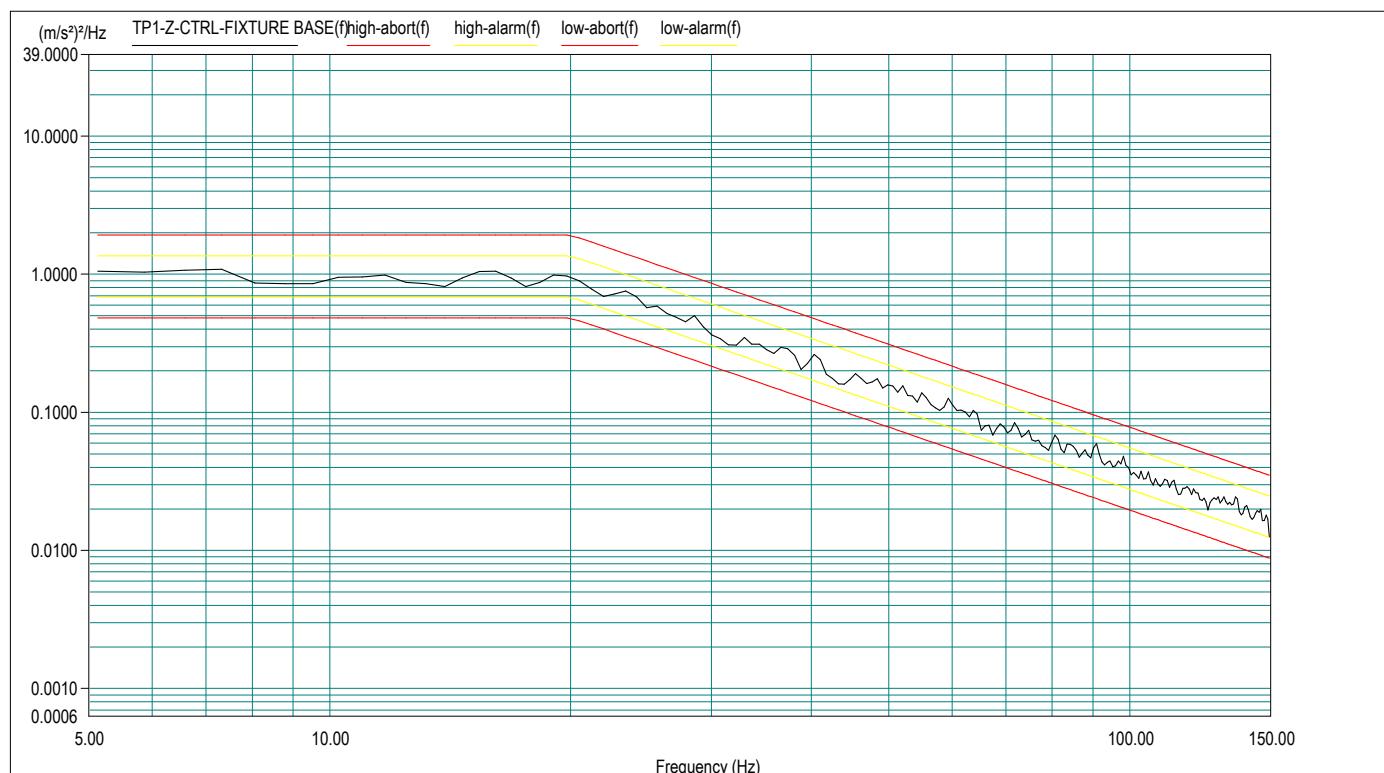
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)

Test Type:

Random

Run

Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23



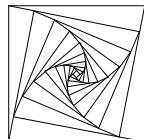
Level: 0 dB

Control RMS: 5.565898 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:16 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 47 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj

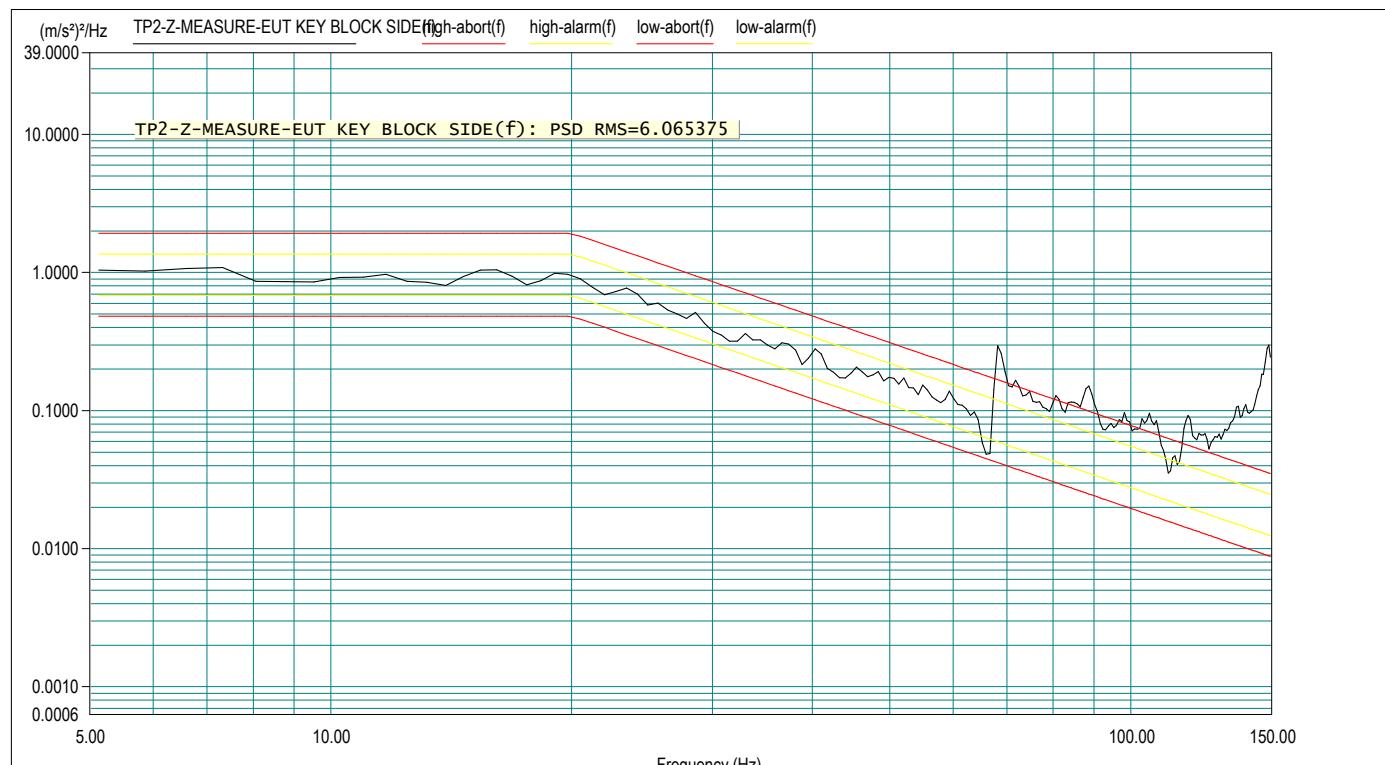
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)

Test Type:

Random

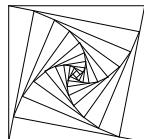
Run

Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23



Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:16 , lunedì, settembre 21, 2015



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**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

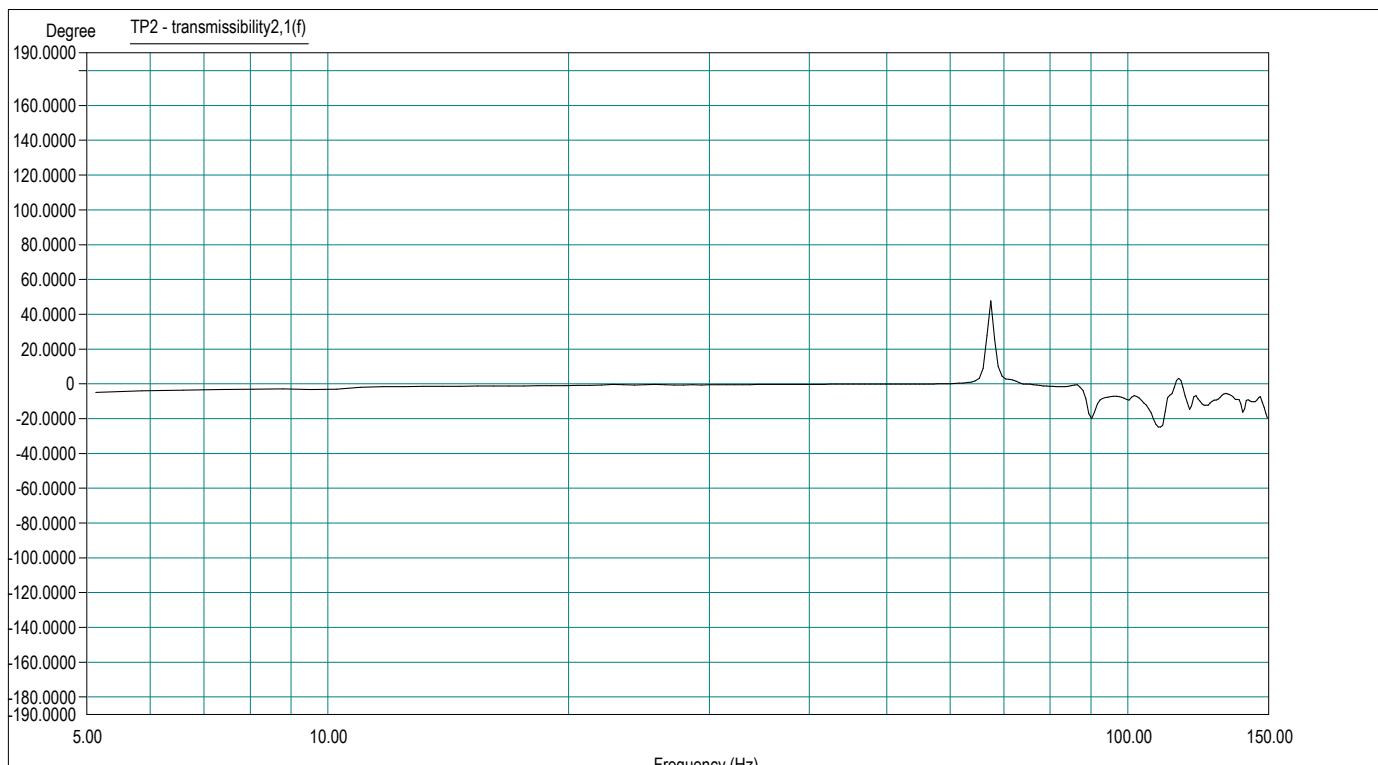
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 48 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj  
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23

Test Type: Random Run



Level: 0 dB

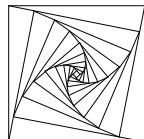
Control RMS: 5.565898 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:16 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

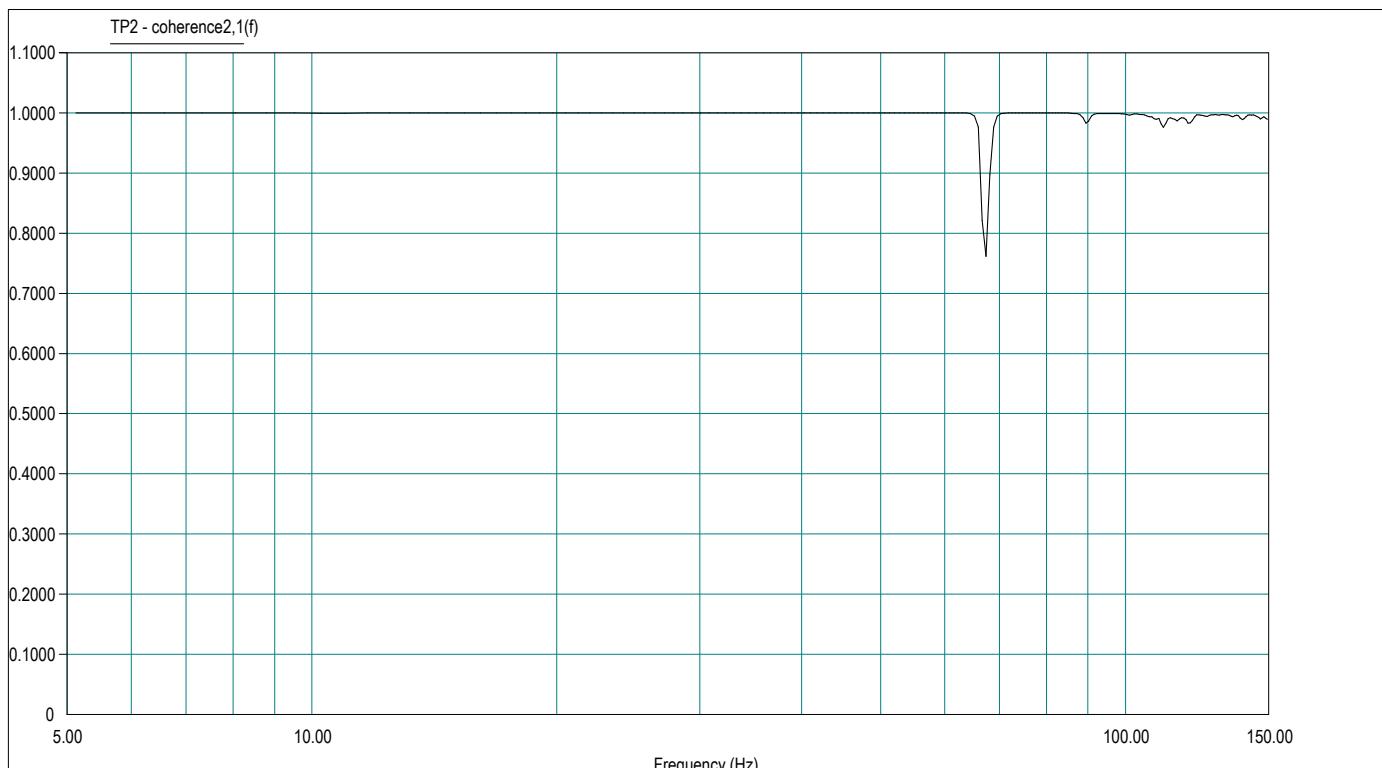
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 49 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj  
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23

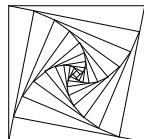
Test Type: Random Run



Level: 0 dB  
Control RMS: 5.565898 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:17 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 50 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj

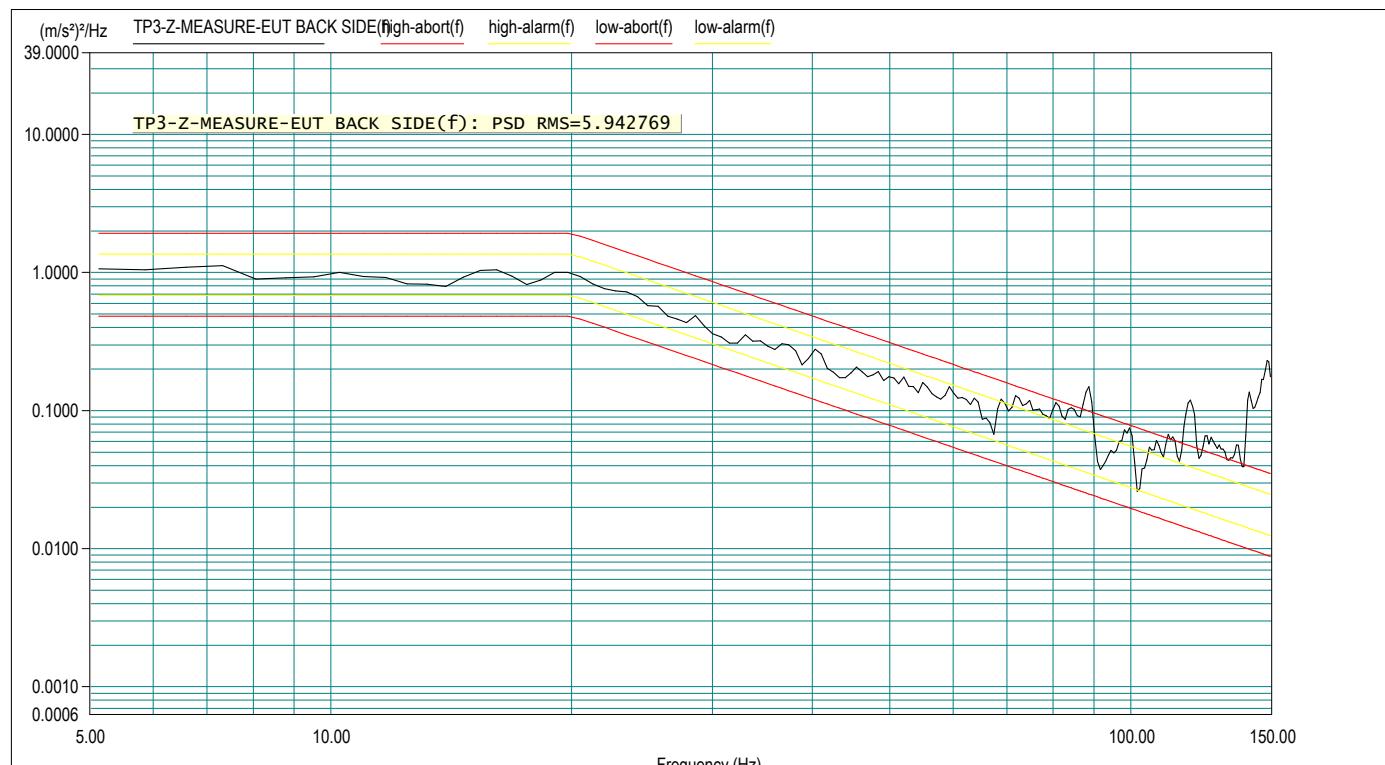
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)

Test Type:

Random

Run

Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23



Level: 0 dB

Control RMS: 5.565898 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

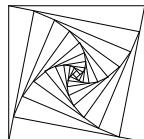
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:17 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

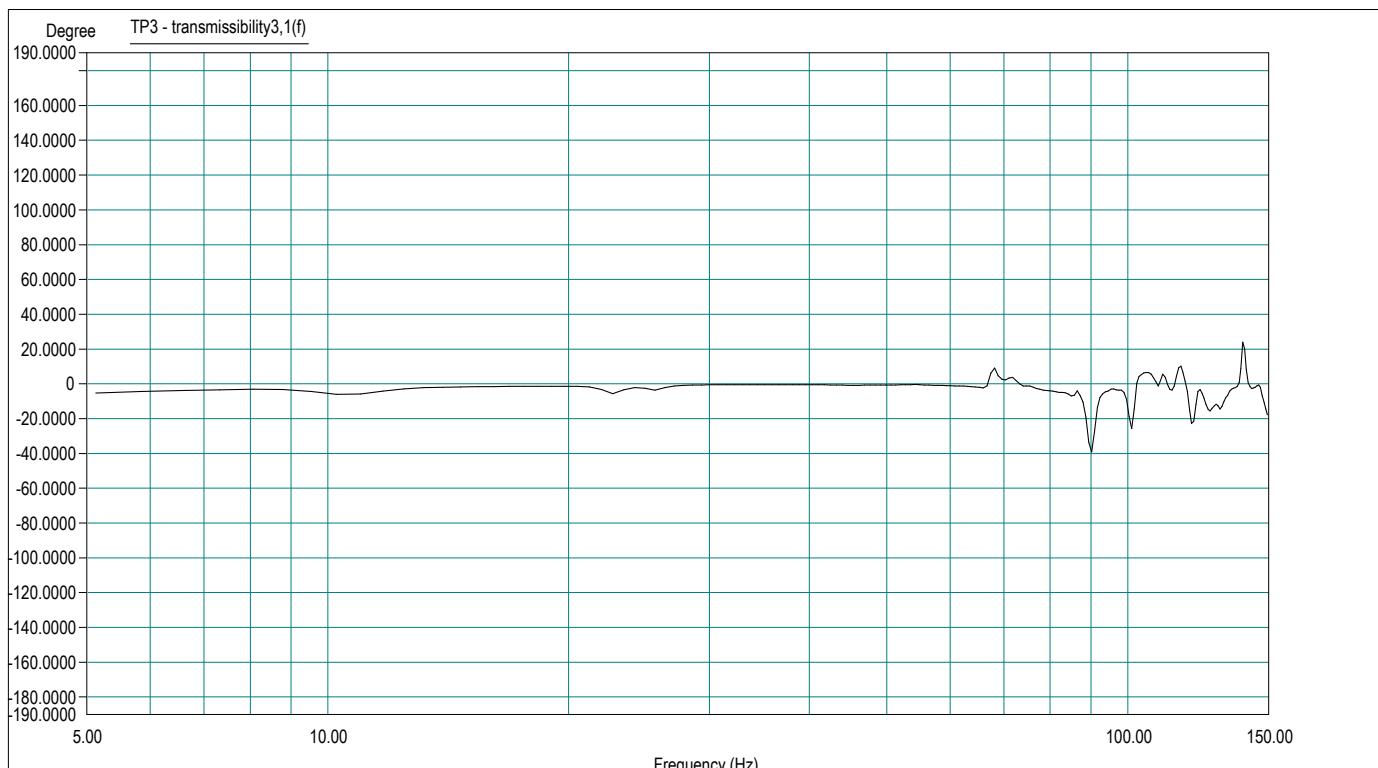
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 51 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj  
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23

Test Type: Random Run



Level: 0 dB

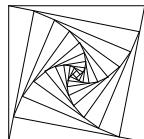
Control RMS: 5.565898 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:17 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

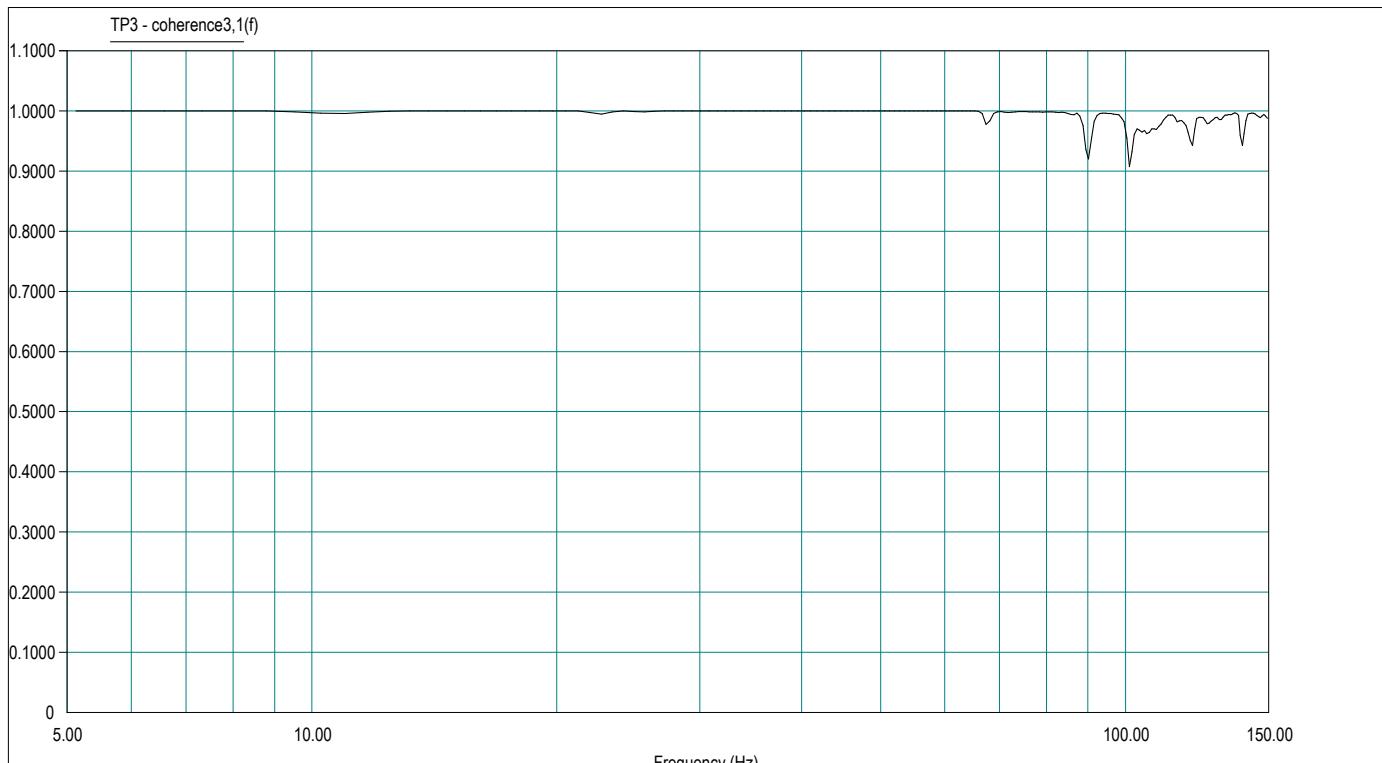
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Rev. 0

Pag. 52 di 117

Project File Name: VERTICAL Z - FINAL MEASURE.prj  
Profile Name: RUN 05 FINAL MEASURE ON ASSE VERTICALE (Z)  
Folder: .\RUN 05 F.M. - Z Sep 21, 2015 16-57-23

Test Type: Random Run



Level: 0 dB

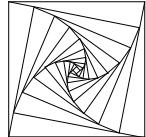
Control RMS: 5.565898 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 05:01:11 PM, Monday, September 21, 2015

Report created at 05:01:18 , lunedì, settembre 21, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 53 di 117

## **ALLEGATO 2.1**

**EARTHING SWITCH E402A CAF**

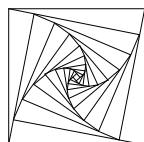
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE TRASVERSALE (Y)**

**INITIAL MEASUREMENTS - PROFILO**  
**ENDURANCE VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

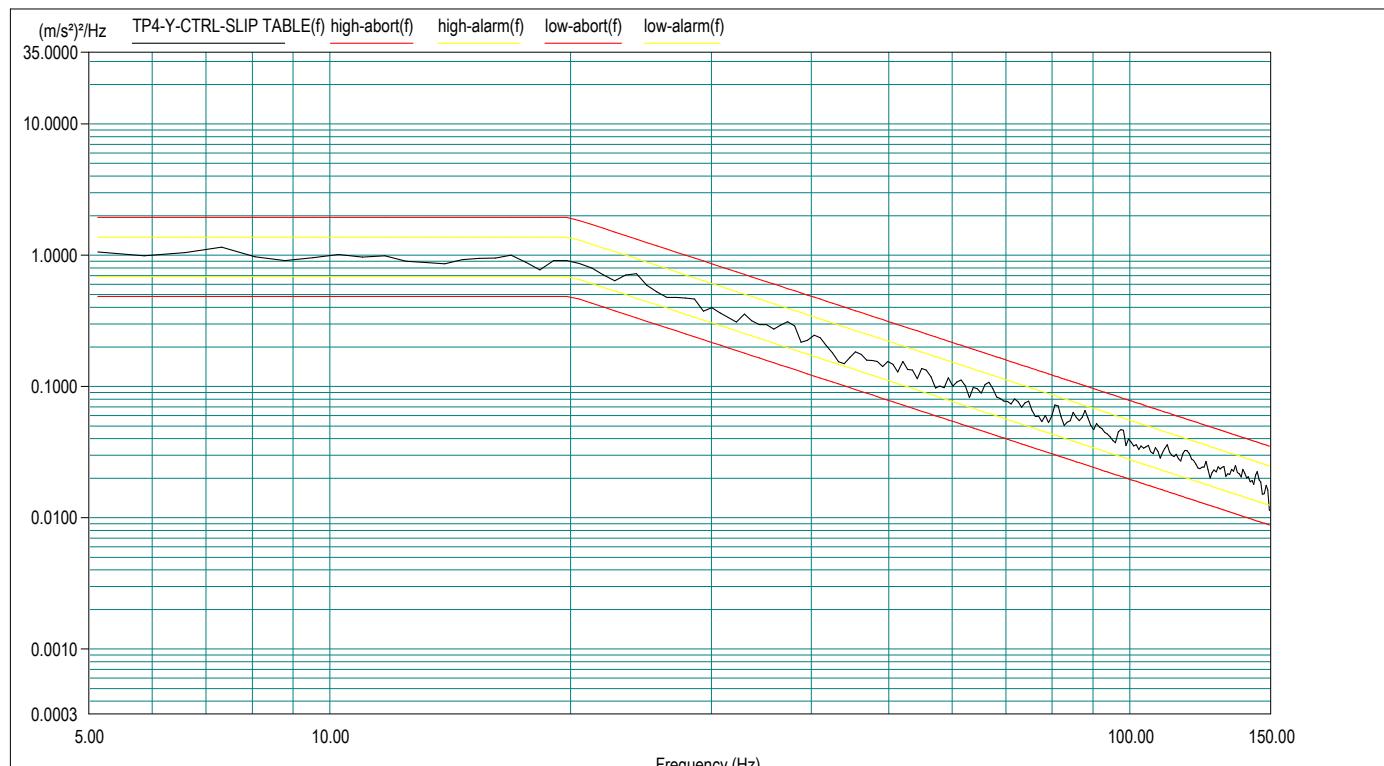
Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 54 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj  
Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

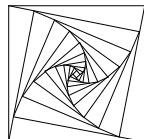
Test Type:



Level: 0 dB  
Control RMS: 5.563500 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:44:58 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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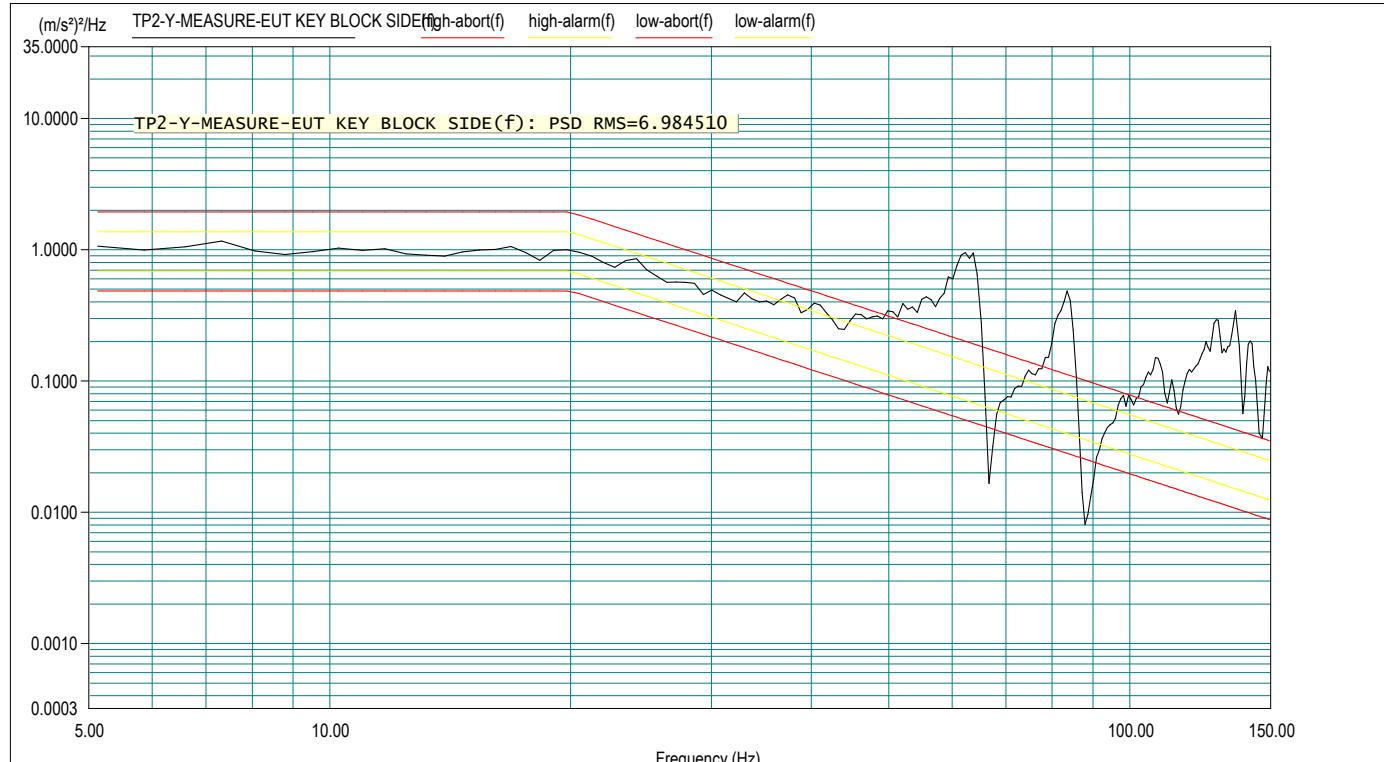
Rev. 0

Pag. 55 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj

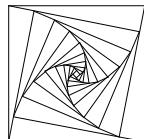
Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

Test Type:



Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:44:59 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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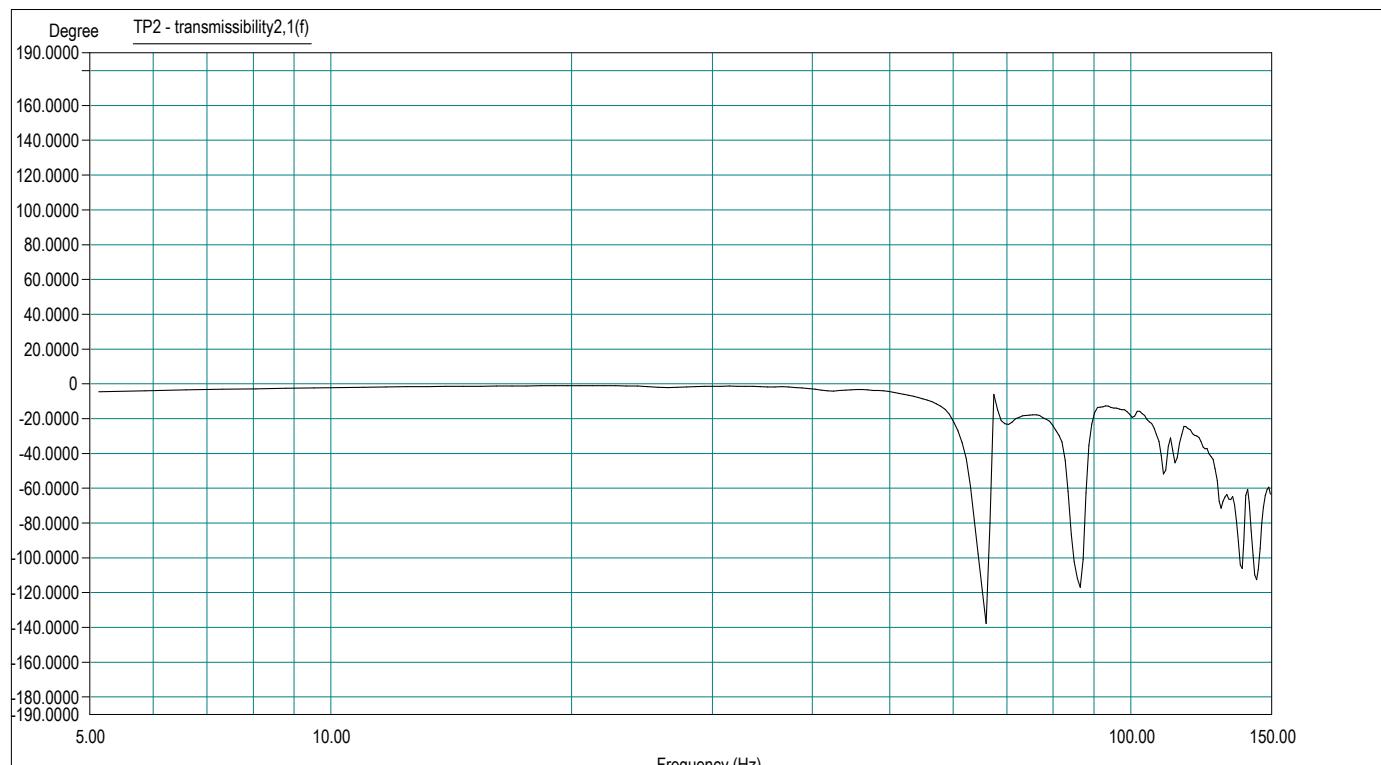
Rev. 0

Pag. 56 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj

Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

Test Type:



Level: 0 dB

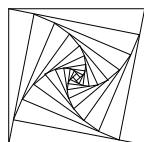
Control RMS: 5.563500 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:44:59 , martedì, settembre 22, 2015



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**Elaborato per: SPII S.p.A.**

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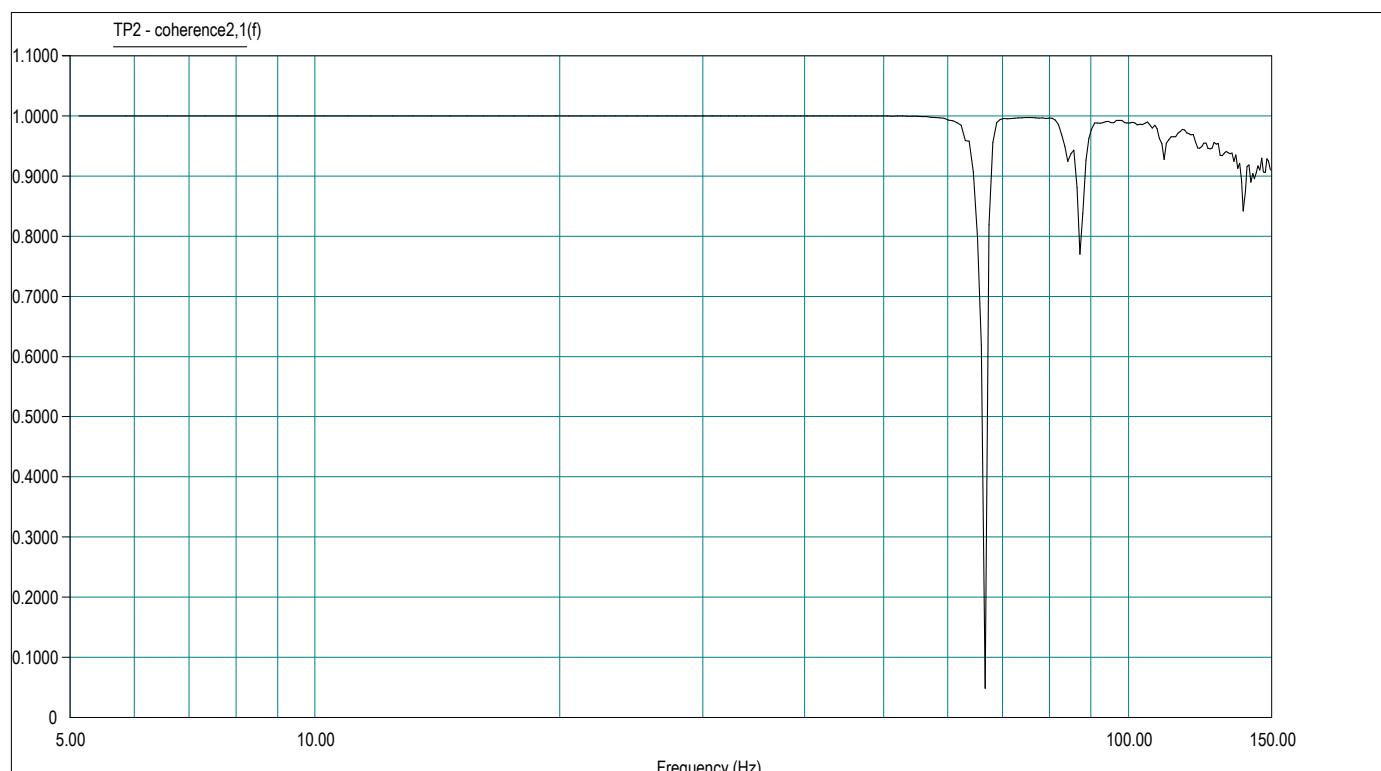
Rev. 0

Pag. 57 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj

Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

Test Type:



Level: 0 dB

Control RMS: 5.563500 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

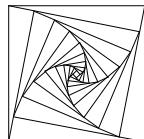
00:00:00

DOF: 154

dF:

Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:44:59 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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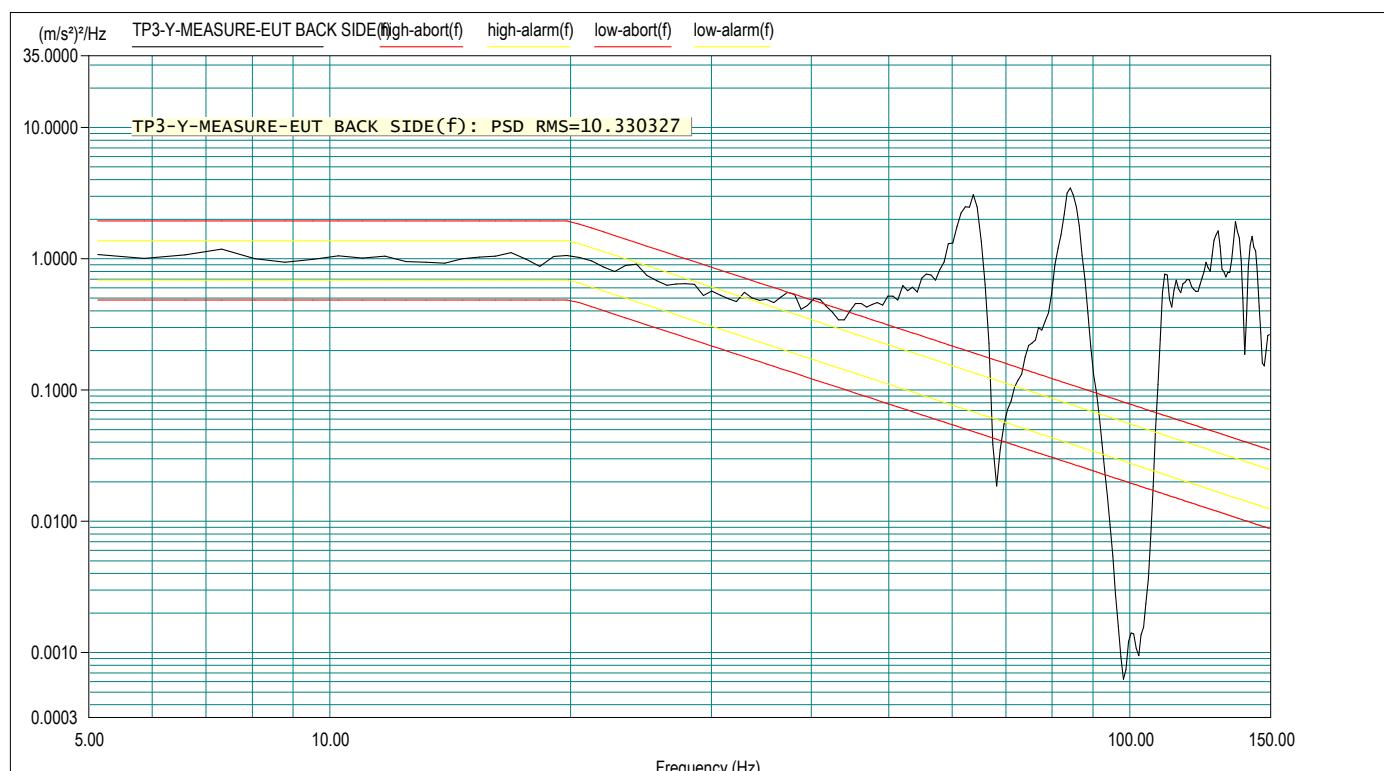
Rev. 0

Pag. 58 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj

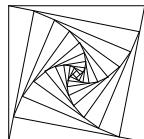
Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

Test Type:



Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:45:00 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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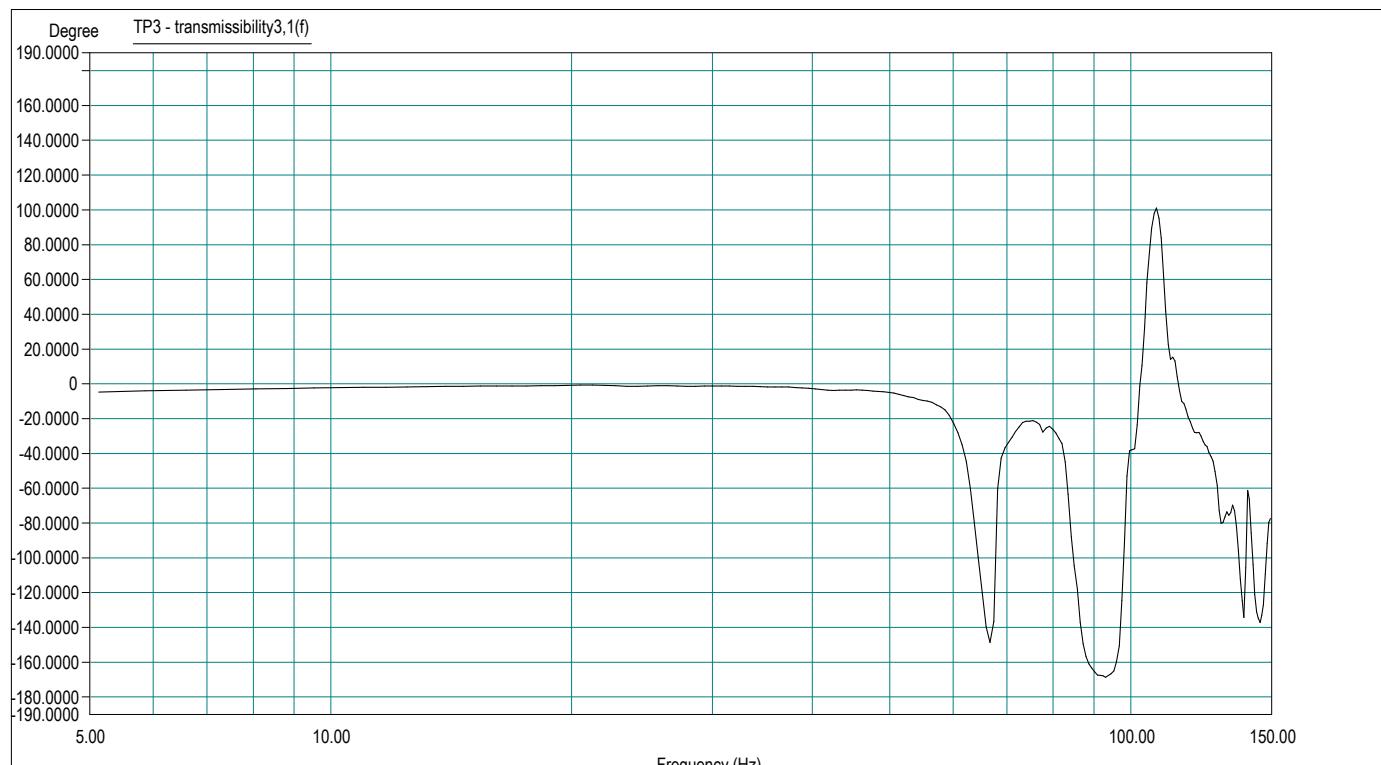
Rev. 0

Pag. 59 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj

Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

Test Type:



Level: 0 dB

Control RMS: 5.563500 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

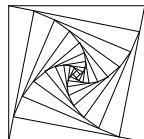
00:00:00

DOF: 154

dF:

Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:45:00 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
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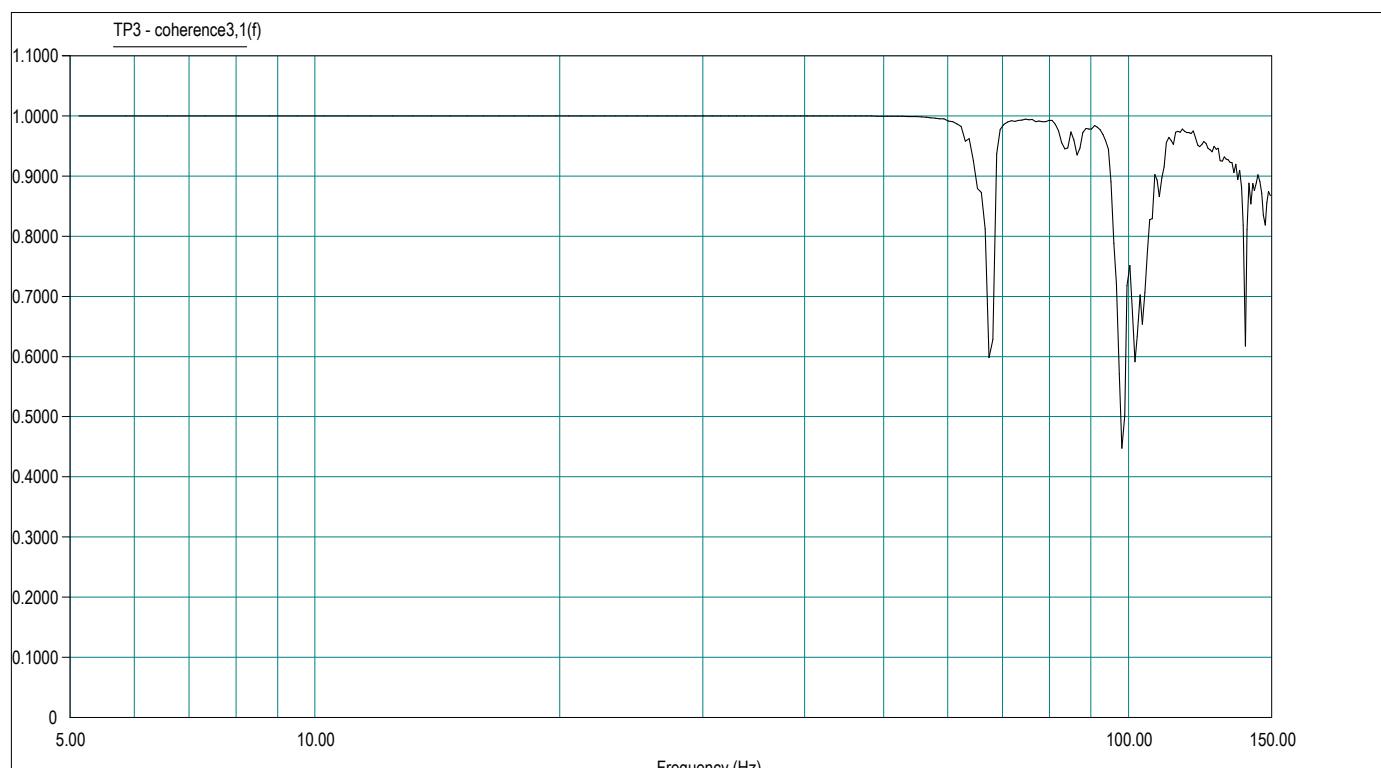
Rev. 0

Pag. 60 di 117

Project File Name: TRANSVERSAL Y - INITIAL MEASURE.prj

Profile Name: RUN 06 INITIAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 06 I.M. - Y Sep 22, 2015 09-40-37

Test Type:



Level: 0 dB

Control RMS: 5.563500 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

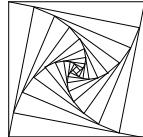
00:00:00

DOF: 154

dF:

Data saved at 09:44:43 AM, Tuesday, September 22, 2015

Report created at 09:45:00 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Pag. 61 di 117

## **ALLEGATO 2.2**

### **EARTHING SWITCH E402A CAF**

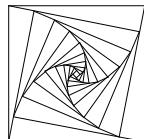
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE TRASVERSALE (Y)**

**ENDURANCE TEST - PROFILO**  
**VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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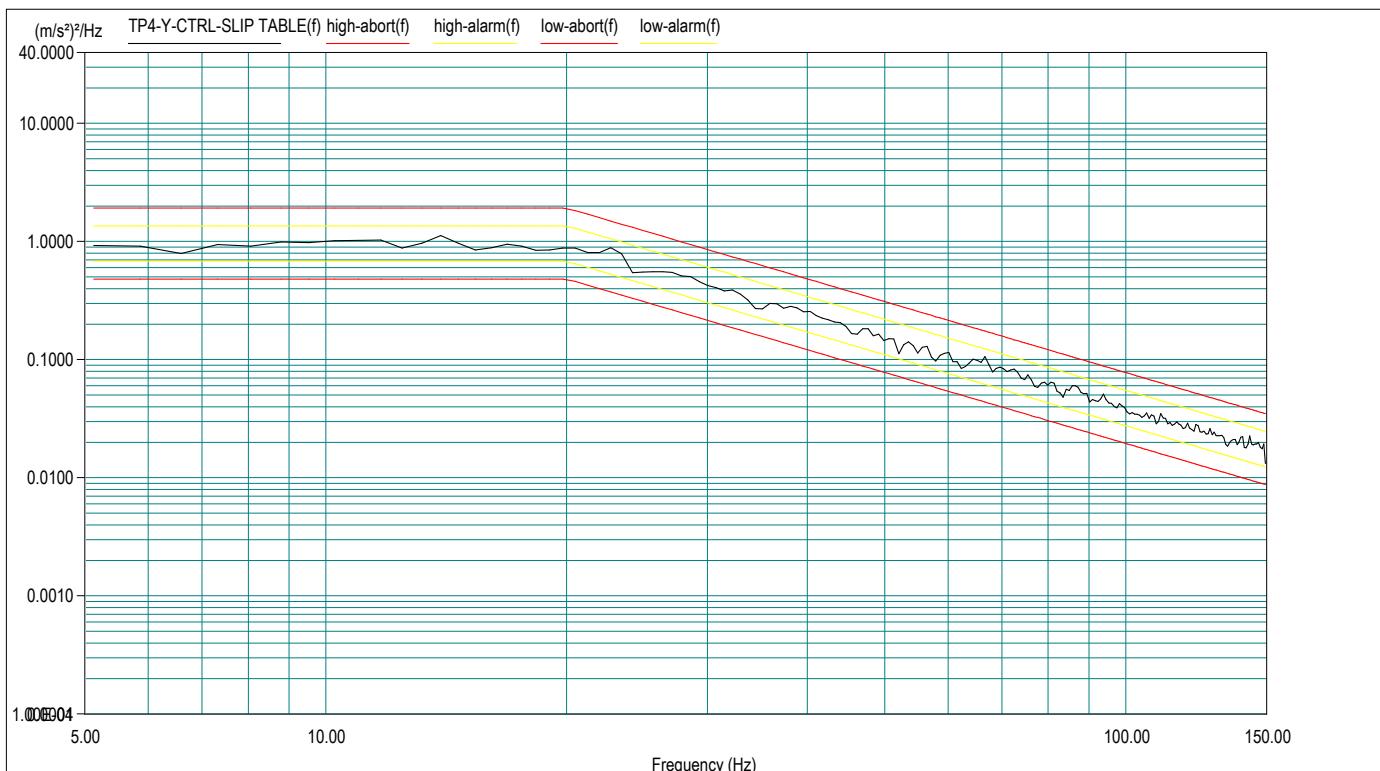
Pag. 62 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



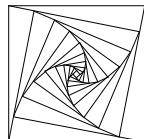
Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:45 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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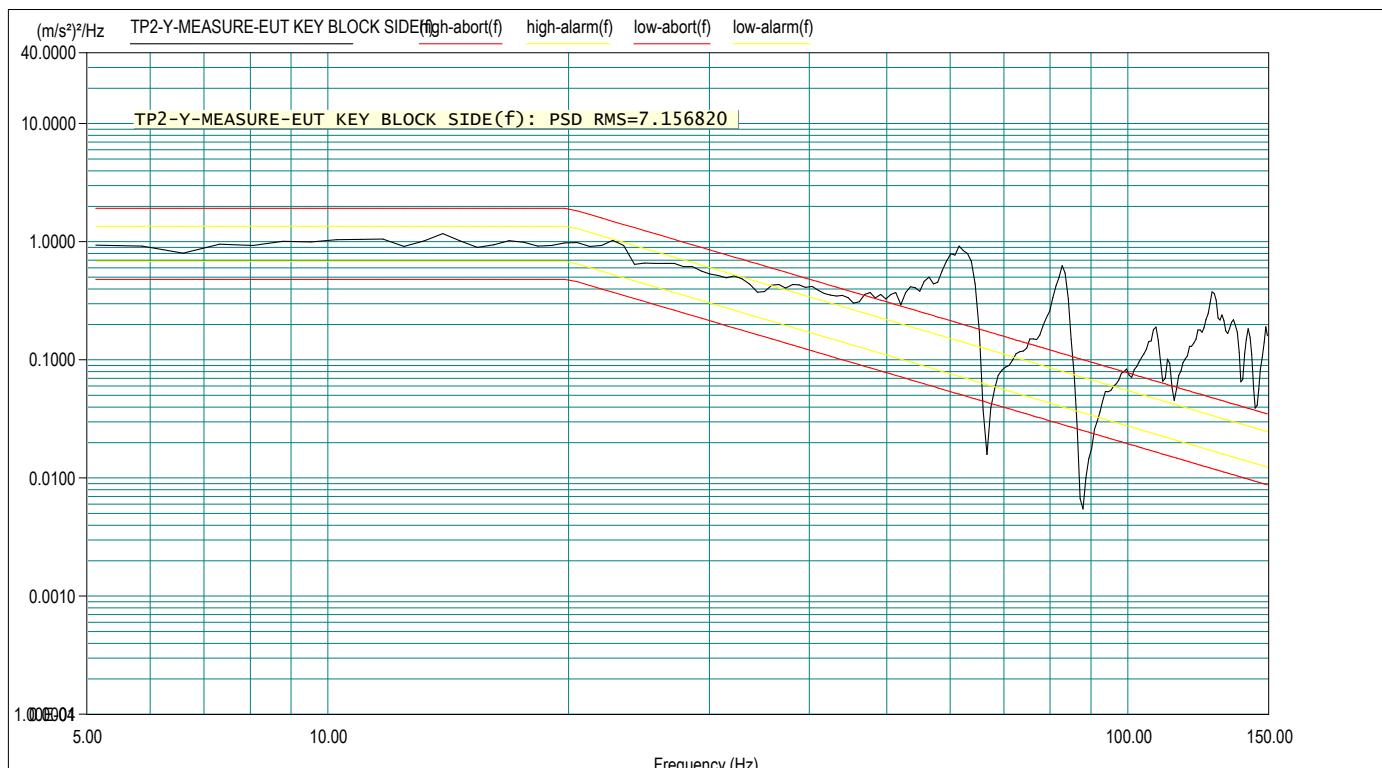
Pag. 63 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

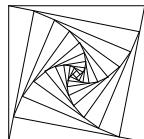
Remaining Time: 00:00:00

DOF: 154

dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:46 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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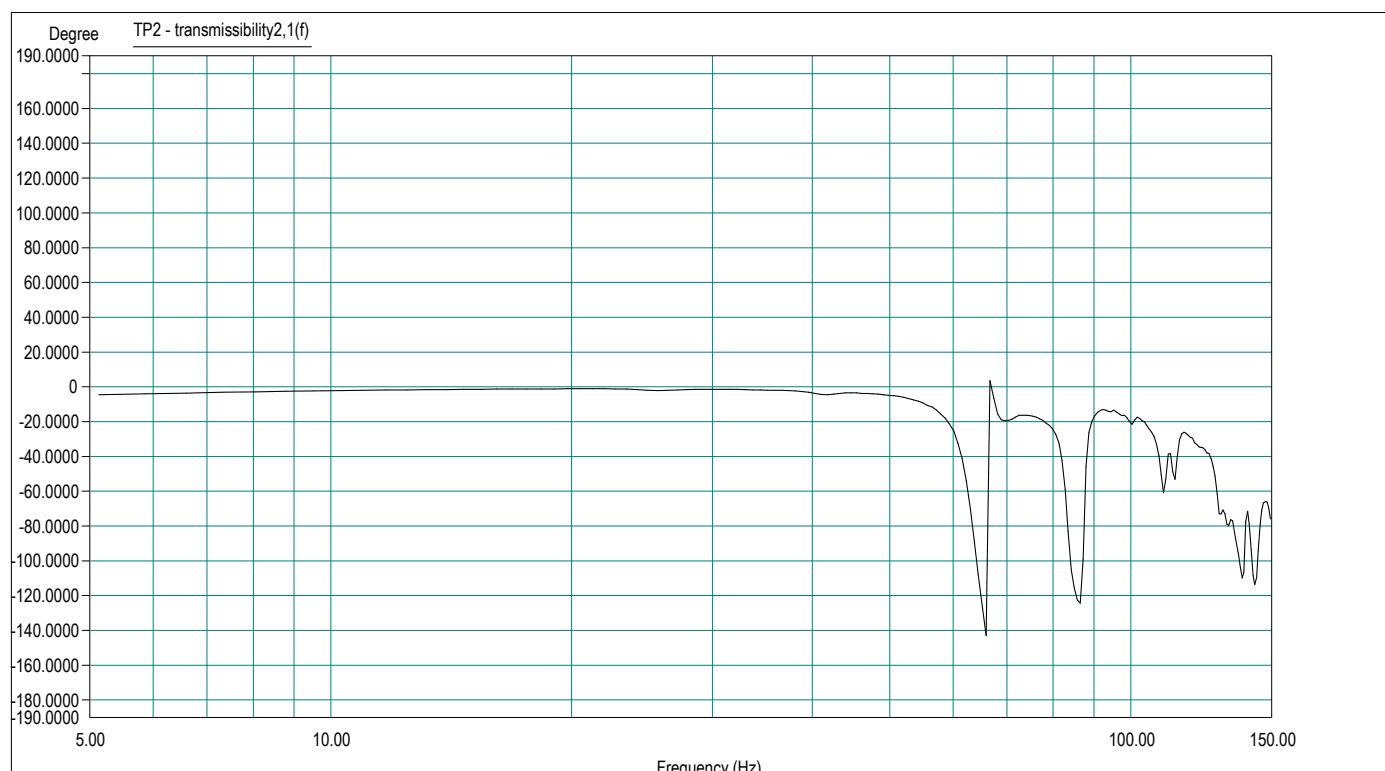
Pag. 64 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

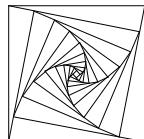
00:00:00

DOF: 154

dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:47 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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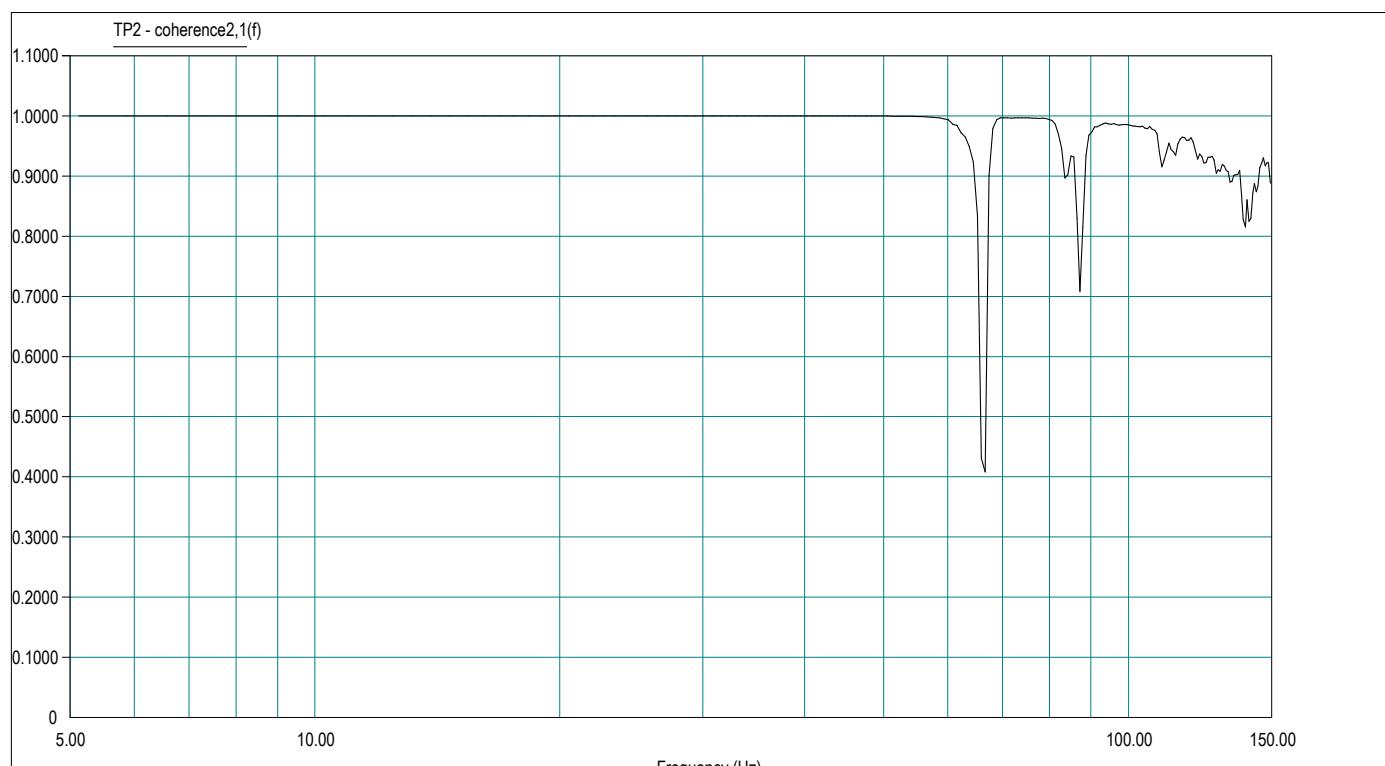
Pag. 65 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

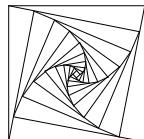
00:00:00

DOF: 154

dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:47 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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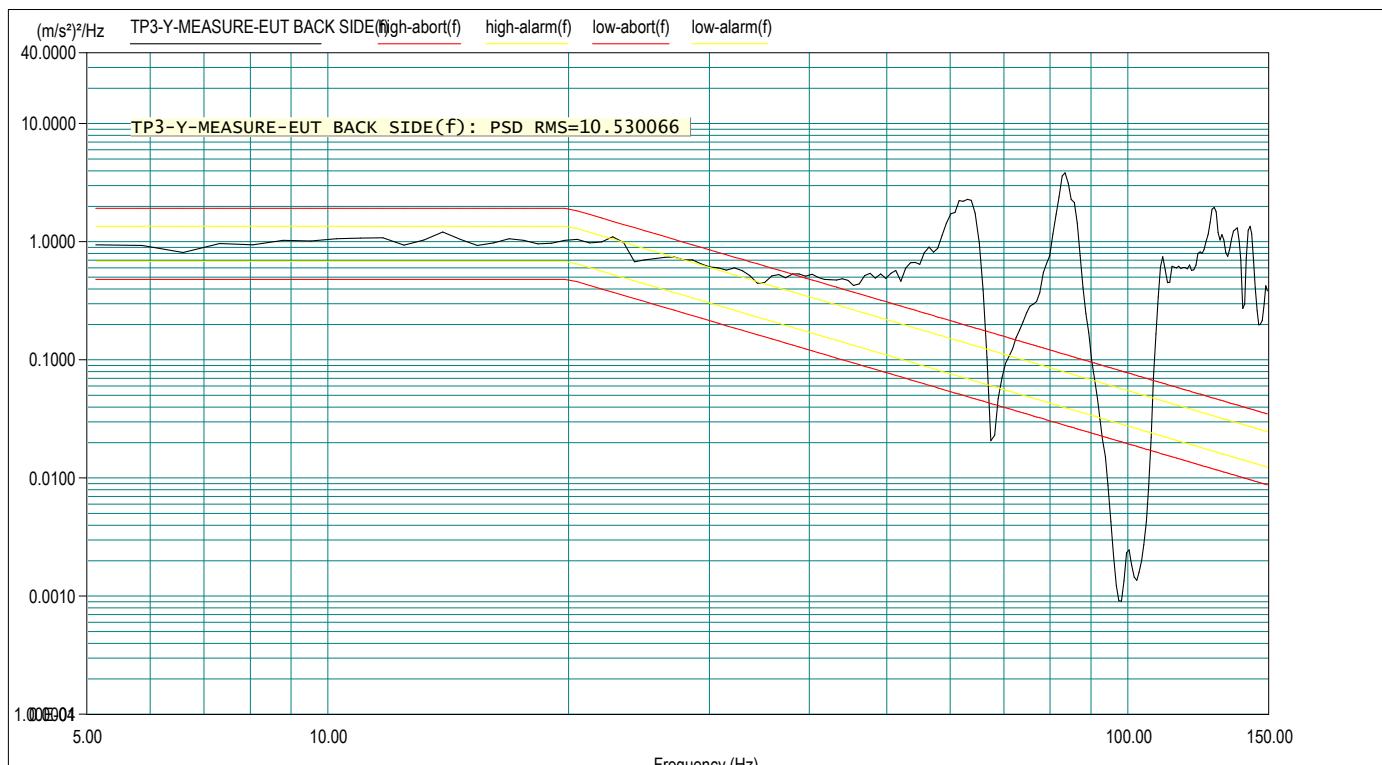
Pag. 66 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 04:59:59

Lines: 200 Frame Time:

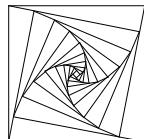
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:48 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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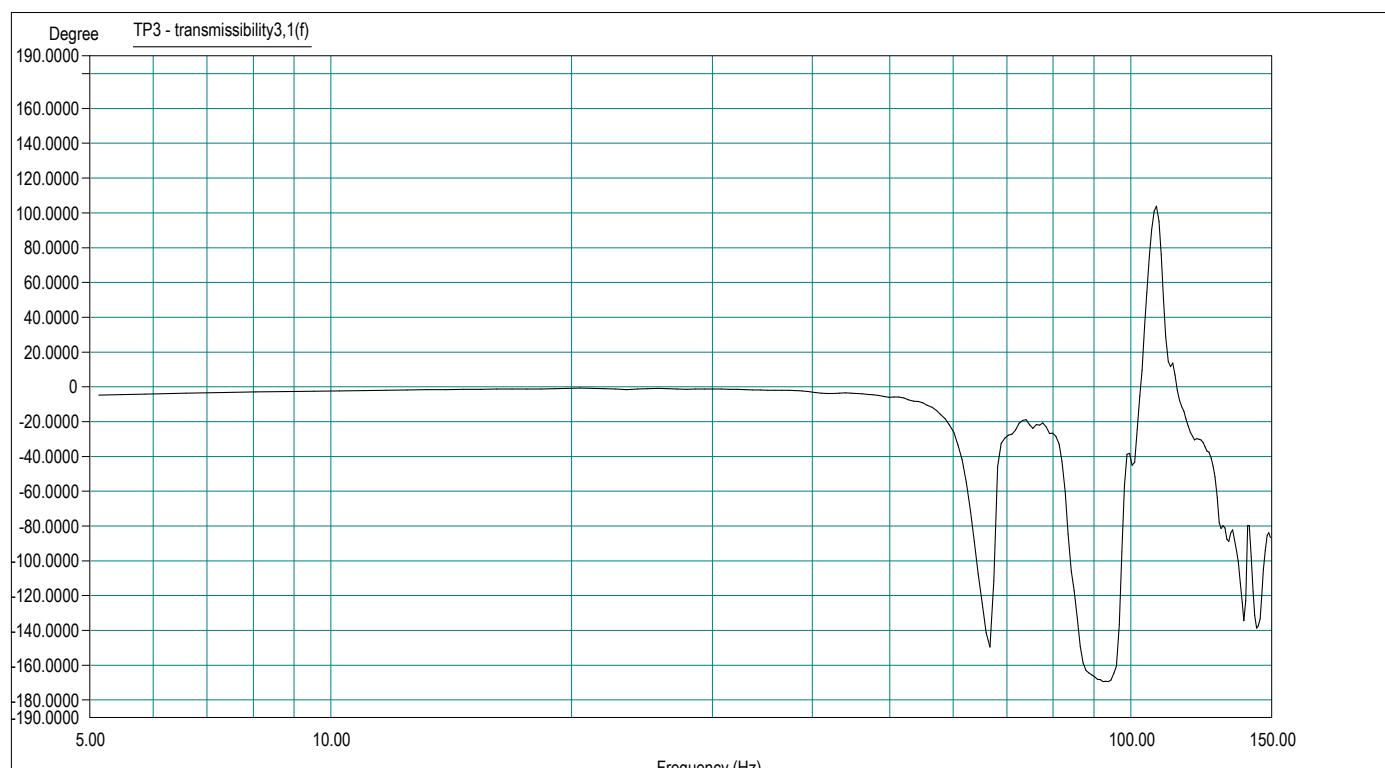
Pag. 67 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

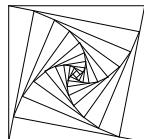
00:00:00

DOF: 154

dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:48 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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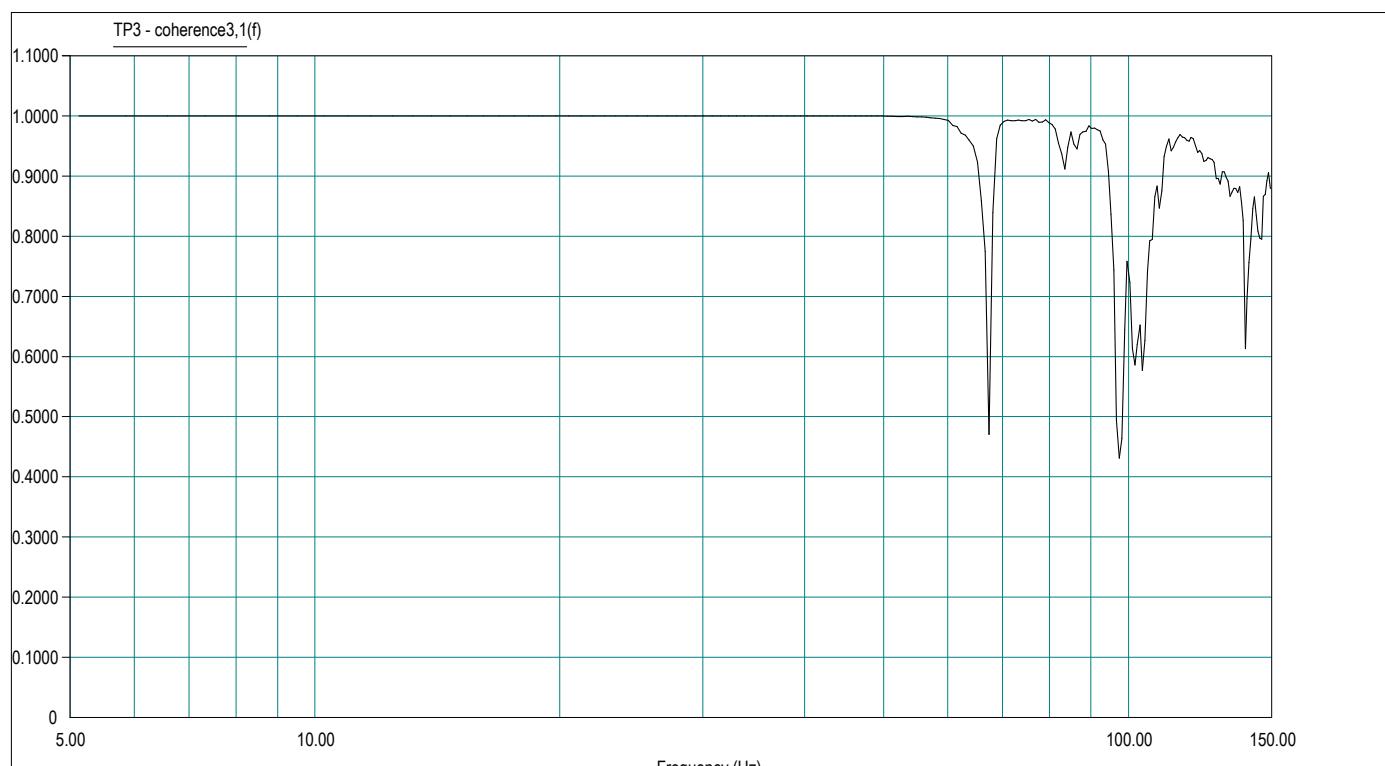
Pag. 68 di 117

Project File Name: TRANSVERSAL Y - ENDURANCE.prj

Profile Name: RUN 07 RANDOM ENDURANCE TEST ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 07 ENDURANCE Y Sep 22, 2015 09-48-38



Level: 0 dB

Control RMS: 5.616270 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

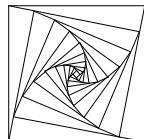
00:00:00

DOF: 154

dF:

Data saved at 02:50:40 PM, Tuesday, September 22, 2015

Report created at 02:50:49 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 69 di 117

## **ALLEGATO 2.3**

**EARTHING SWITCH E402A CAF**

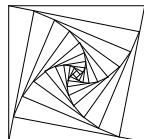
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE TRASVERSALE (Y)**

**SHOCK TEST - UP DIRECTION -**  
**PROFILO LONGITUDINALE**  
**(3 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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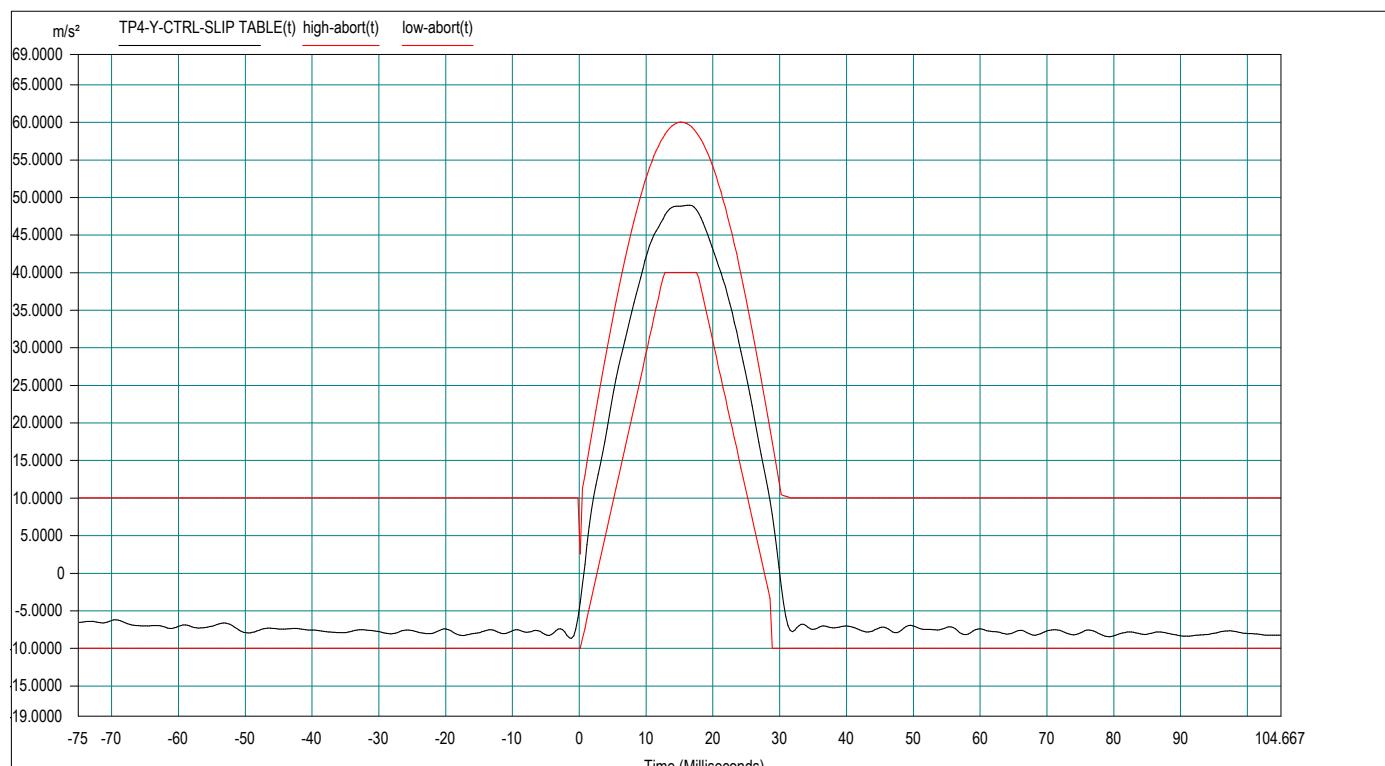
Pag. 70 di 117

Project File Name: TRANSVERSAL Y - SHOCK.prj

Profile Name: RUN 08 SHOCK TEST ON TRANSVERSAL (Y) - UP DIRECTION - PROFILO LONGITUDINALE

Test

Type: Classical Shock Run Folder: .\RUN 08 SHOCK Y - UP Sep 22, 2015 15-02-24



Level: 0 dB Block Size: 2048

Elapsed Pulses: 18

Frame Time: 0.682667 Seconds Control Peak: 48.963539 Control RMS: 8.750772 Full Level Elapsed Pulses:

3

dT: 0.000333 Seconds Demand Peak: 50.000000

Demand RMS: 8.770651 Remaining Pulses: 0

Pulse Type: Half Sine Amplitude: 50.000000

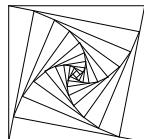
Pulse Width: 29.999999 ms

Data saved at 03:03:58 PM, Tuesday, September 22, 2015

Report created at 03:04:03 , martedì, settembre 22, 2015

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1

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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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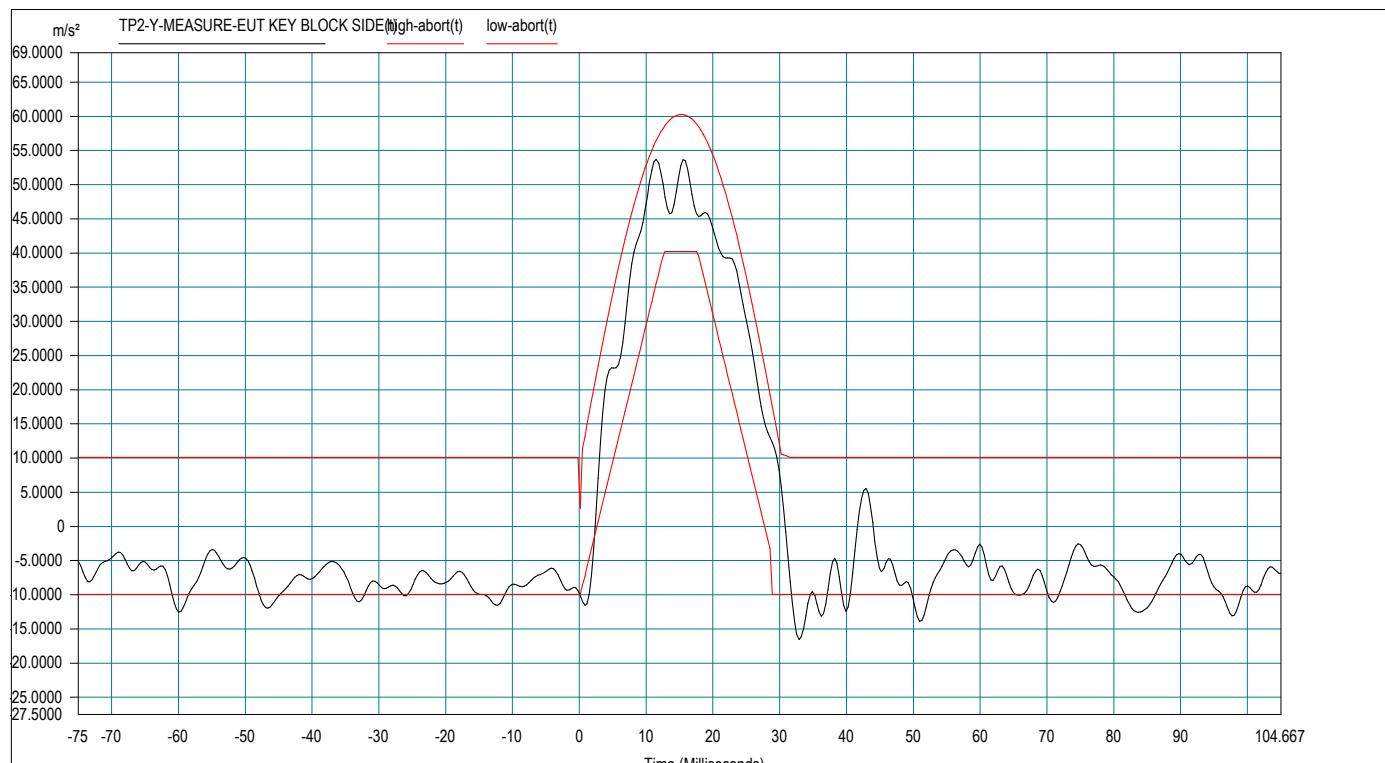
Pag. 71 di 117

Project File Name: TRANSVERSAL Y - SHOCK.prj

Profile Name: RUN 08 SHOCK TEST ON TRANSVERSAL (Y) - UP DIRECTION - PROFILO LONGITUDINALE

Test

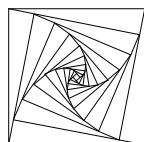
Type: Classical Shock Run Folder: .\RUN 08 SHOCK Y - UP Sep 22, 2015 15-02-24



Level: 0 dB Block Size: 2048 Elapsed Pulses: 18  
Frame Time: 0.682667 Seconds Control Peak: 48.963539 Control RMS: 8.750772 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms

Data saved at 03:03:58 PM, Tuesday, September 22, 2015

Report created at 03:04:04 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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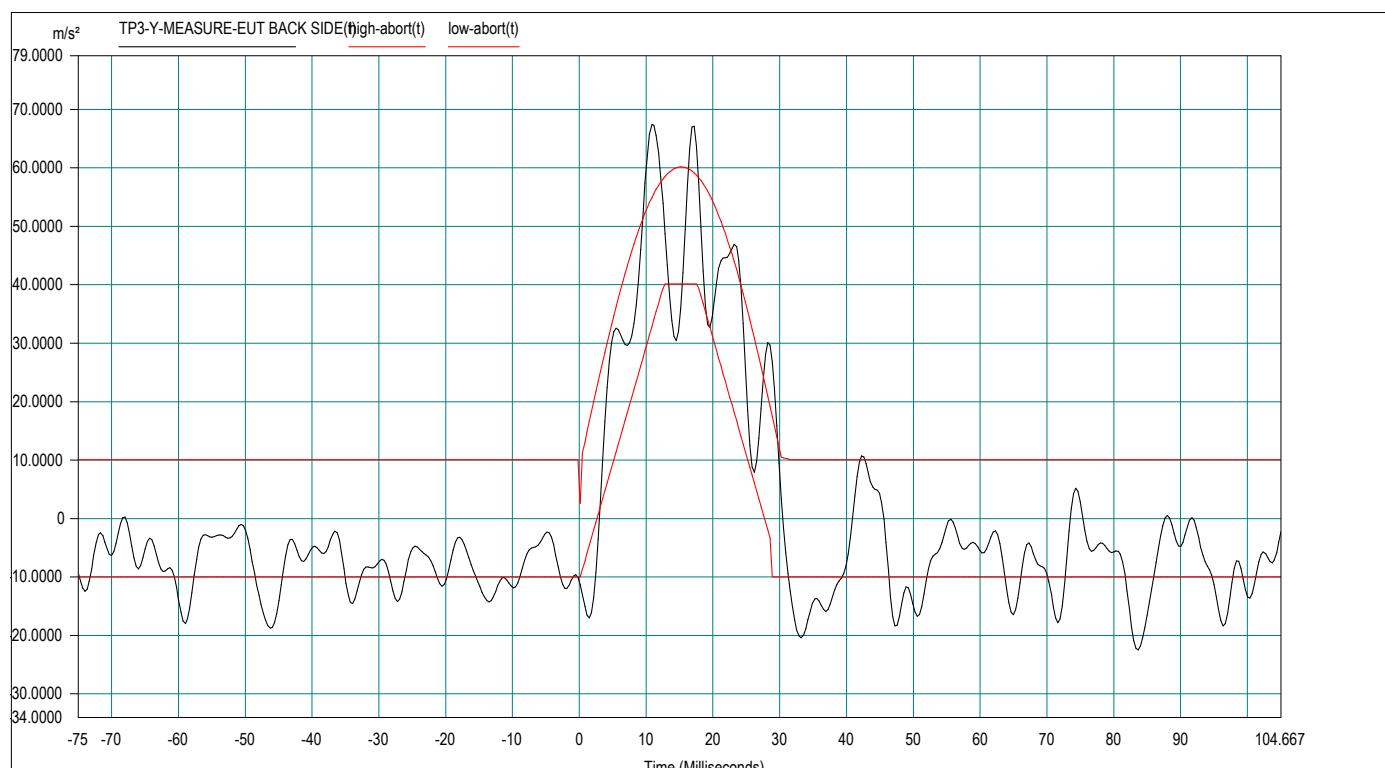
Pag. 72 di 117

Project File Name: TRANSVERSAL Y - SHOCK.prj

Profile Name: RUN 08 SHOCK TEST ON TRANSVERSAL (Y) - UP DIRECTION - PROFILO LONGITUDINALE

Test

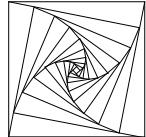
Type: Classical Shock Run Folder: .\RUN 08 SHOCK Y - UP Sep 22, 2015 15-02-24



Level: 0 dB Block Size: 2048 Elapsed Pulses: 18  
Frame Time: 0.682667 Seconds Control Peak: 48.963539 Control RMS: 8.750772 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms

Data saved at 03:03:58 PM, Tuesday, September 22, 2015

Report created at 03:04:04 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Pag. 73 di 117

## ALLEGATO 2.4

### EARTHING SWITCH E402A CAF

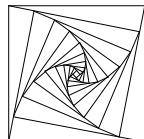
TYPE: D344640

S/N: A1506999

DWG N.: D344639

ASSE TRASVERSALE (Y)

SHOCK TEST - DOWN DIRECTION -  
PROFILO LONGITUDINALE  
(3 PLOTS)



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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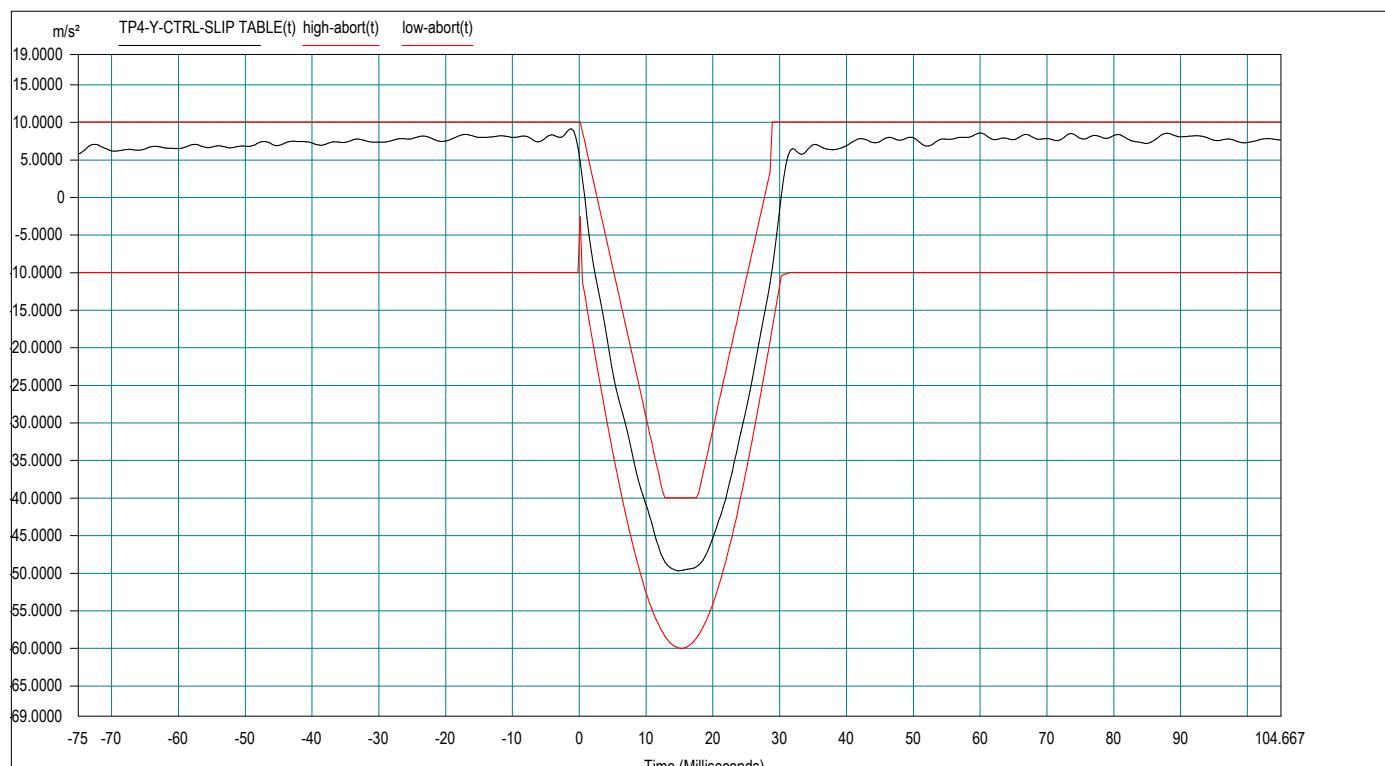
Pag. 74 di 117

Project File Name: TRANSVERSAL Y - SHOCK.prj

Profile Name: RUN 09 SHOCK TEST ON TRANSVERSAL (Y) - DOWN DIRECTION - PROFILO LONGITUDINALE

Test

Type: Classical Shock Run Folder: .\RUN 09 SHOCK Y - DOWN Sep 22, 2015 15-06-06



Level: 0 dB Block Size: 2048

Elapsed Pulses: 15

Frame Time: 0.682667 Seconds Control Peak: 49.674400

Control RMS: 8.814052 Full Level Elapsed Pulses:

3

dT: 0.000333 Seconds Demand Peak: 50.000000

Demand RMS: 8.770651 Remaining Pulses: 0

Pulse Type: Half Sine Amplitude: 50.000000

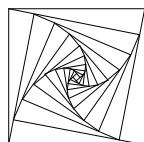
Pulse Width: 29.999999 ms

Data saved at 03:07:24 PM, Tuesday, September 22, 2015

Report created at 03:07:25 , martedì, settembre 22, 2015

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

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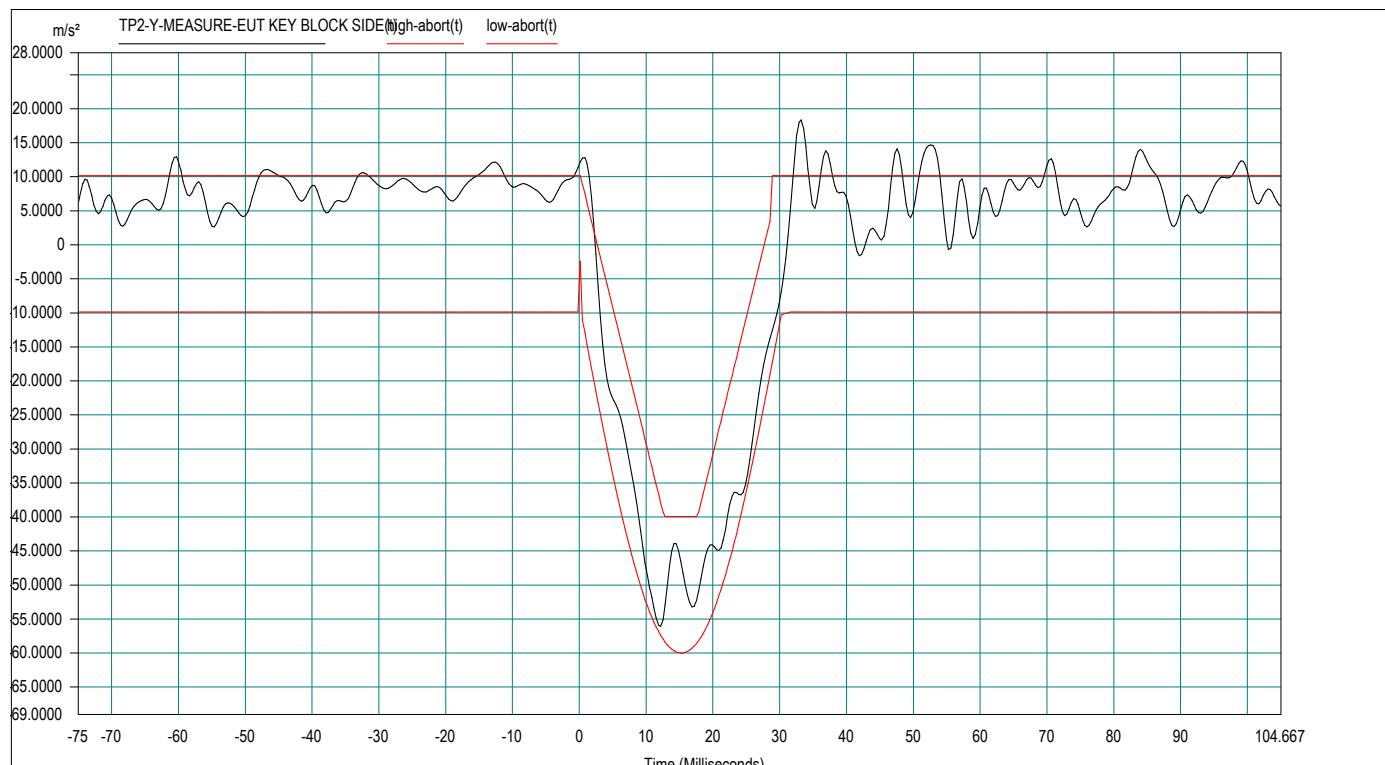
Pag. 75 di 117

Project File Name: TRANSVERSAL Y - SHOCK.prj

Profile Name: RUN 09 SHOCK TEST ON TRANSVERSAL (Y) - DOWN DIRECTION - PROFILO LONGITUDINALE

Test

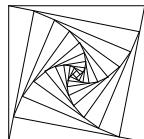
Type: Classical Shock Run Folder: .\RUN 09 SHOCK Y - DOWN Sep 22, 2015 15-06-06



Level: 0 dB Block Size: 2048 Elapsed Pulses: 15  
Frame Time: 0.682667 Seconds Control Peak: 49.674400 Control RMS: 8.814052 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms

Data saved at 03:07:24 PM, Tuesday, September 22, 2015

Report created at 03:07:26 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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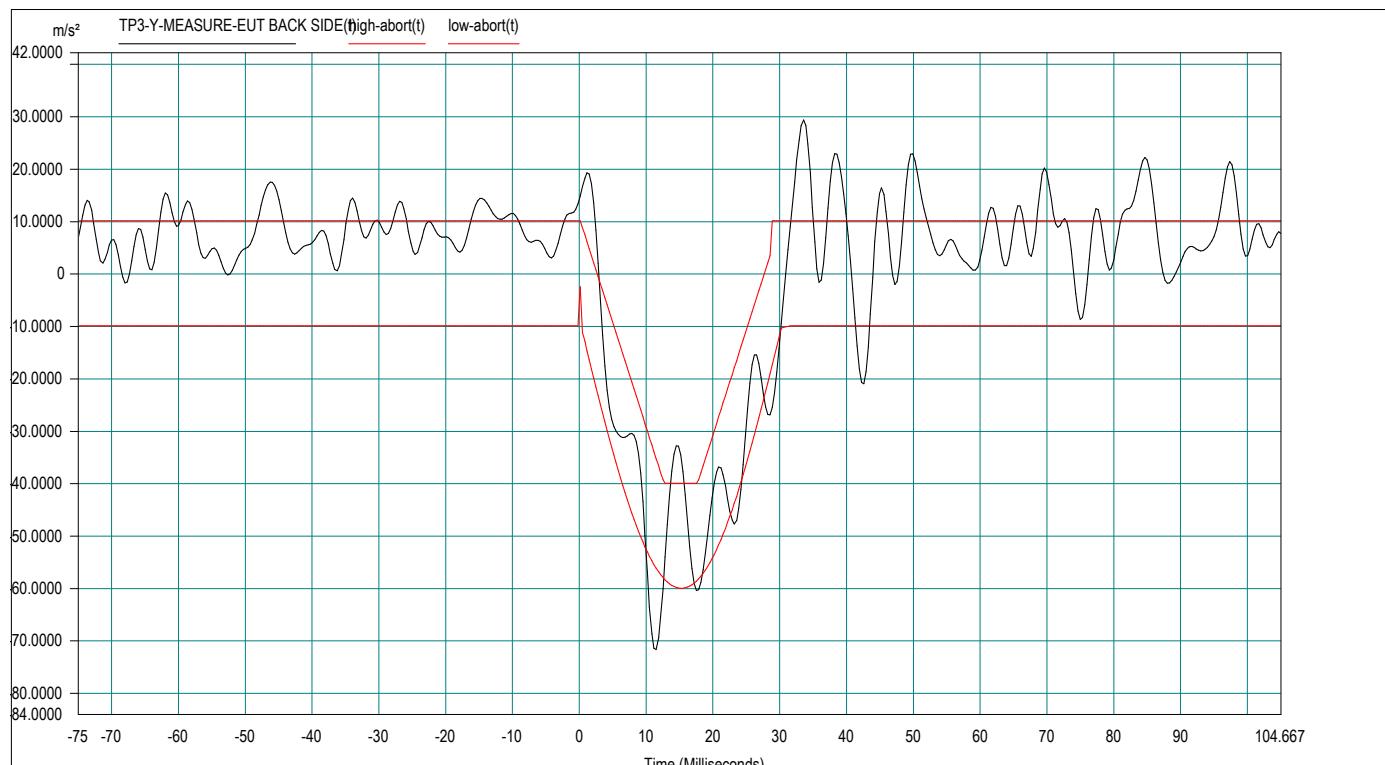
Pag. 76 di 117

Project File Name: TRANSVERSAL Y - SHOCK.prj

Profile Name: RUN 09 SHOCK TEST ON TRANSVERSAL (Y) - DOWN DIRECTION - PROFILO LONGITUDINALE

Test

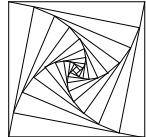
Type: Classical Shock Run Folder: .\RUN 09 SHOCK Y - DOWN Sep 22, 2015 15-06-06



Level:	0 dB	Block Size:	2048	Elapsed Pulses:	15
Frame Time:	0.682667 Seconds	Control Peak:	49.674400	Control RMS:	8.814052 Full Level Elapsed Pulses:
dT:	0.000333 Seconds	Demand Peak:	50.000000	Demand RMS:	8.770651 Remaining Pulses: 0
Pulse Type:	Half Sine	Amplitude:	50.000000	Pulse Width:	29.999999 ms

Data saved at 03:07:24 PM, Tuesday, September 22, 2015

Report created at 03:07:26 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Pag. 77 di 117

## **ALLEGATO 2.5**

**EARTHING SWITCH E402A CAF**

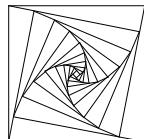
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE TRASVERSALE (Y)**

**FINAL MEASUREMENTS - PROFILO**  
**ENDURANCE VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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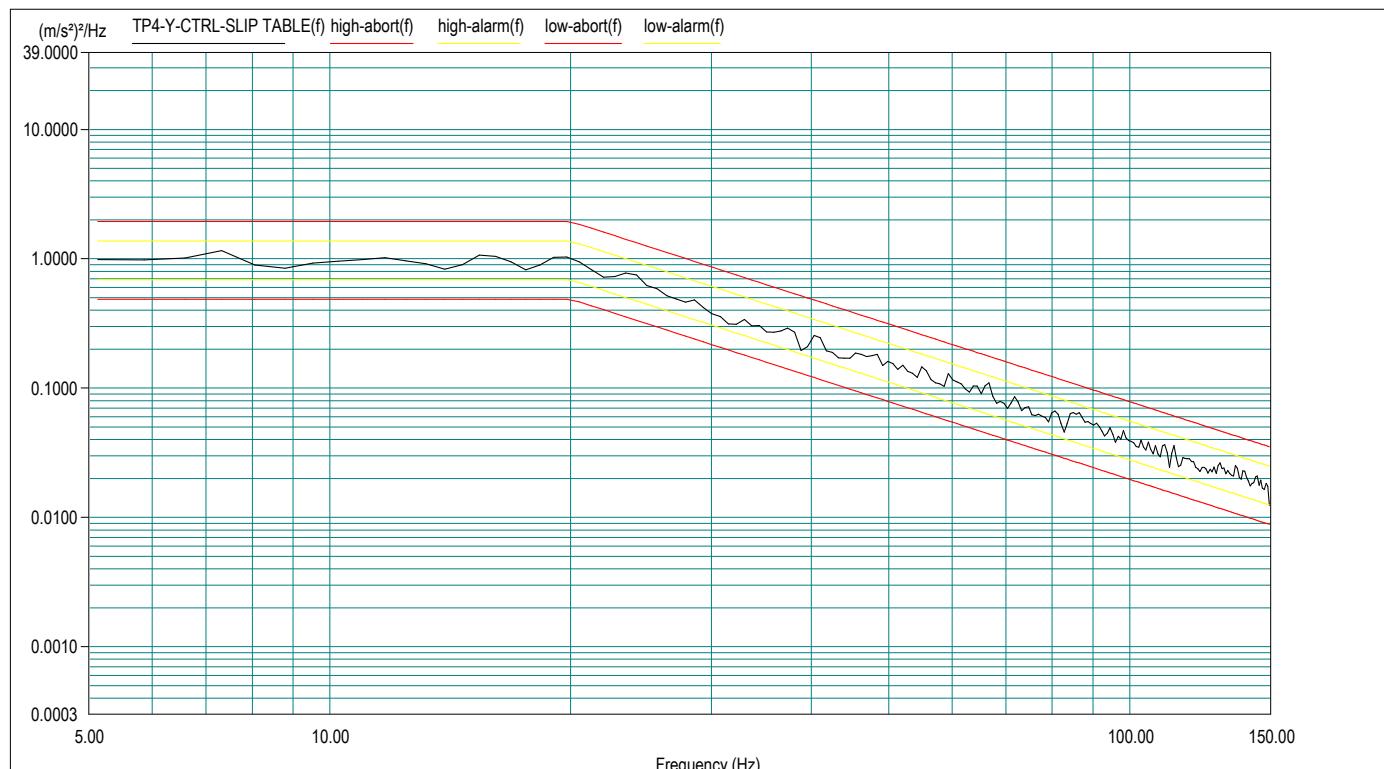
Rev. 0

Pag. 78 di 117

Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj

Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02

Test Type:



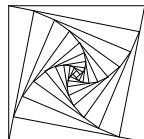
Level: 0 dB

Control RMS: 5.602522 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:35 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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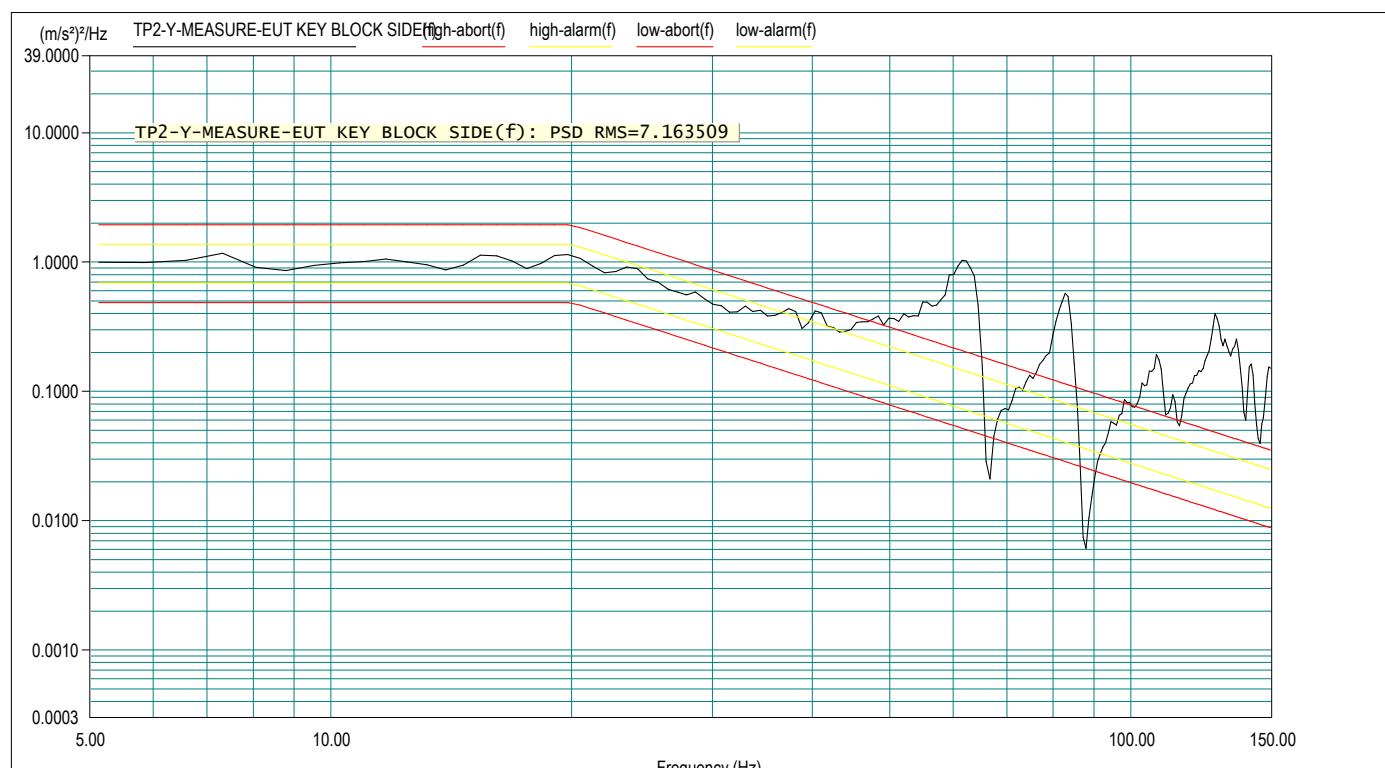
Rev. 0

Pag. 79 di 117

Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj

Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02

Test Type:



Level: 0 dB

Control RMS: 5.602522 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

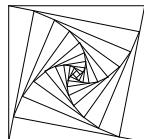
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:35 , martedì, settembre 22, 2015



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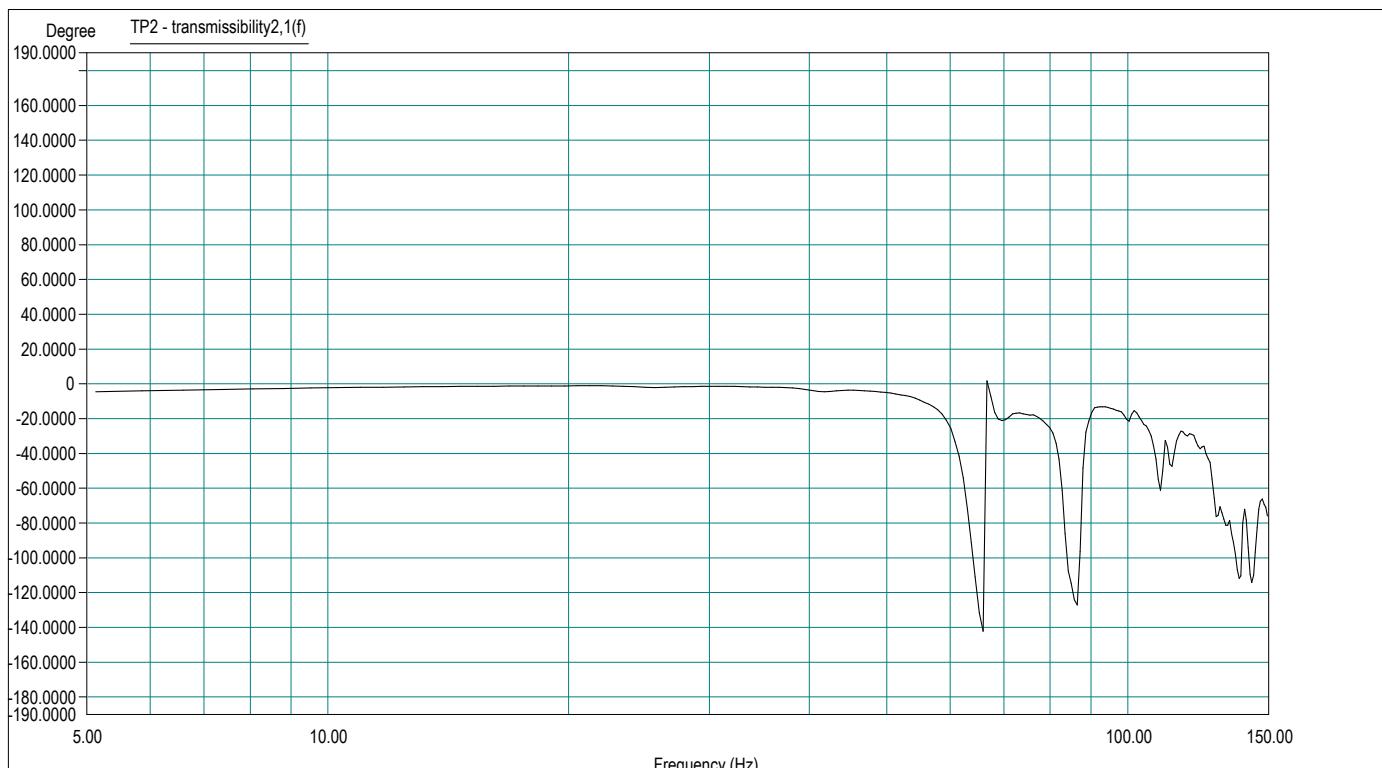
**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 80 di 117

Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj  
Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE Test Type:  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02



Level: 0 dB

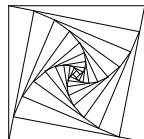
Control RMS: 5.602522 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:35 , martedì, settembre 22, 2015



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**RELAZIONE SU TEST MECCANICI**  
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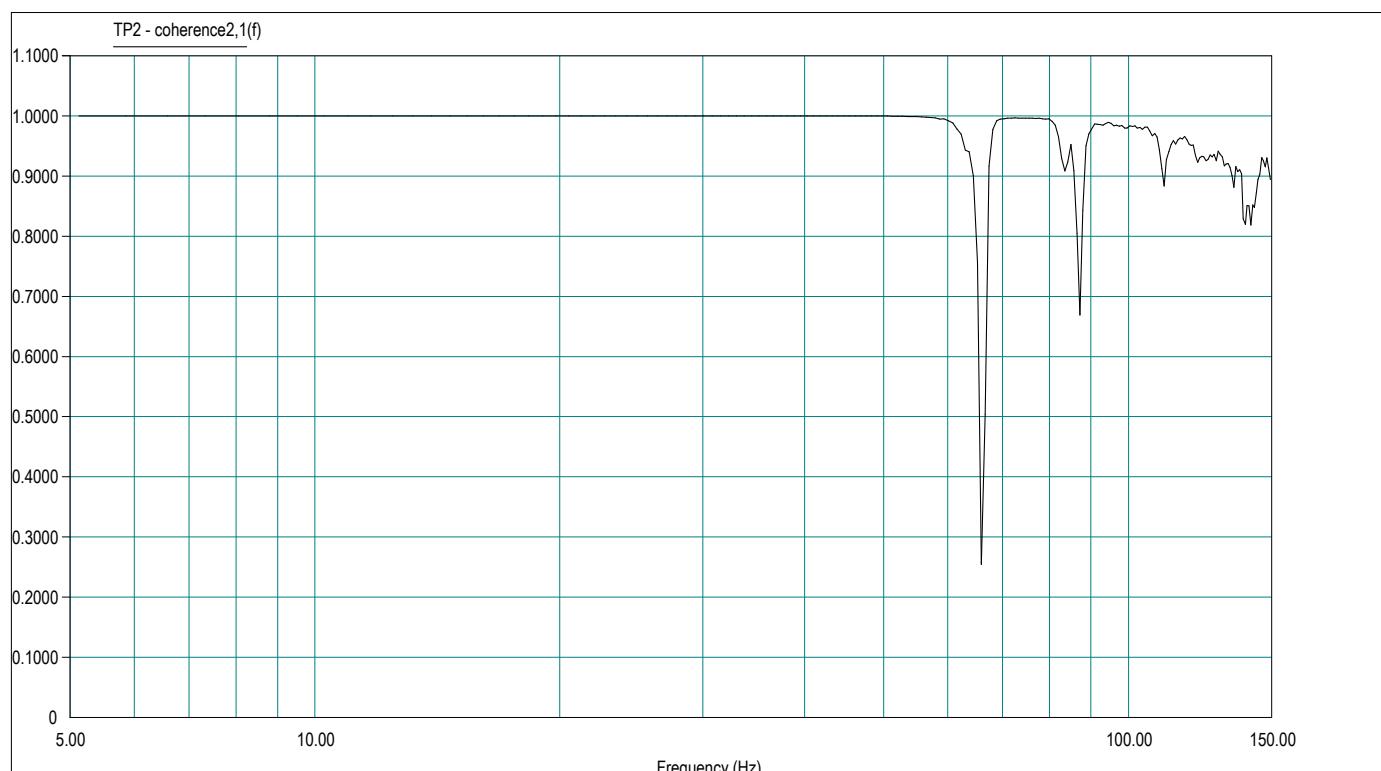
Rev. 0

Pag. 81 di 117

Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj

Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02

Test Type:



Level: 0 dB

Control RMS: 5.602522 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

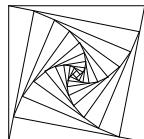
00:00:00

DOF: 154

dF:

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:35 , martedì, settembre 22, 2015



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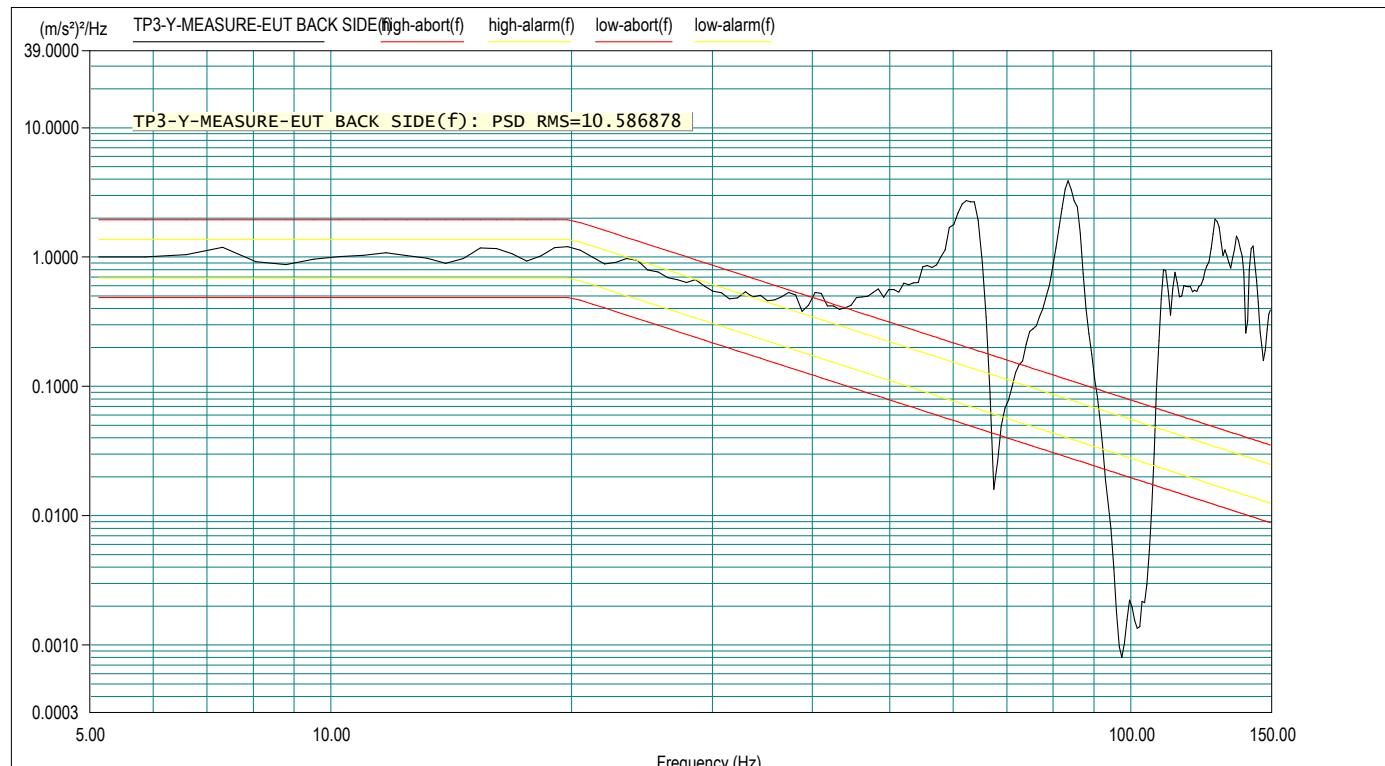
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**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 82 di 117

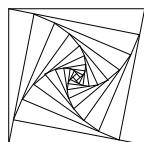
Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj  
Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02  
Test Type:



Level: 0 dB  
Control RMS: 5.602522 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:36 , martedì, settembre 22, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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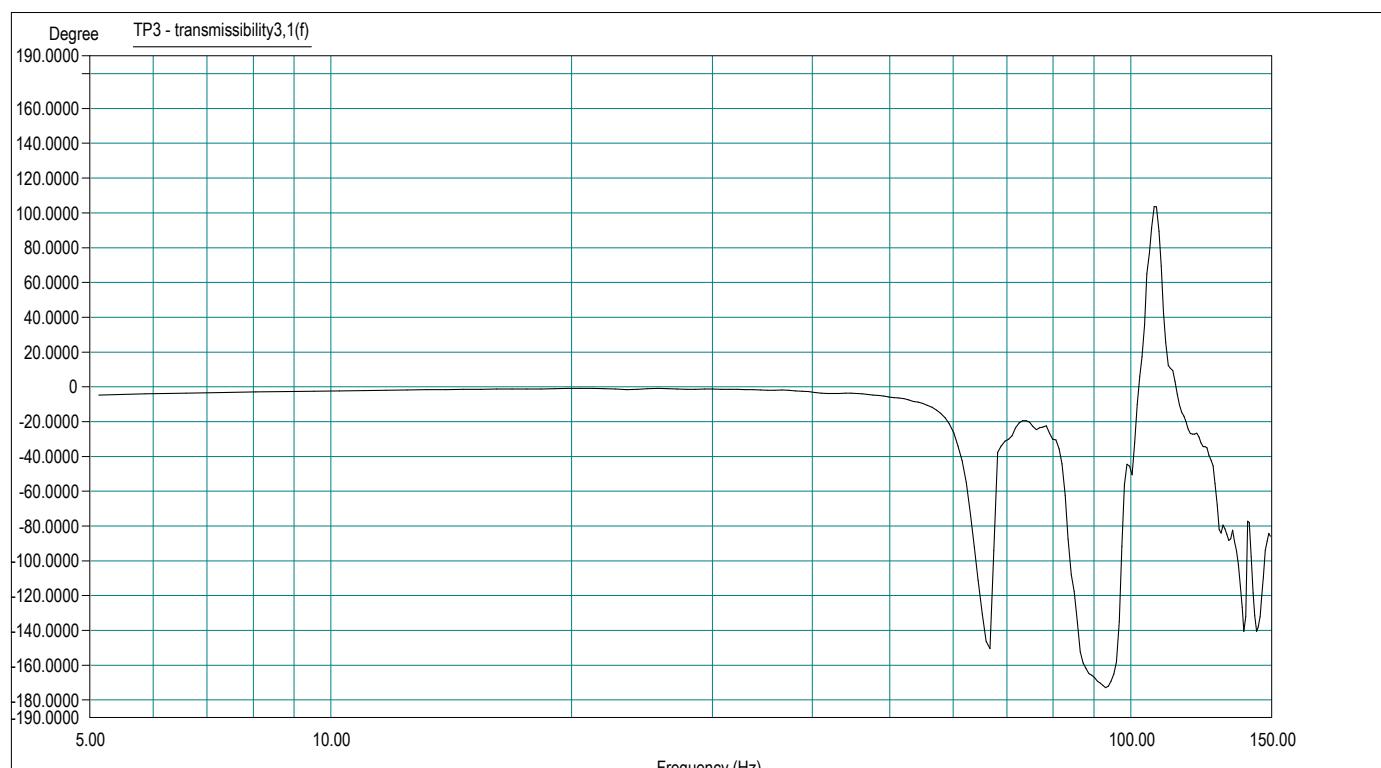
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Pag. 83 di 117

Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj

Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02

Test Type:



Level: 0 dB

Control RMS: 5.602522 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

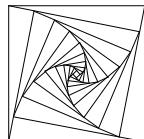
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:36 , martedì, settembre 22, 2015



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**RELAZIONE SU TEST MECCANICI**  
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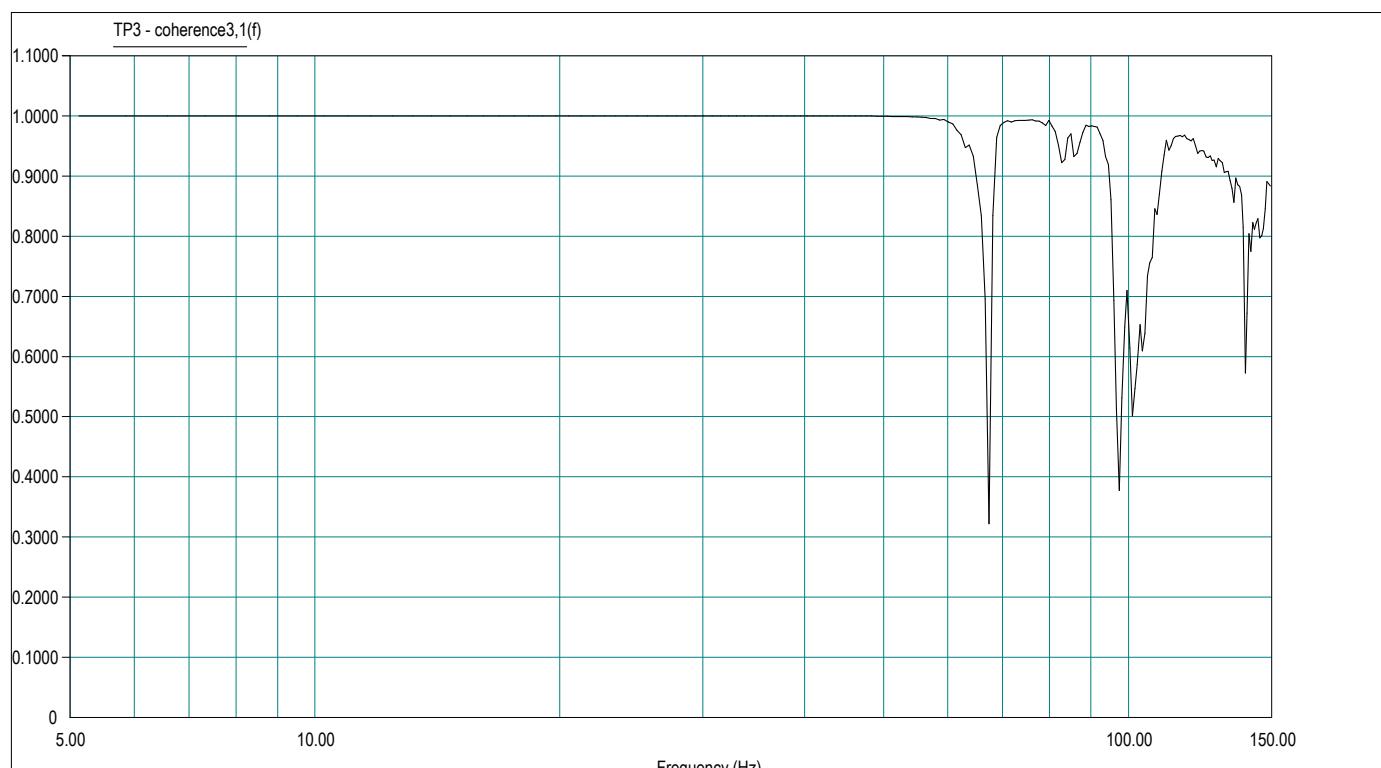
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Pag. 84 di 117

Project File Name: TRANSVERSAL Y - FINAL MEASURE.prj

Profile Name: RUN 10 FINAL MEASURE ON ASSE TRASVERSALE (Y) - PROFILO VERTICALE  
Random Run Folder: .\RUN 10 F.M. - Y Sep 22, 2015 15-10-02

Test Type:



Level: 0 dB

Control RMS: 5.602522 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time:

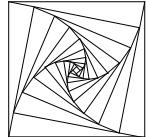
00:00:00

DOF: 154

dF:

Data saved at 03:13:33 PM, Tuesday, September 22, 2015

Report created at 03:13:36 , martedì, settembre 22, 2015



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**RELAZIONE SU TEST MECCANICI**  
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Pag. 85 di 117

## ALLEGATO 3.1

**EARTHING SWITCH E402A CAF**

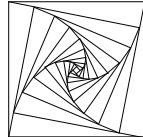
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE LONGITUDINALE (X)**

**INITIAL MEASUREMENTS - PROFILO**  
**ENDURANCE VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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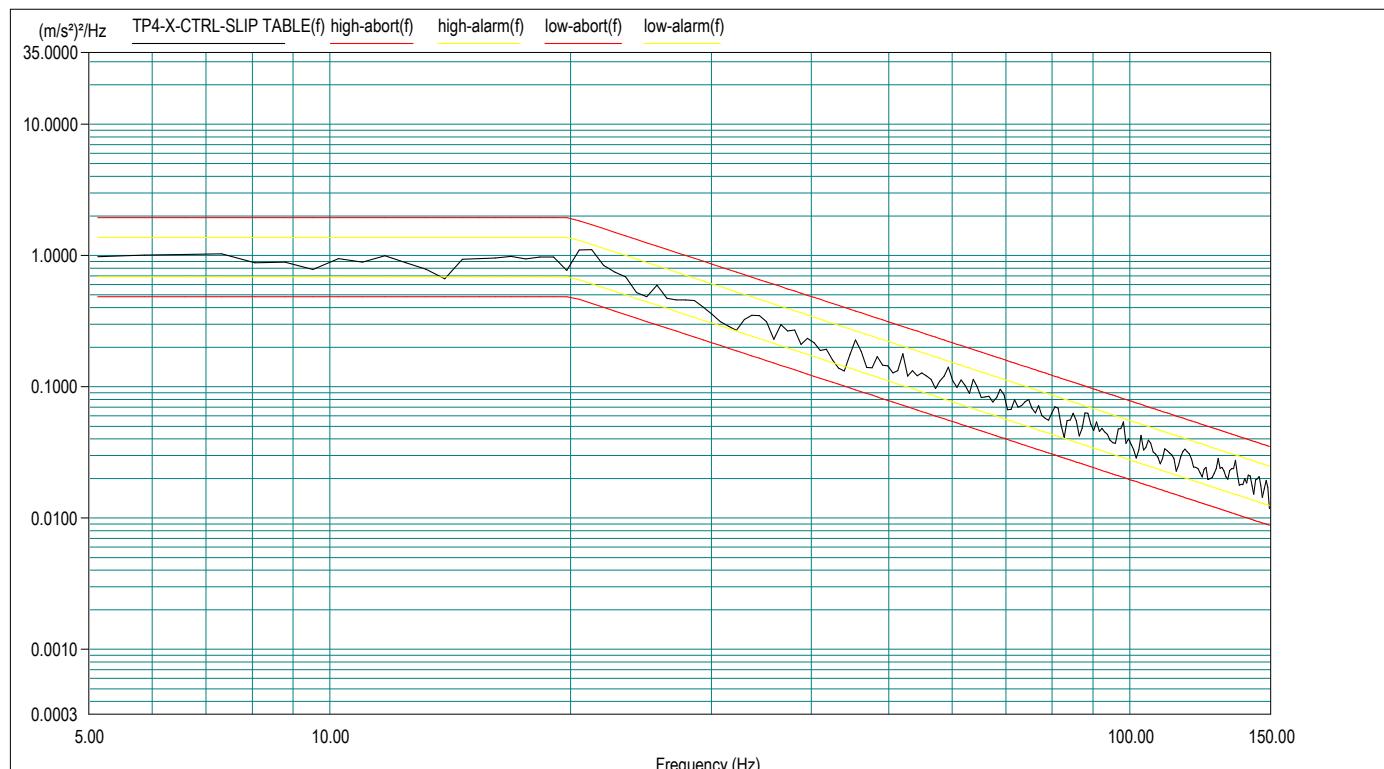
Rev. 0

Pag. 86 di 117

Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj

Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 11 I.M. - X Sep 23, 2015 09-09-06

Test Type:



Level: 0 dB

Control RMS: 5.518383 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:

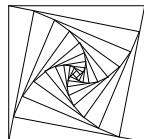
0.732422 Hz

Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:05 , mercoledì, settembre 23, 2015

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 87 di 117

Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj

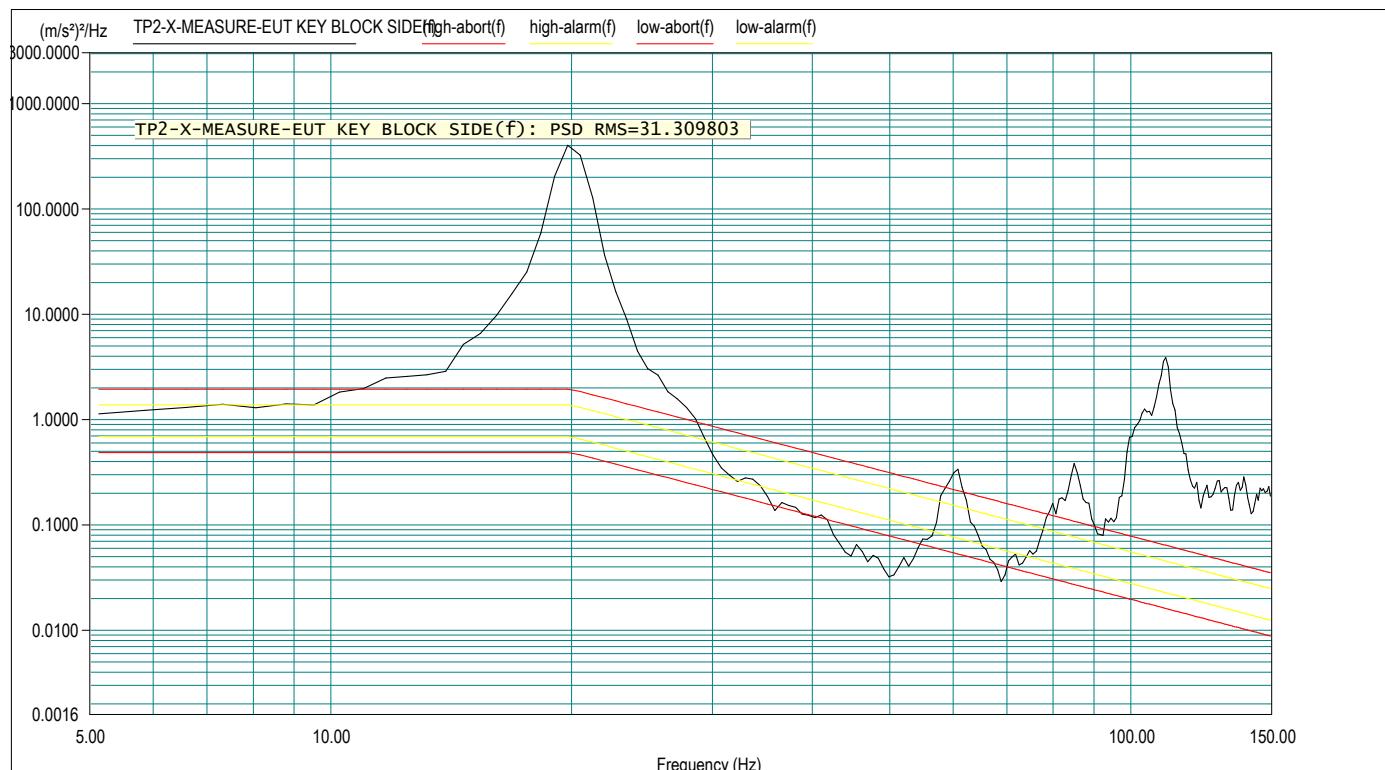
Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test Type:

Random

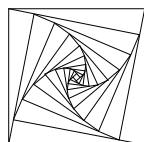
Run Folder:

.\\RUN 11 I.M. - X Sep 23, 2015 09-09-06



Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:05 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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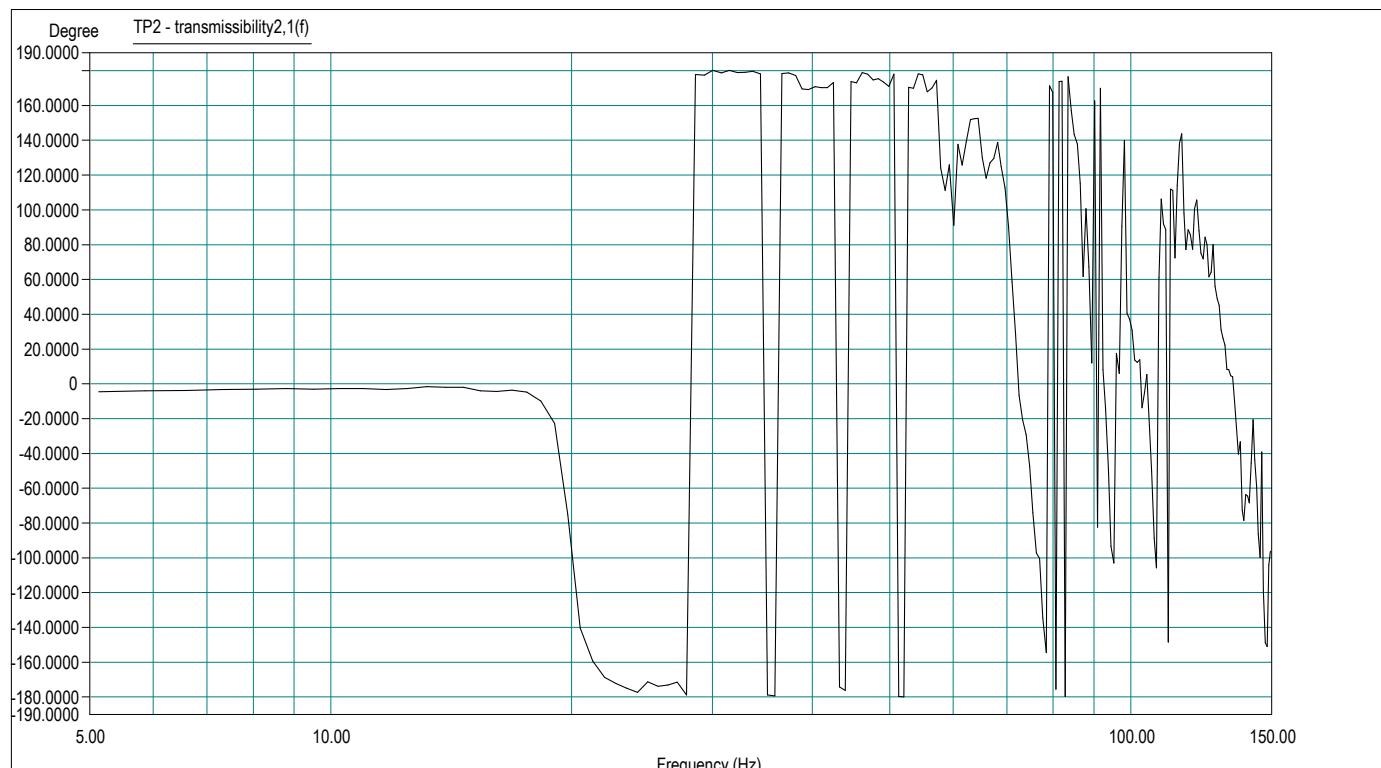
Rev. 0

Pag. 88 di 117

Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj

Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 11 I.M. - X Sep 23, 2015 09-09-06

Test Type:



Level: 0 dB

Control RMS: 5.518383 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

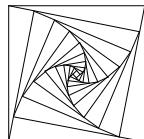
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:05 , mercoledì, settembre 23, 2015



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Tel. 0255305888  
E-mail info@ctecnica.it www.ctecnica.it  
Partita I.V.A. / Cod. Fiscale 04703330961

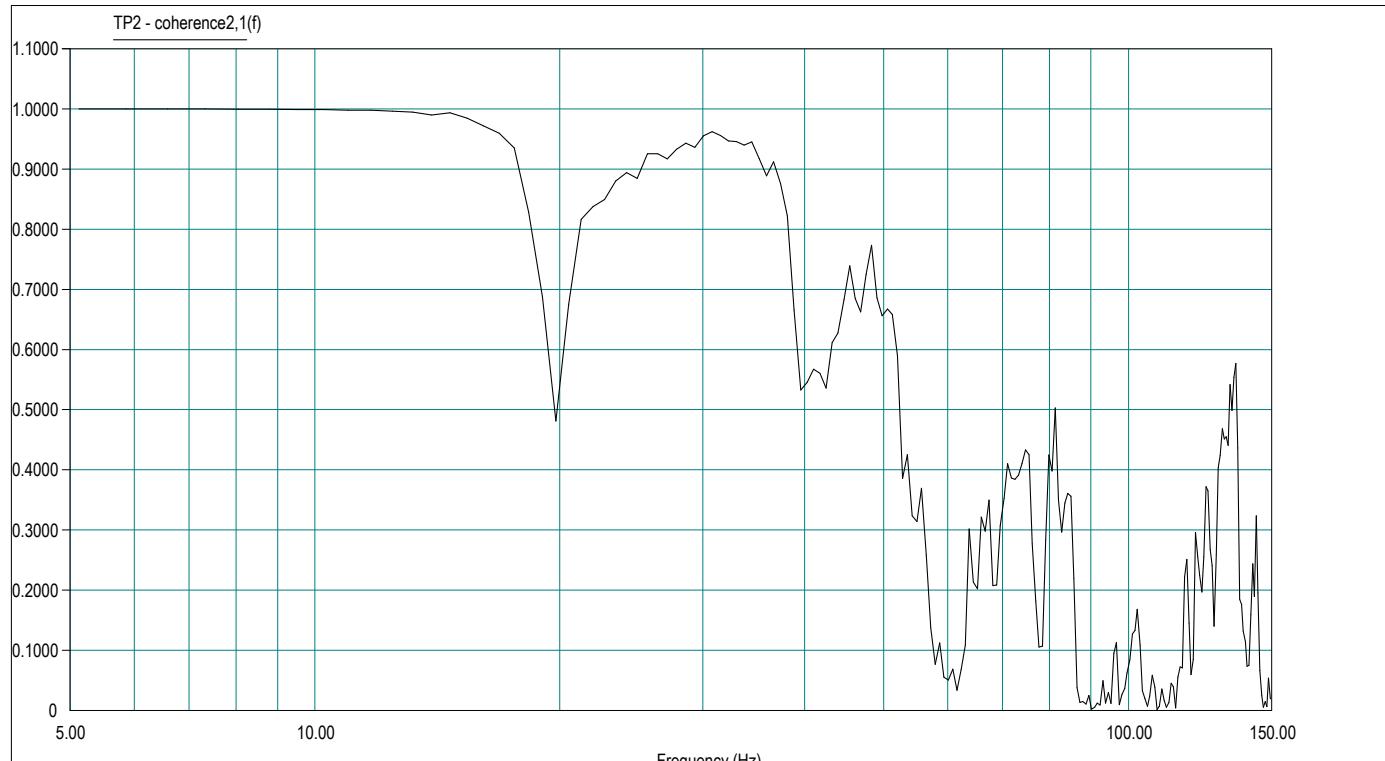
**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

Documento: VR1527001SPMA-ITA.doc

Rev. 0

Pag. 89 di 117

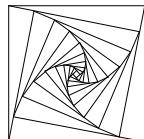
Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj  
Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE Test Type:  
Random Run Folder: .\RUN 11 I.M. - X Sep 23, 2015 09-09-06



Level: 0 dB  
Control RMS: 5.518383 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:06 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 90 di 117

Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj

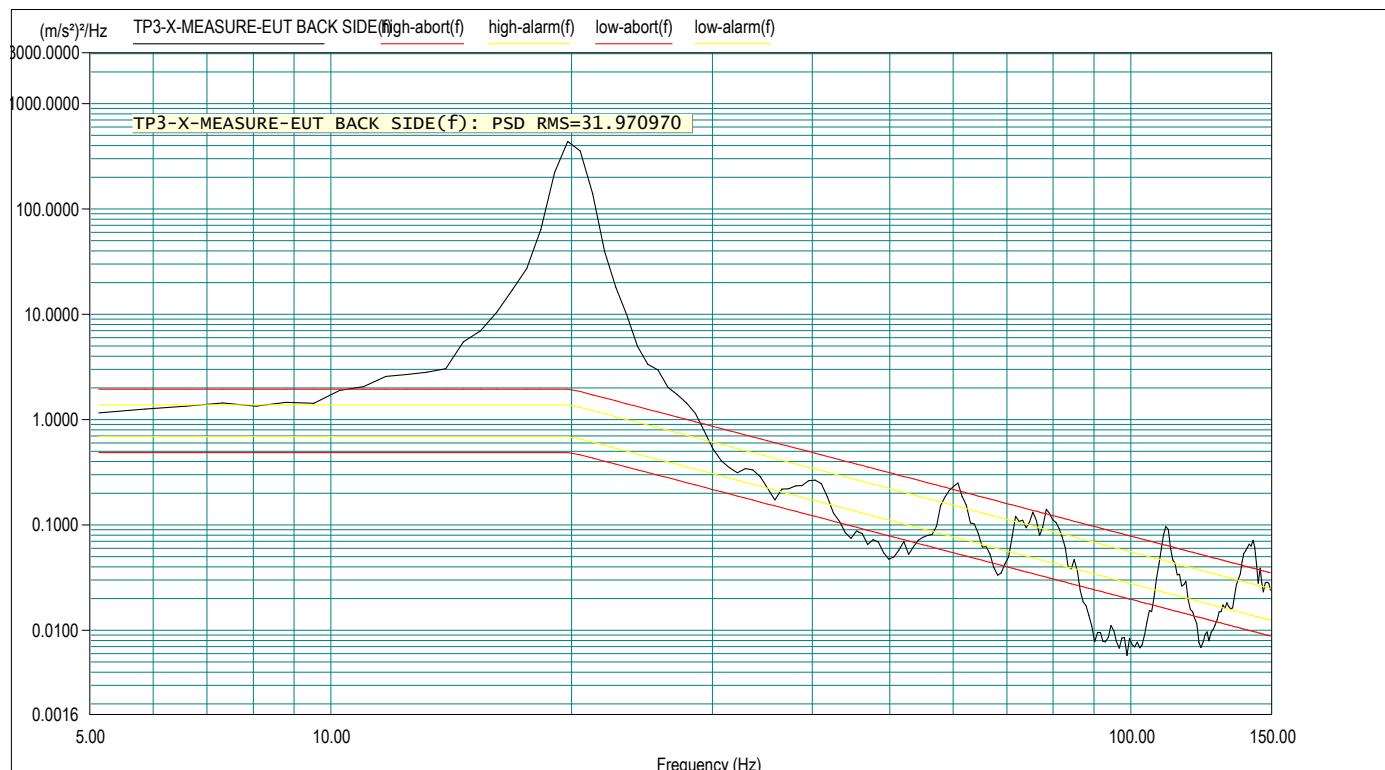
Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test Type:

Random

Run Folder:

.\\RUN 11 I.M. - X Sep 23, 2015 09-09-06



Level: 0 dB

Control RMS: 5.518383 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

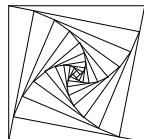
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:06 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
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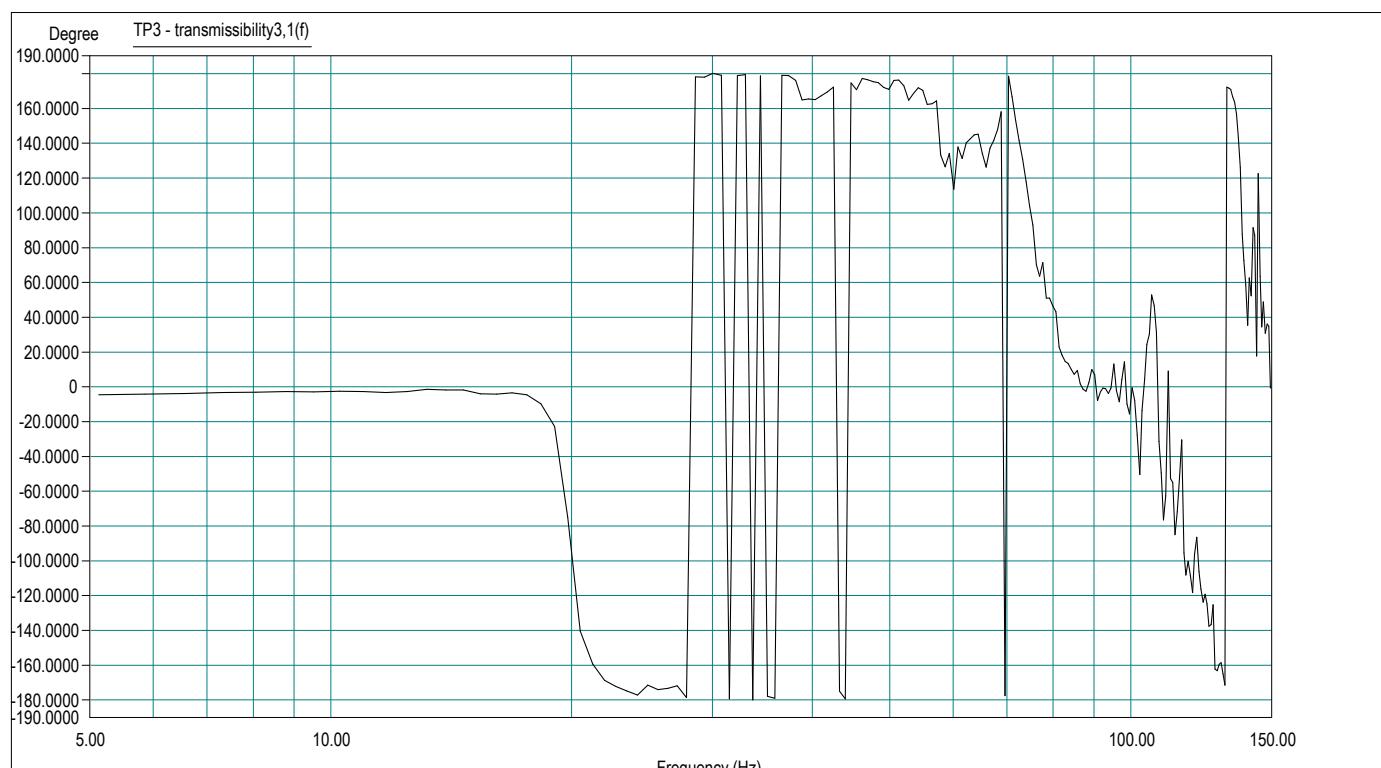
Rev. 0

Pag. 91 di 117

Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj

Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 11 I.M. - X Sep 23, 2015 09-09-06

Test Type:



Level: 0 dB

Control RMS: 5.518383 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

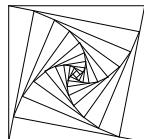
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:06 , mercoledì, settembre 23, 2015



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Rev. 0

Pag. 92 di 117

Project File Name: LONGITUDINAL X - INITIAL MEASURE.prj

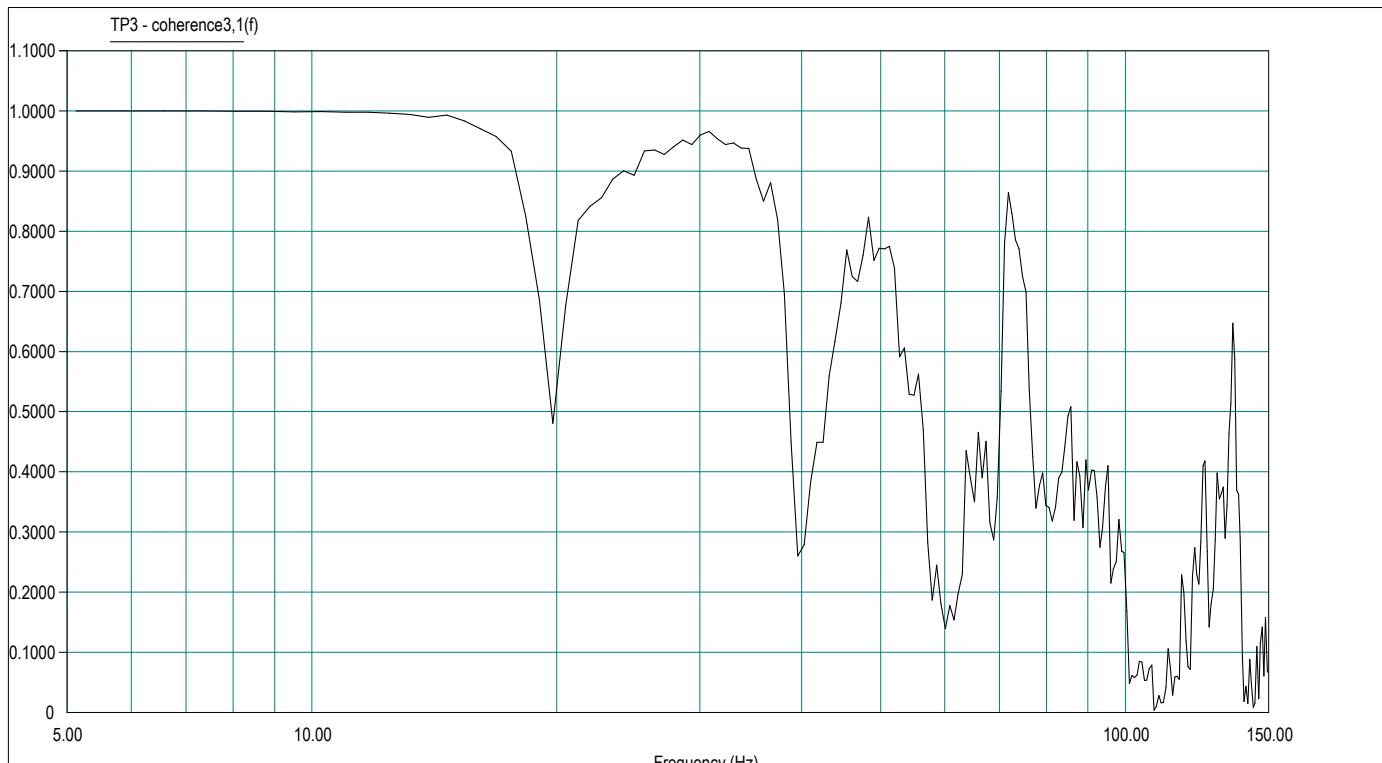
Profile Name: RUN 11 INITIAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test Type:

Random

Run Folder:

.\RUN 11 I.M. - X Sep 23, 2015 09-09-06



Level: 0 dB

Control RMS: 5.518383 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

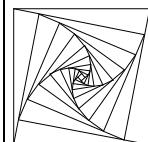
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 09:13:01 AM, Wednesday, September 23, 2015

Report created at 09:13:07 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Rev. 0

Pag. 93 di 117

## **ALLEGATO 3.2**

### **EARTHING SWITCH E402A CAF**

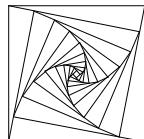
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE LONGITUDINALE (X)**

**ENDURANCE TEST - PROFILO**  
**VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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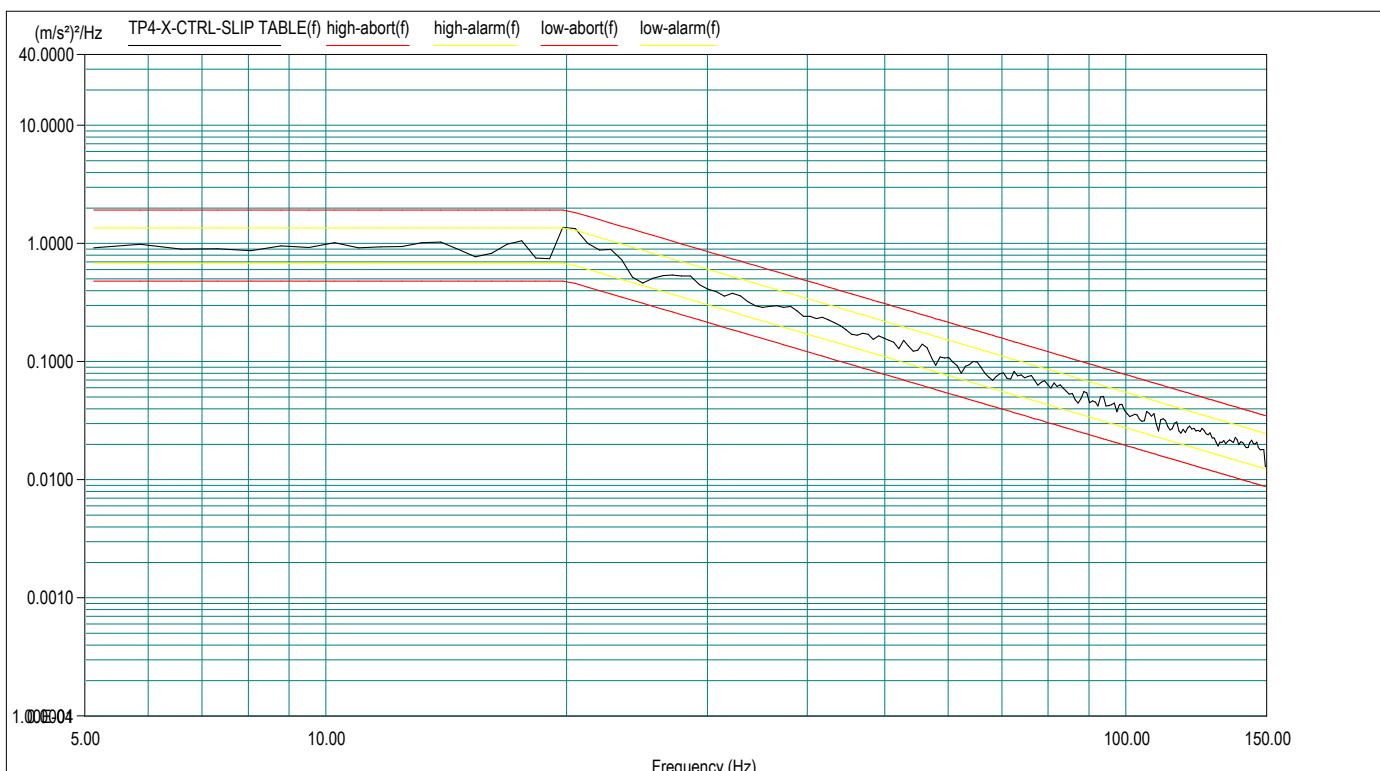
Pag. 94 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

Control RMS: 5.653069 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:

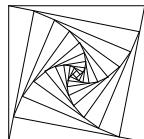
0.732422 Hz

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:15 , mercoledì, settembre 23, 2015

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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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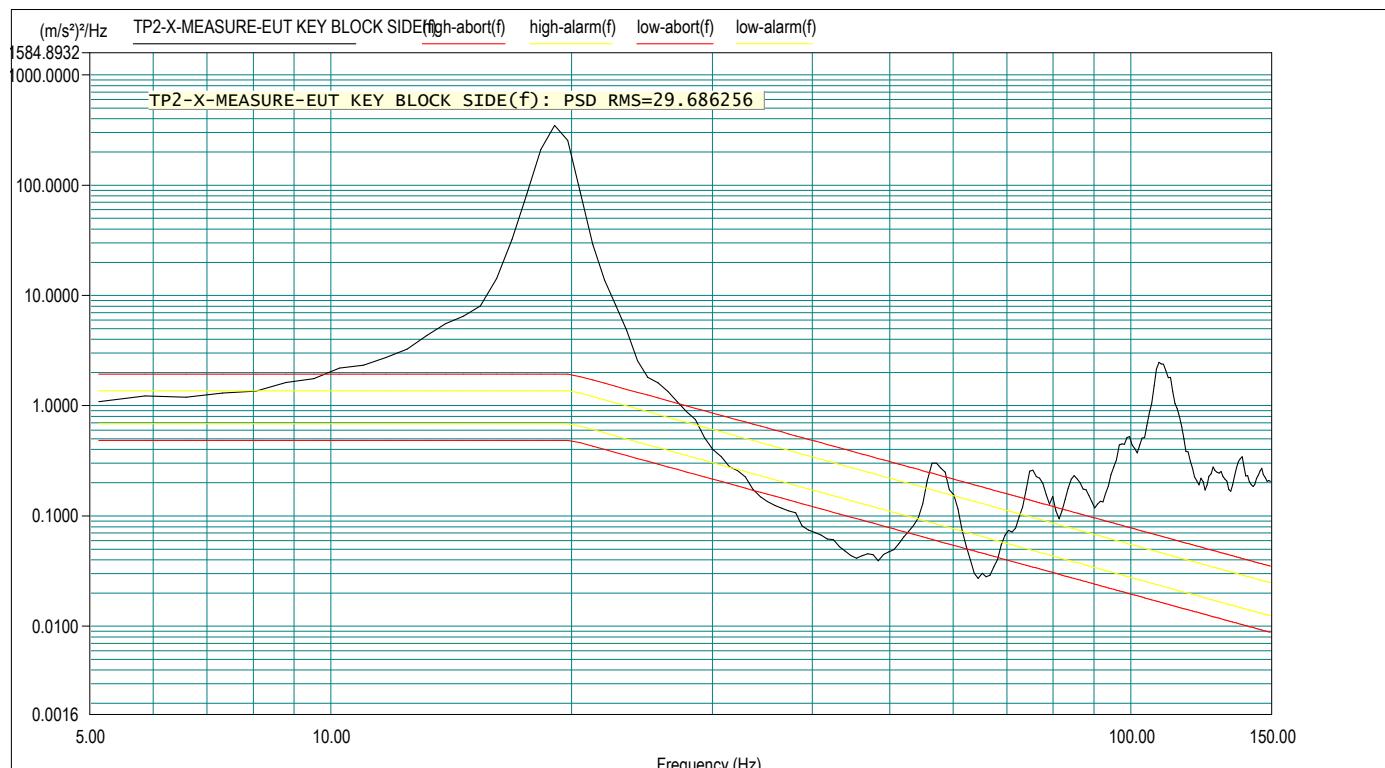
Pag. 95 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

Control RMS: 5.653069 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 04:59:59

Lines: 200 Frame Time:

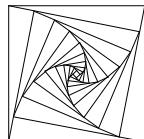
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:15 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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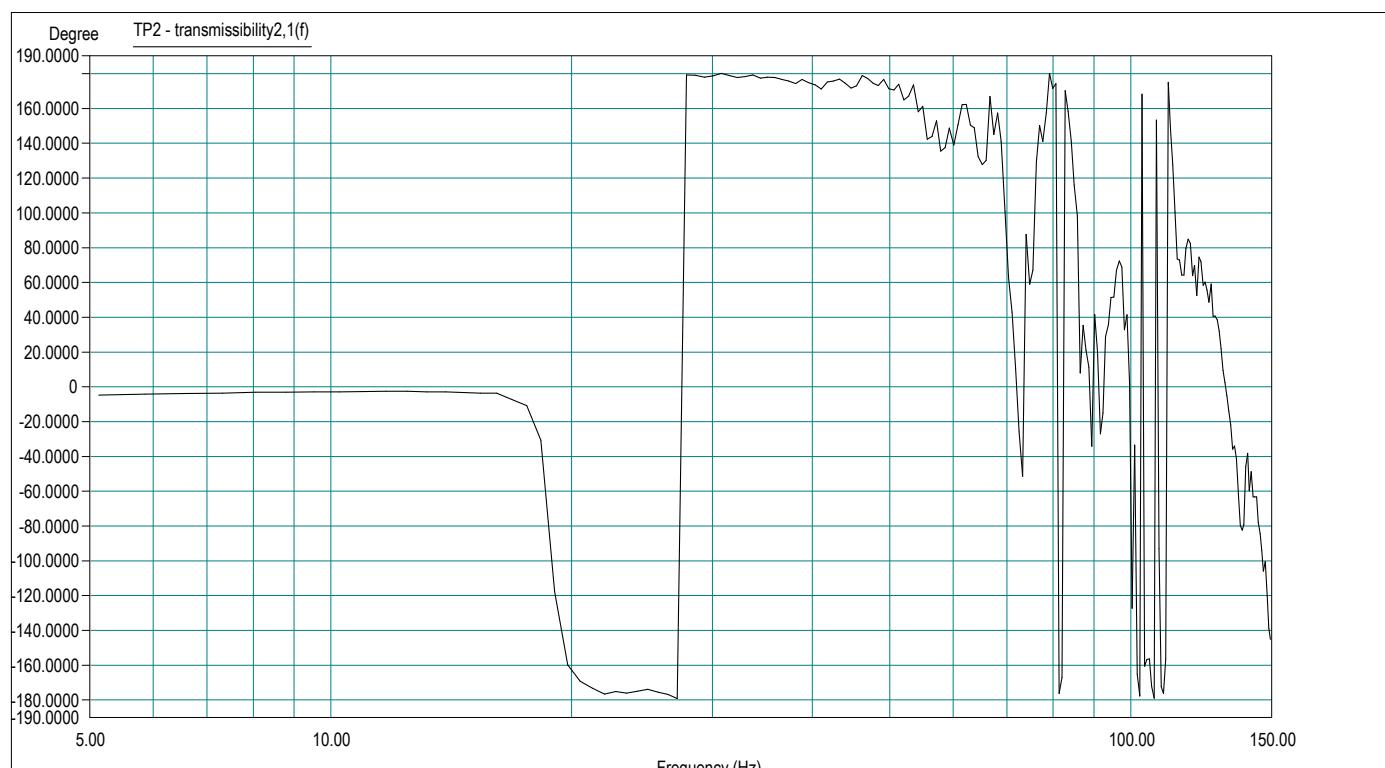
Pag. 96 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

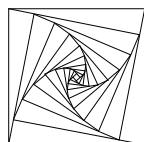
Control RMS: 5.653069 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:16 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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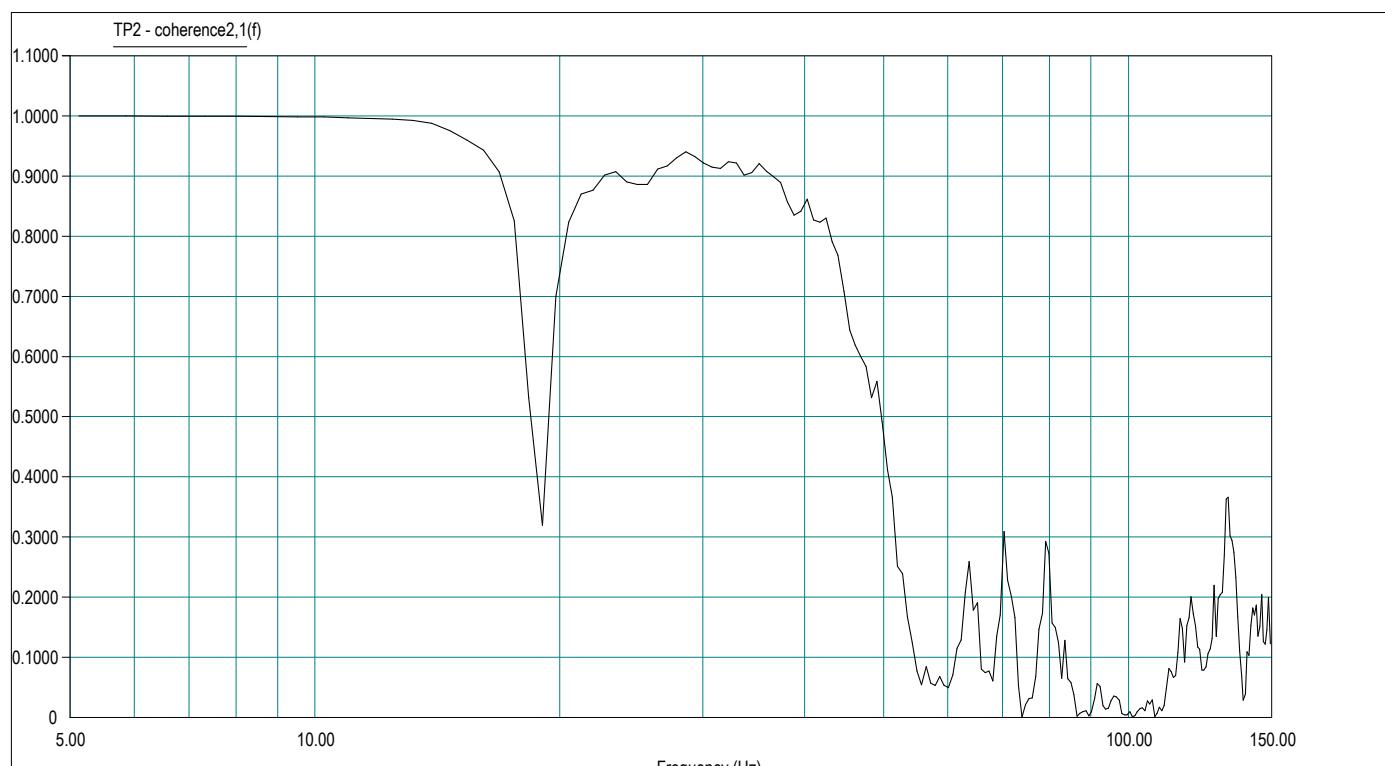
Pag. 97 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

Control RMS: 5.653069 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

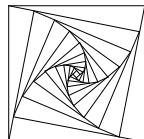
Remaining Time: 00:00:00

DOF: 154

dF:

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:17 , mercoledì, settembre 23, 2015



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**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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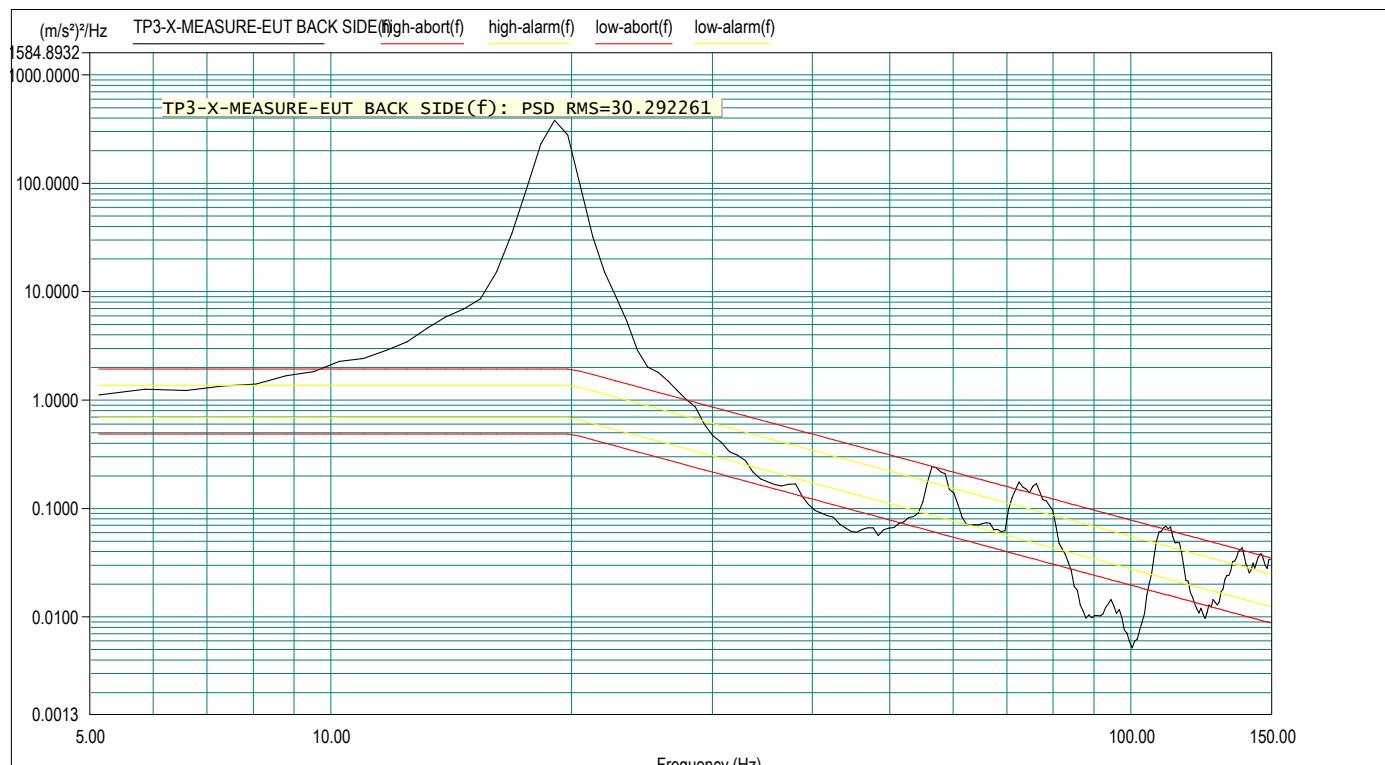
Pag. 98 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

Control RMS: 5.653069 m/s<sup>2</sup>  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Full Level Elapsed Time:

04:59:59

Lines: 200

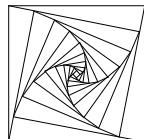
Frame Time:

DOF: 154

dF:

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:17 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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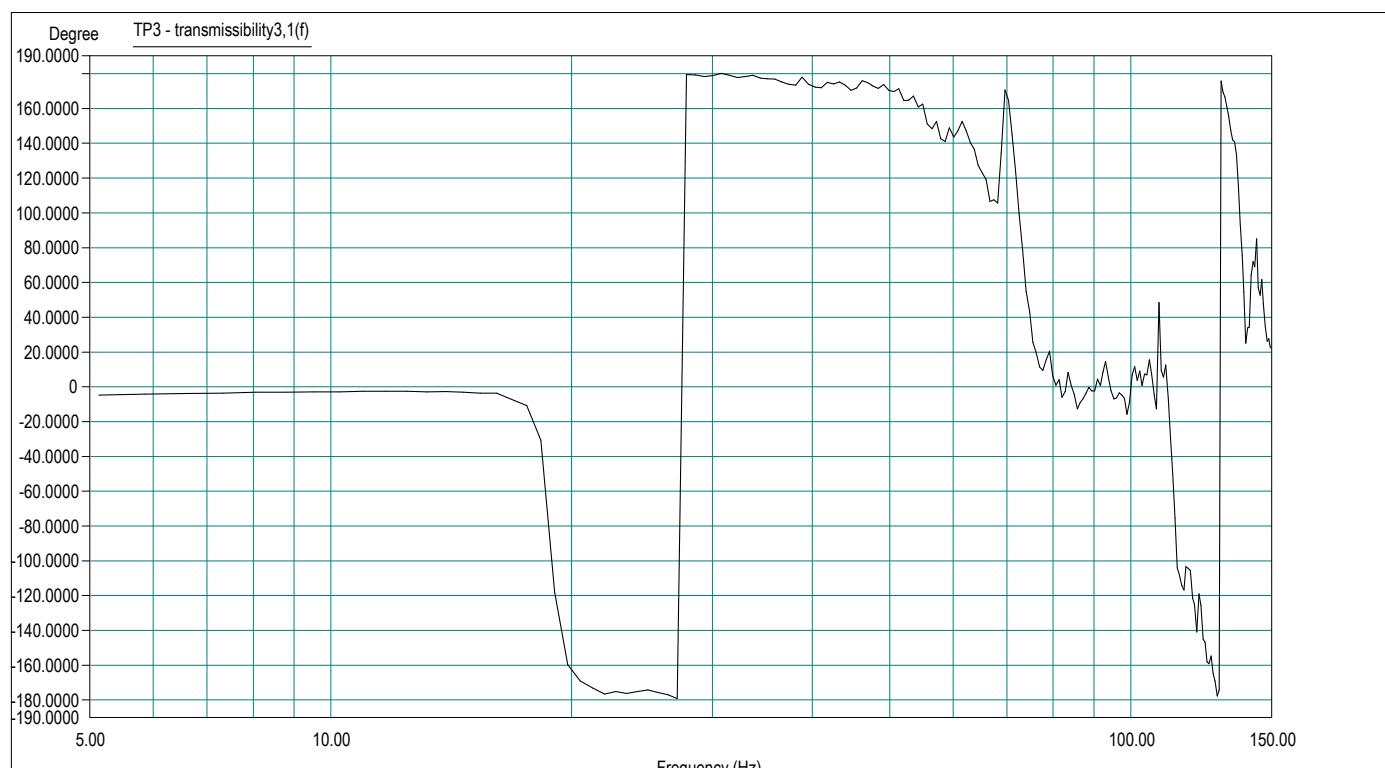
Pag. 99 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

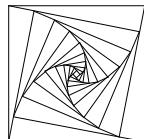
Control RMS: 5.653069 m/s<sup>2</sup> Full Level Elapsed Time: 04:59:59 Lines: 200 Frame Time:

1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:18 , mercoledì, settembre 23, 2015



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**RELAZIONE SU TEST MECCANICI**  
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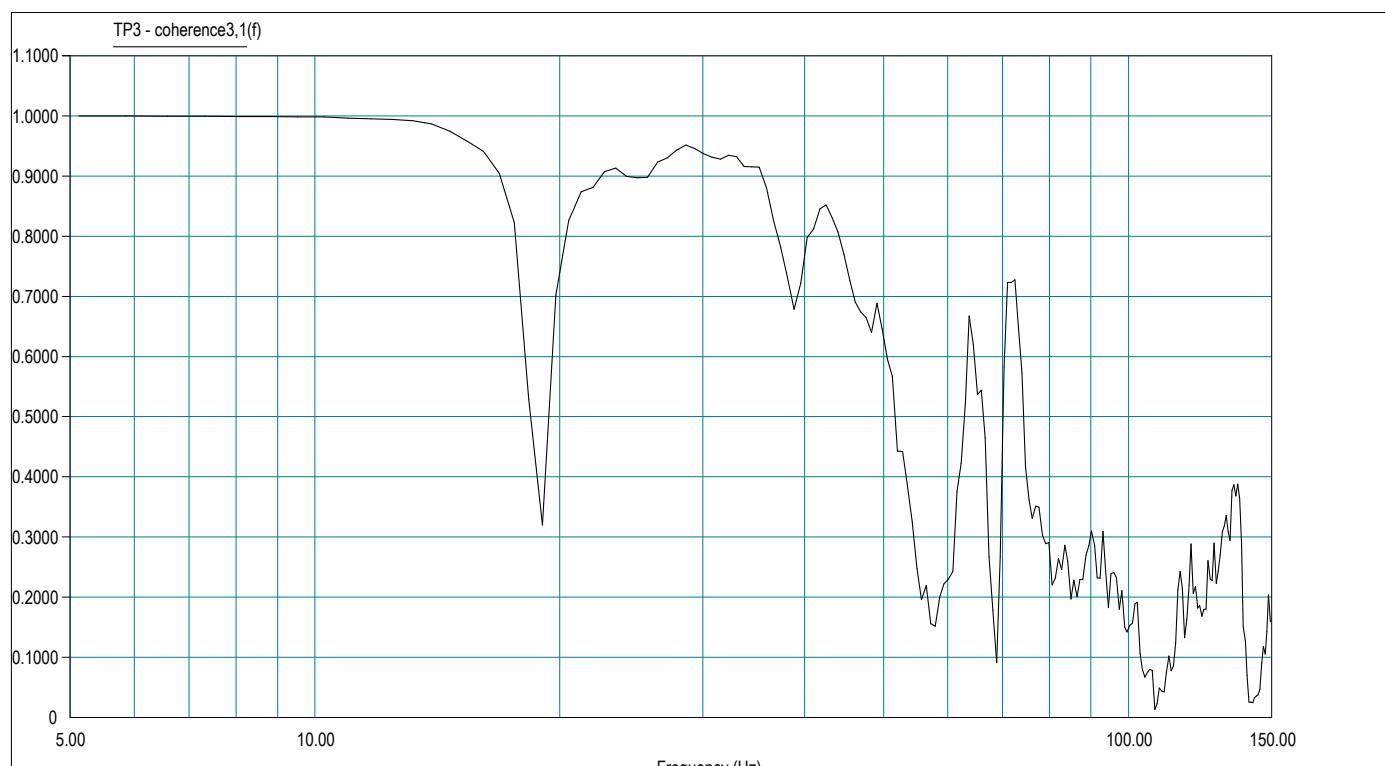
Pag. 100 di 117

Project File Name: LONGITUDINAL X - ENDURANCE.prj

Profile Name: RUN 12 RANDOM ENDURANCE TEST ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE

Test

Type: Random Run Folder: .\RUN 12 ENDURANCE X Sep 23, 2015 09-16-20



Level: 0 dB

Control RMS: 5.653069 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 04:59:59

Lines: 200

Frame Time:

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

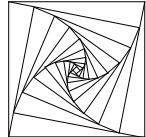
Remaining Time: 00:00:00

DOF: 154

dF:

Data saved at 02:19:11 PM, Wednesday, September 23, 2015

Report created at 02:19:18 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
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Pag. 101 di 117

## **ALLEGATO 3.3**

### **EARTHING SWITCH E402A CAF**

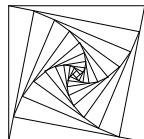
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE LONGITUDINALE (X)**

**SHOCK TEST - UP DIRECTION -**  
**PROFILO LONGITUDINALE**  
**(3 PLOTS)**



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**RELAZIONE SU TEST MECCANICI**  
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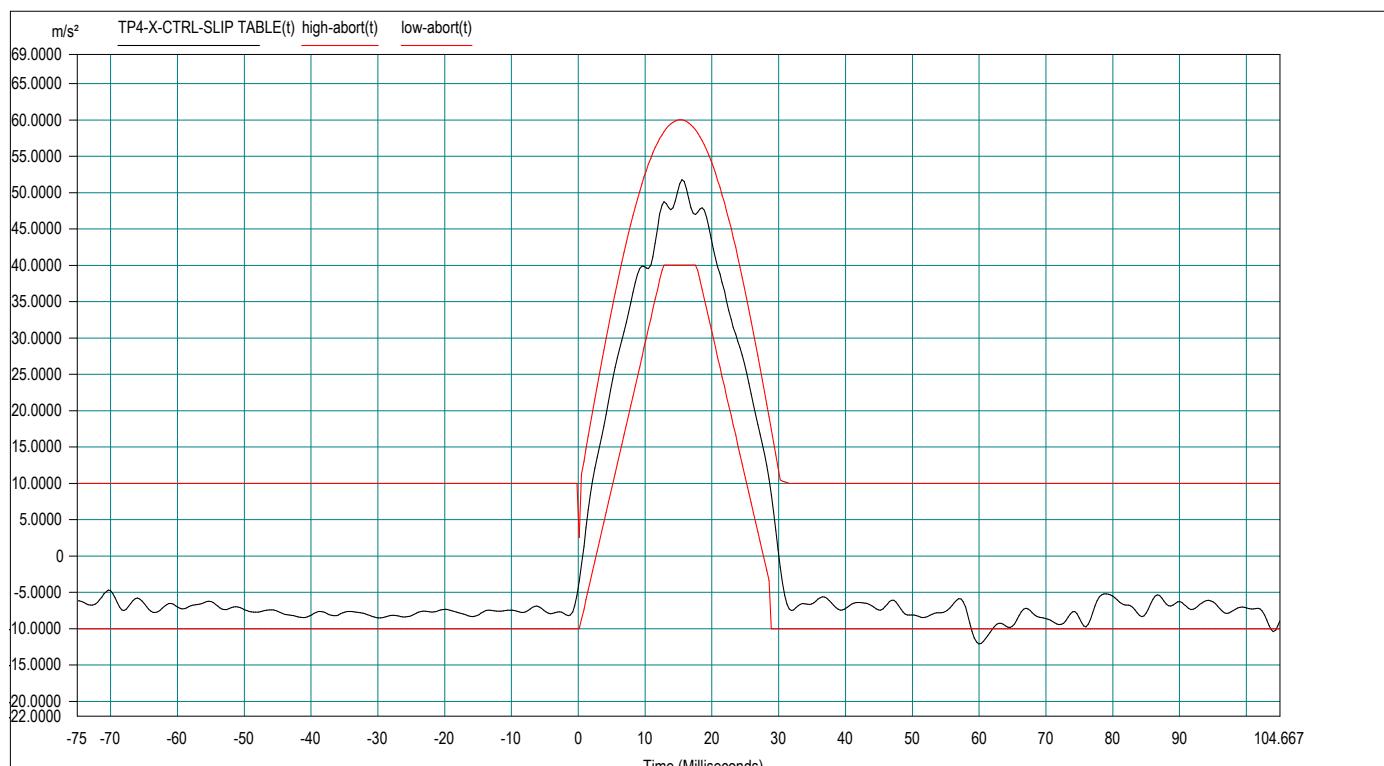
Pag. 102 di 117

Project File Name: LONGITUDINAL X - SHOCK.prj

Profile Name: RUN 13 SHOCK TEST ON ASSE LONGITUDINALE (X) - UP DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 13 SHOCK X - UP Sep 23, 2015 14-43-35



Level: 0 dB Block Size: 2048

Elapsed Pulses: 17

Frame Time: 0.682667 Seconds Control Peak: 51.767784 Control RMS: 8.793738 Full Level Elapsed Pulses:

3

dT: 0.000333 Seconds Demand Peak: 50.000000

Demand RMS: 8.770651 Remaining Pulses: 0

Pulse Type: Half Sine Amplitude: 50.000000

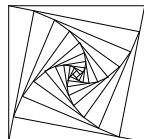
Pulse Width: 29.999999 ms

Data saved at 02:45:04 PM, Wednesday, September 23, 2015

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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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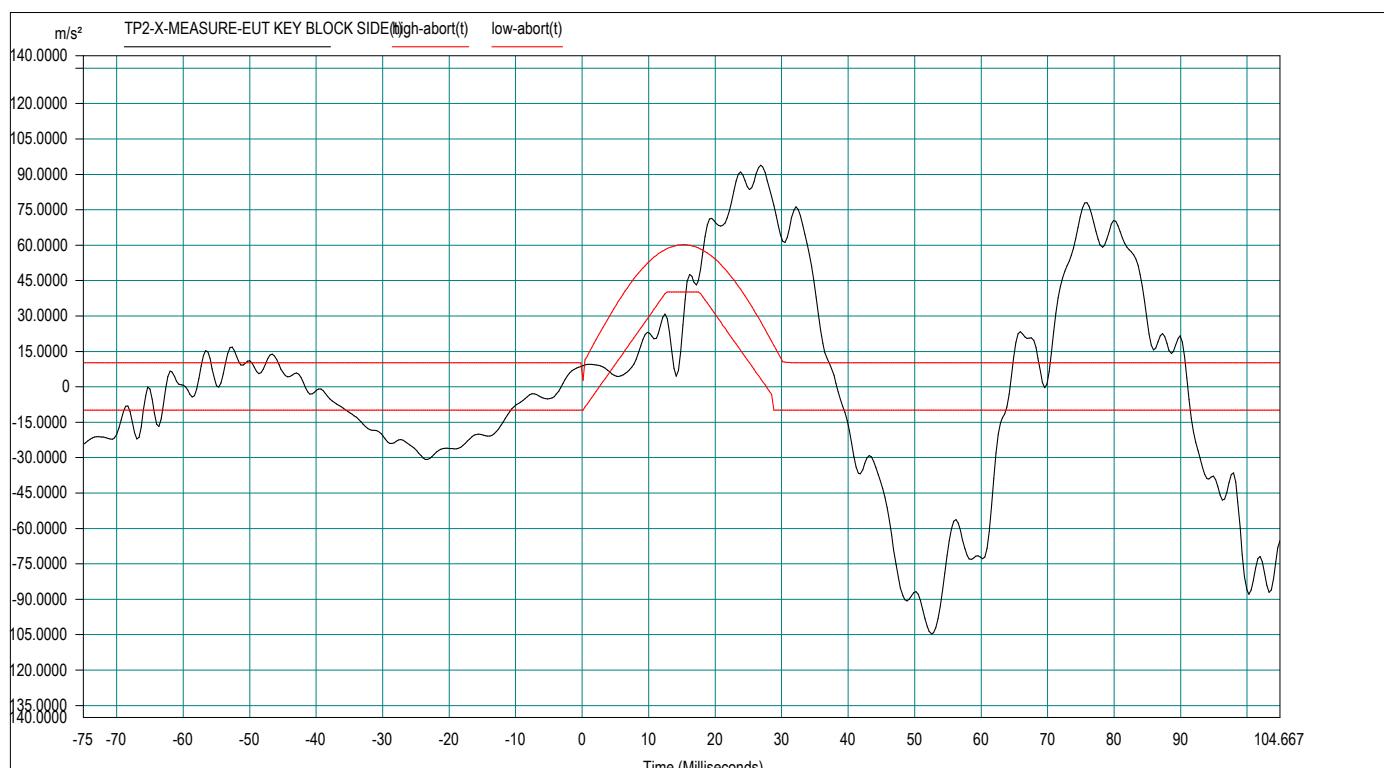
Pag. 103 di 117

Project File Name: LONGITUDINAL X - SHOCK.prj

Profile Name: RUN 13 SHOCK TEST ON ASSE LONGITUDINALE (X) - UP DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

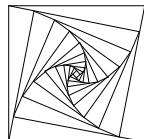
Run Folder: .\RUN 13 SHOCK X - UP Sep 23, 2015 14-43-35



Level:	0 dB	Block Size:	2048	Elapsed Pulses:	17
Frame Time:	0.682667 Seconds	Control Peak:	51.767784	Control RMS:	8.793738 Full Level Elapsed Pulses:
dT:	0.000333 Seconds	Demand Peak:	50.000000	Demand RMS:	8.770651 Remaining Pulses: 0
Pulse Type:	Half Sine	Amplitude:	50.000000	Pulse Width:	29.999999 ms

Data saved at 02:45:04 PM, Wednesday, September 23, 2015

Report created at 02:45:10 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

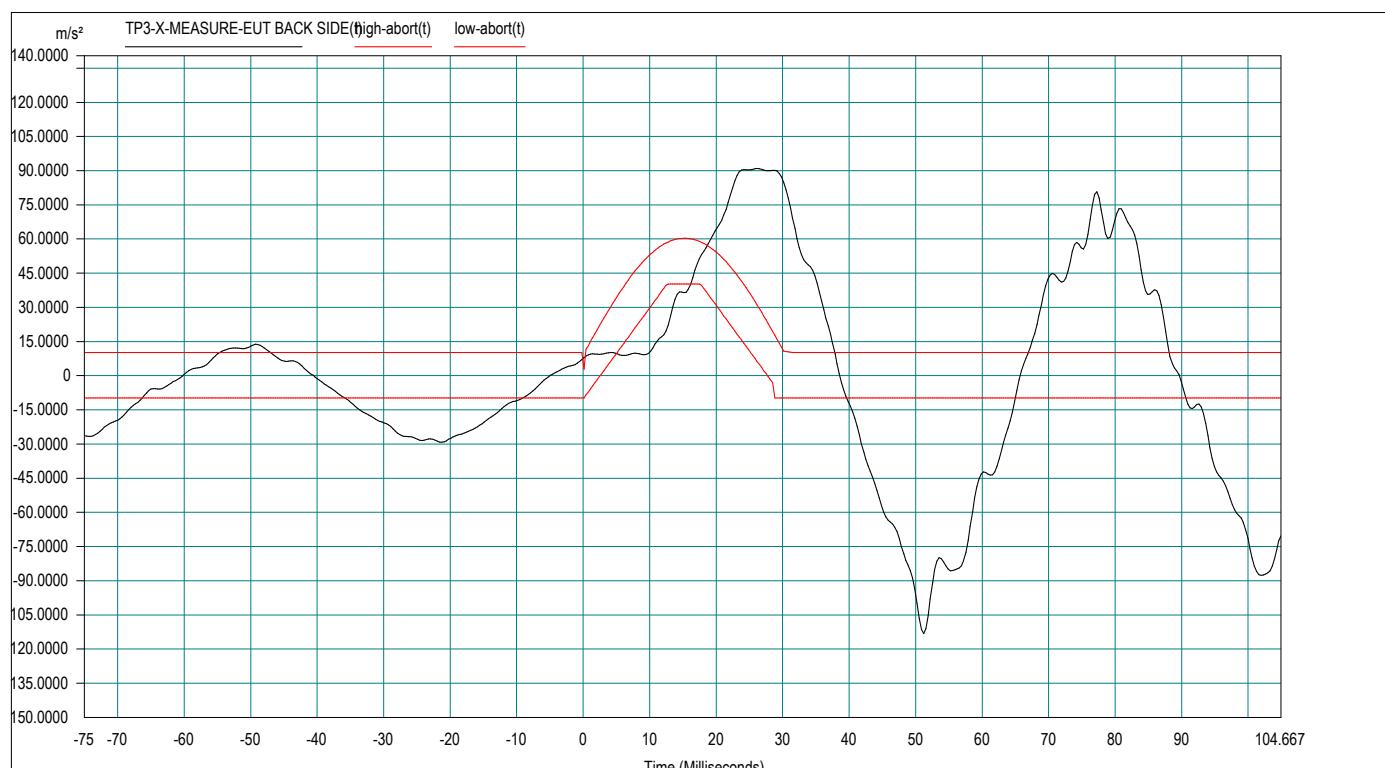
Pag. 104 di 117

Project File Name: LONGITUDINAL X - SHOCK.prj

Profile Name: RUN 13 SHOCK TEST ON ASSE LONGITUDINALE (X) - UP DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

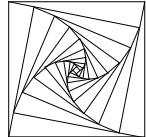
Run Folder: .\RUN 13 SHOCK X - UP Sep 23, 2015 14-43-35



Level:	0 dB	Block Size:	2048	Elapsed Pulses:	17
Frame Time:	0.682667 Seconds	Control Peak:	51.767784	Control RMS:	8.793738 Full Level Elapsed Pulses:
dT:	0.000333 Seconds	Demand Peak:	50.000000	Demand RMS:	8.770651 Remaining Pulses: 0
Pulse Type:	Half Sine	Amplitude:	50.000000	Pulse Width:	29.999999 ms

Data saved at 02:45:04 PM, Wednesday, September 23, 2015

Report created at 02:45:11 , mercoledì, settembre 23, 2015



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Pag. 105 di 117

## ALLEGATO 3.4

**EARTHING SWITCH E402A CAF**

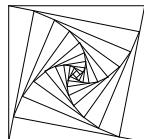
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE LONGITUDINALE (X)**

**SHOCK TEST - DOWN DIRECTION -**  
**PROFILO LONGITUDINALE**  
**(3 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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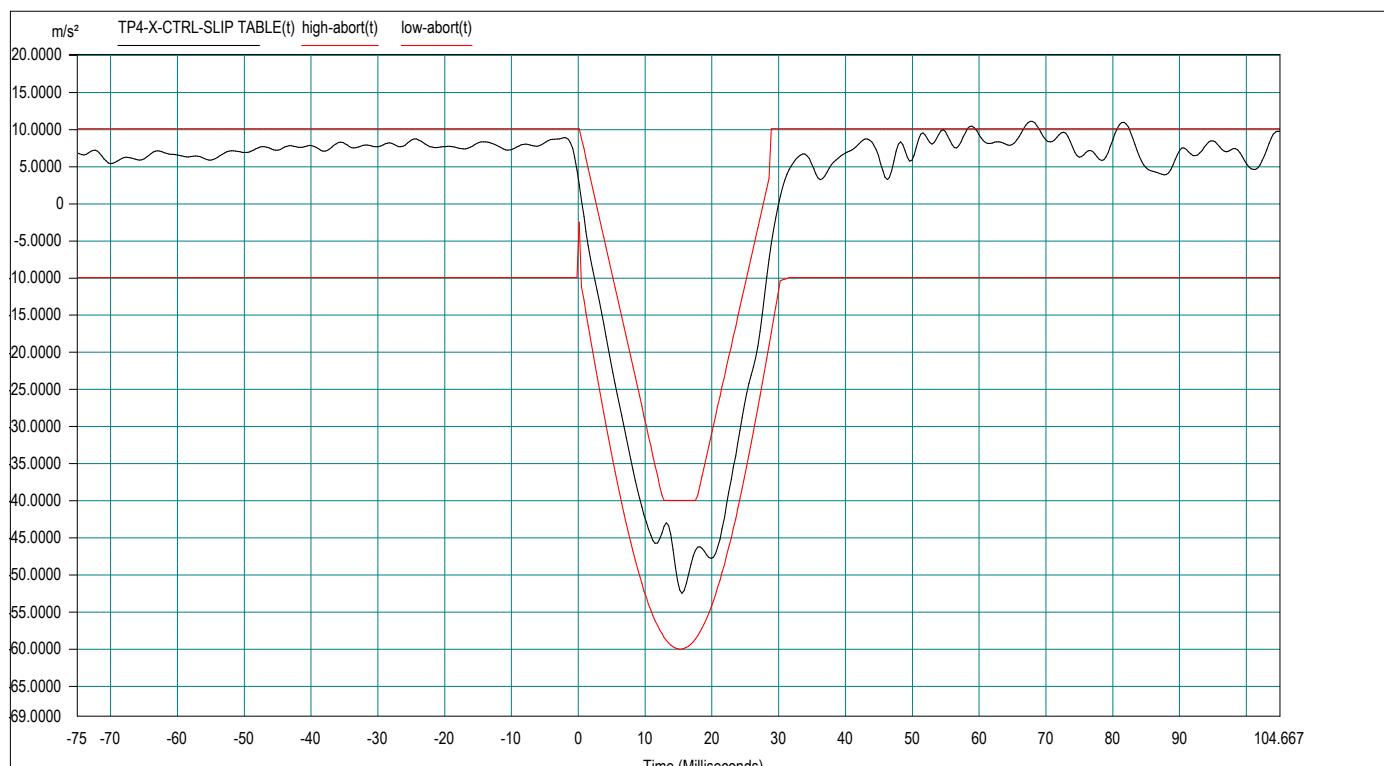
Pag. 106 di 117

Project File Name: LONGITUDINAL X - SHOCK.prj

Profile Name: RUN 14 SHOCK TEST ON LONGITUDINAL (X) AX - DOWN DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 14 SHOCK X - DOWN Sep 23, 2015 14-45-49



Level: 0 dB Block Size: 2048

Elapsed Pulses: 18

Frame Time: 0.682667 Seconds Control Peak: 52.482666

Control RMS: 8.871209 Full Level Elapsed Pulses:

3

dT: 0.000333 Seconds Demand Peak: 50.000000

Demand RMS: 8.770651 Remaining Pulses: 0

Pulse Type: Half Sine Amplitude: 50.000000

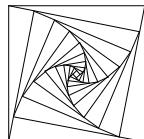
Pulse Width: 29.999999 ms

Data saved at 02:47:21 PM, Wednesday, September 23, 2015

Report created at 02:47:23 , mercoledì, settembre 23, 2015

I risultati riportati nel presente rapporto di prova si riferiscono unicamente ai campioni descritti nel paragrafo 2.1.

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**RELAZIONE SU TEST MECCANICI**  
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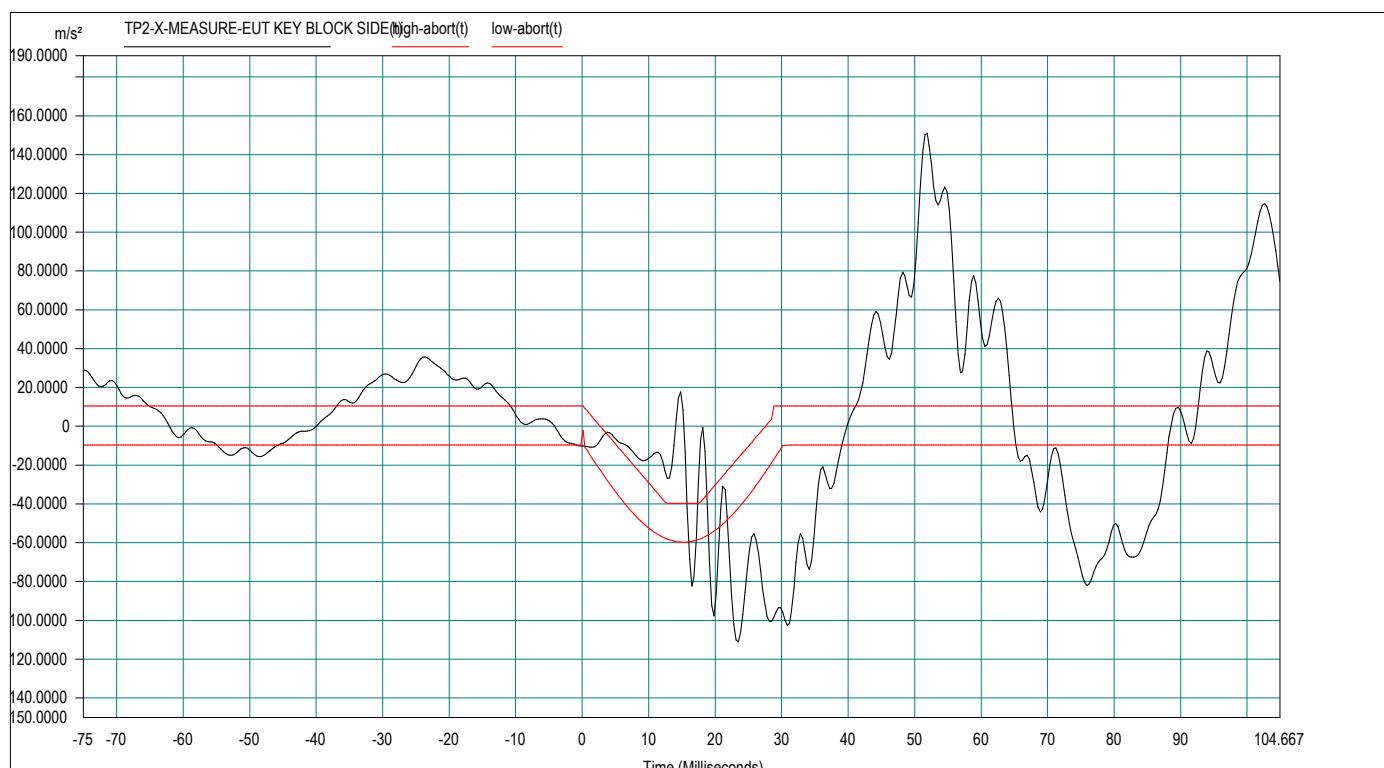
Pag. 107 di 117

Project File Name: LONGITUDINAL X - SHOCK.prj

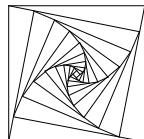
Profile Name: RUN 14 SHOCK TEST ON LONGITUDINAL (X) AX - DOWN DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 14 SHOCK X - DOWN Sep 23, 2015 14:45:49



Level: 0 dB Block Size: 2048 Elapsed Pulses: 18  
Frame Time: 0.682667 Seconds Control Peak: 52.482666 Control RMS: 8.871209 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms  
Data saved at 02:47:21 PM, Wednesday, September 23, 2015 Report created at 02:47:23 , mercoledì, settembre 23, 2015



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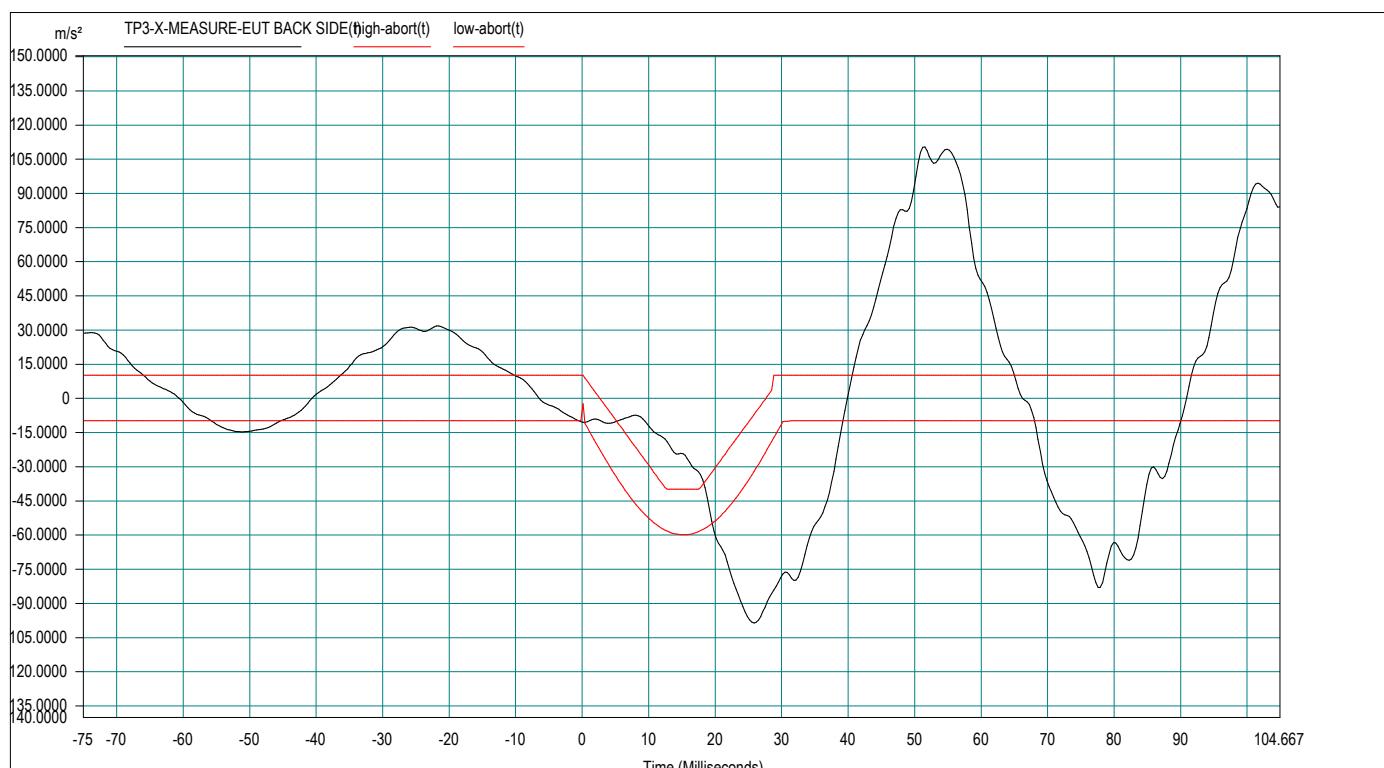
Pag. 108 di 117

Project File Name: LONGITUDINAL X - SHOCK.prj

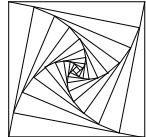
Profile Name: RUN 14 SHOCK TEST ON LONGITUDINAL (X) AX - DOWN DIRECTION - PROFILO LONGITUDINALE

Test Type: Classical Shock

Run Folder: .\RUN 14 SHOCK X - DOWN Sep 23, 2015 14:45:49



Level: 0 dB Block Size: 2048 Elapsed Pulses: 18  
Frame Time: 0.682667 Seconds Control Peak: 52.482666 Control RMS: 8.871209 Full Level Elapsed Pulses:  
3  
dT: 0.000333 Seconds Demand Peak: 50.000000 Demand RMS: 8.770651 Remaining Pulses: 0  
Pulse Type: Half Sine Amplitude: 50.000000 Pulse Width: 29.999999 ms  
Data saved at 02:47:21 PM, Wednesday, September 23, 2015 Report created at 02:47:24 , mercoledì, settembre 23, 2015



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**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
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Pag. 109 di 117

## **ALLEGATO 3.5**

**EARTHING SWITCH E402A CAF**

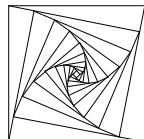
**TYPE: D344640**

**S/N: A1506999**

**DWG N.: D344639**

**ASSE LONGITUDINALE (X)**

**FINAL MEASUREMENTS - PROFILO**  
**ENDURANCE VERTICALE**  
**(7 PLOTS)**



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**EARTHING SWITCH E402A CAF**  
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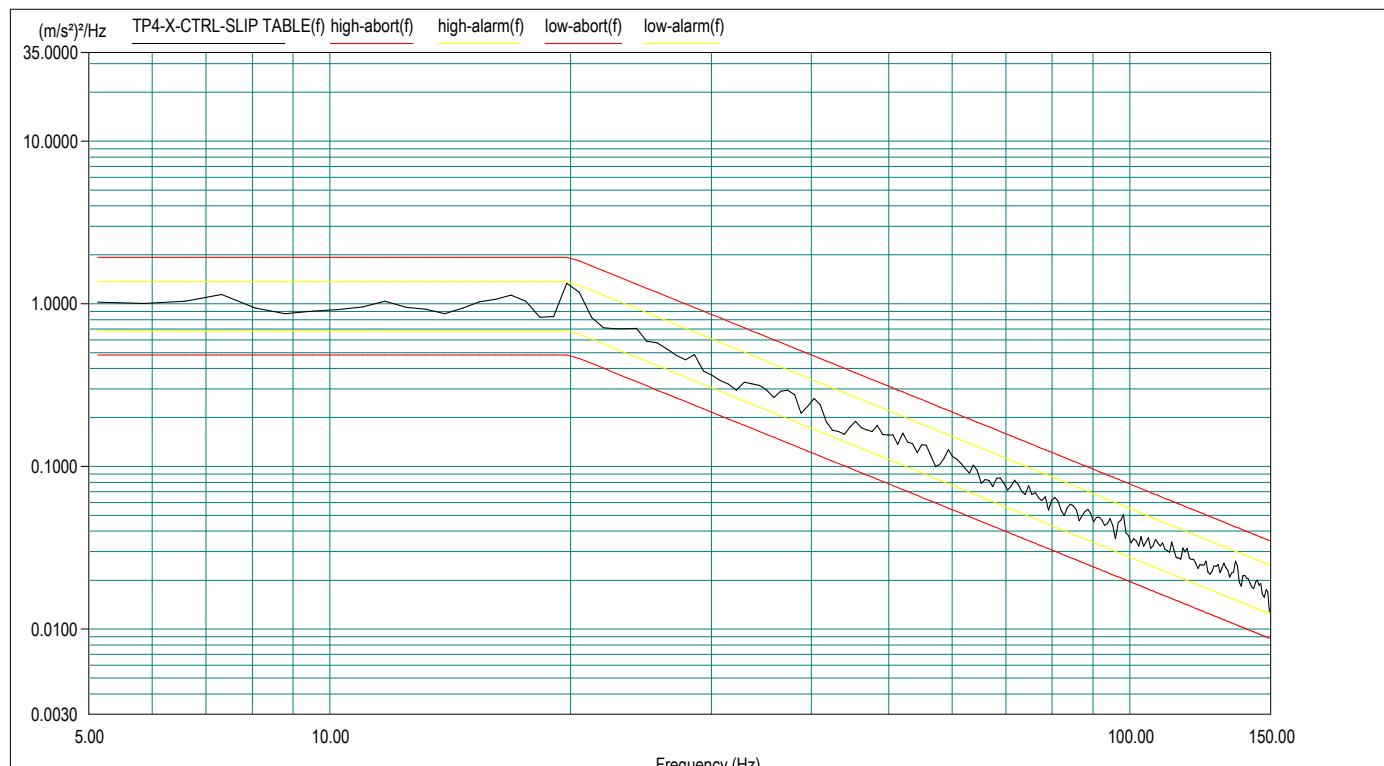
Rev. 0

Pag. 110 di 117

Project File Name: LONGITUDINAL X - FINAL MEASURE.prj

Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14-49-47

Test Type:



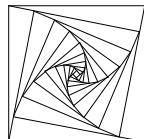
Level: 0 dB

Control RMS: 5.650515 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:43 , mercoledì, settembre 23, 2015



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**RELAZIONE SU TEST MECCANICI**  
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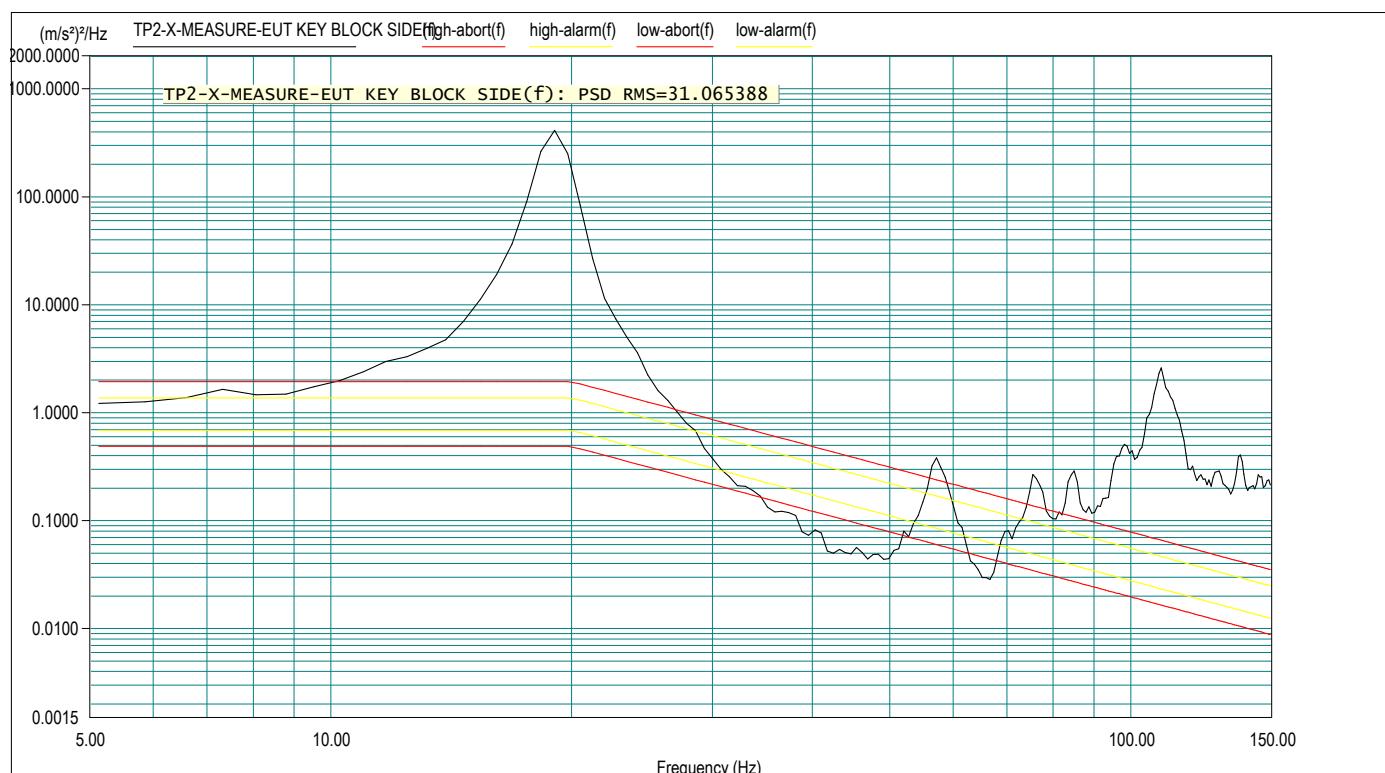
Rev. 0

Pag. 111 di 117

Project File Name: LONGITUDINAL X - FINAL MEASURE.prj

Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14:49:47

Test Type:



Level: 0 dB

Control RMS: 5.650515 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

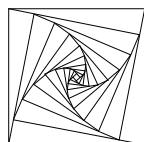
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:43 , mercoledì, settembre 23, 2015



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**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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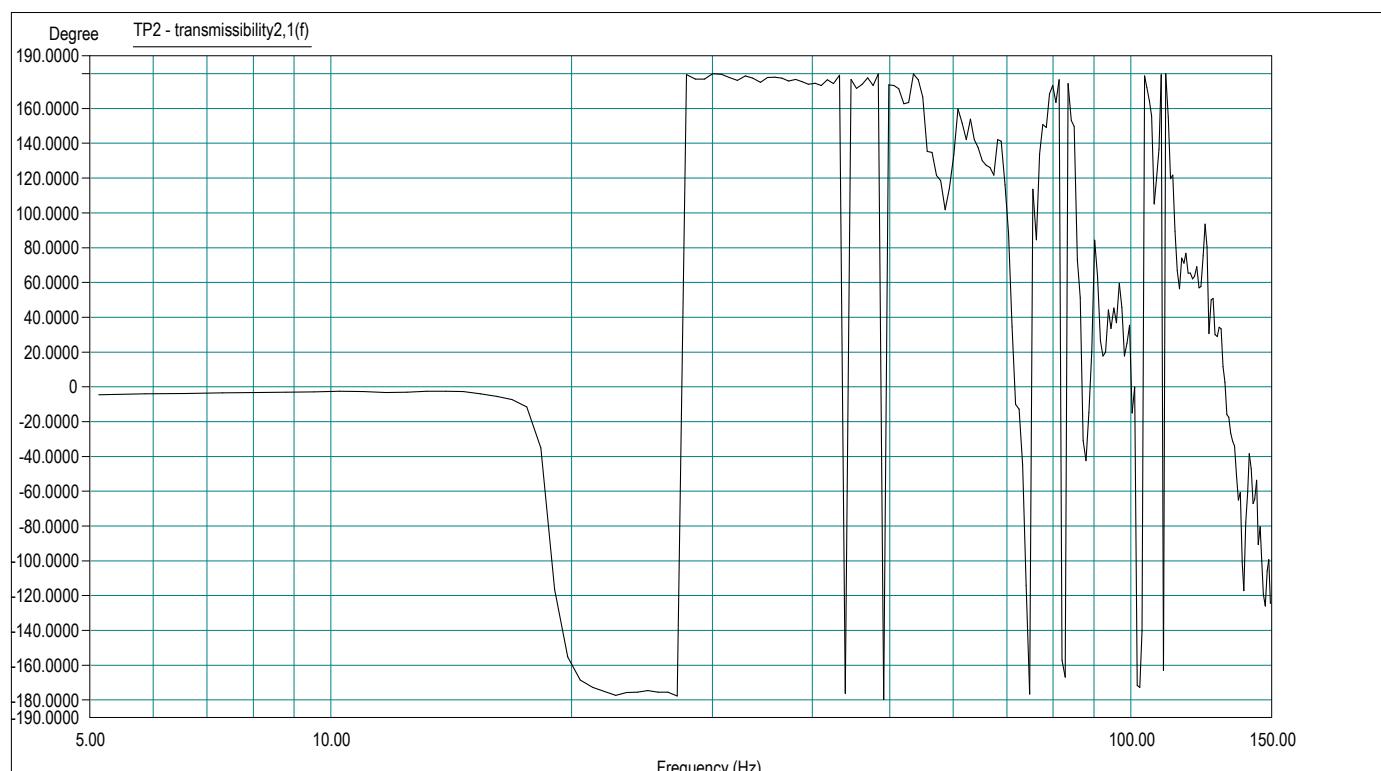
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Pag. 112 di 117

Project File Name: LONGITUDINAL X - FINAL MEASURE.prj

Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14-49-47

Test Type:



Level: 0 dB

Control RMS: 5.650515 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

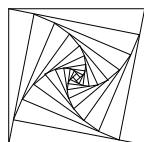
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:43 , mercoledì, settembre 23, 2015



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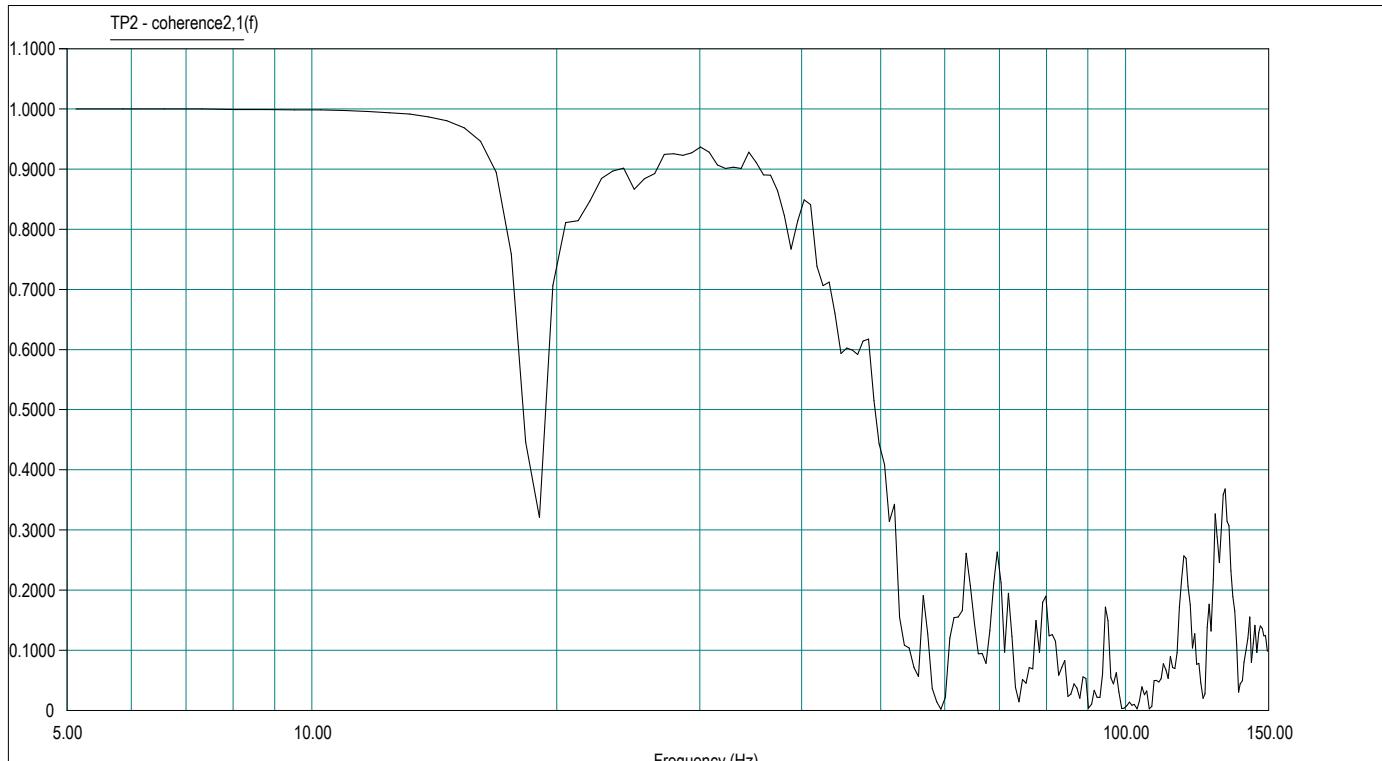
**EARTHING SWITCH E402A CAF**  
**RELAZIONE SU TEST MECCANICI**  
**Elaborato per: SPII S.p.A.**

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Rev. 0

Pag. 113 di 117

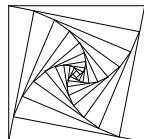
Project File Name: LONGITUDINAL X - FINAL MEASURE.prj  
Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14:49:47  
Test Type:



Level: 0 dB  
Control RMS: 5.650515 m/s<sup>2</sup> Full Level Elapsed Time: 00:02:00 Lines: 200 Frame Time:  
1.365333 Seconds  
Demand RMS: 5.626908 m/s<sup>2</sup> Remaining Time: 00:00:00 DOF: 154 dF:  
0.732422 Hz

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:43 , mercoledì, settembre 23, 2015



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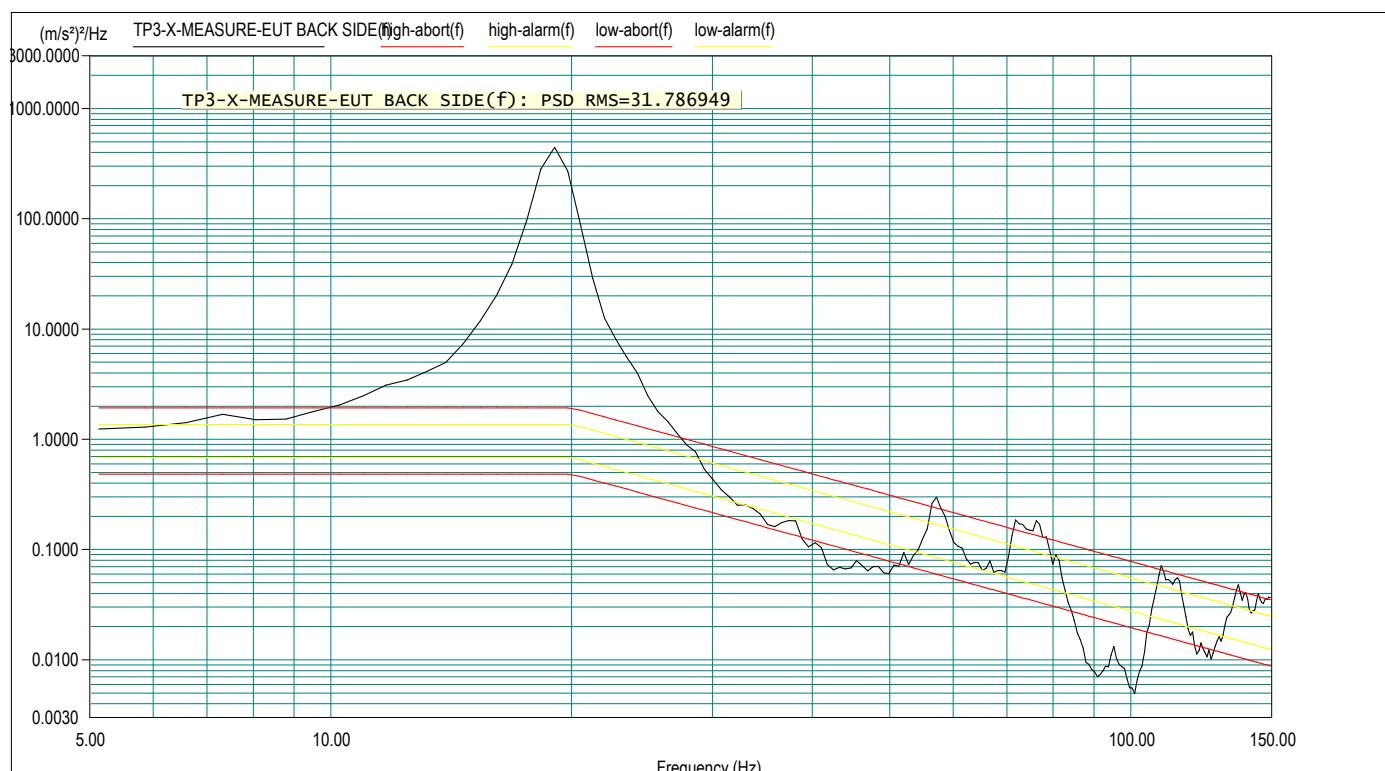
Rev. 0

Pag. 114 di 117

Project File Name: LONGITUDINAL X - FINAL MEASURE.prj

Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14:49:47

Test Type:



Level: 0 dB

Control RMS: 5.650515 m/s<sup>2</sup>  
1.365333 Seconds

Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Full Level Elapsed Time:

00:02:00

Lines: 200

Frame Time:

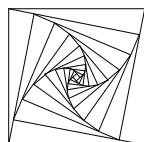
00:00:00

DOF: 154

dF:

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:44 , mercoledì, settembre 23, 2015



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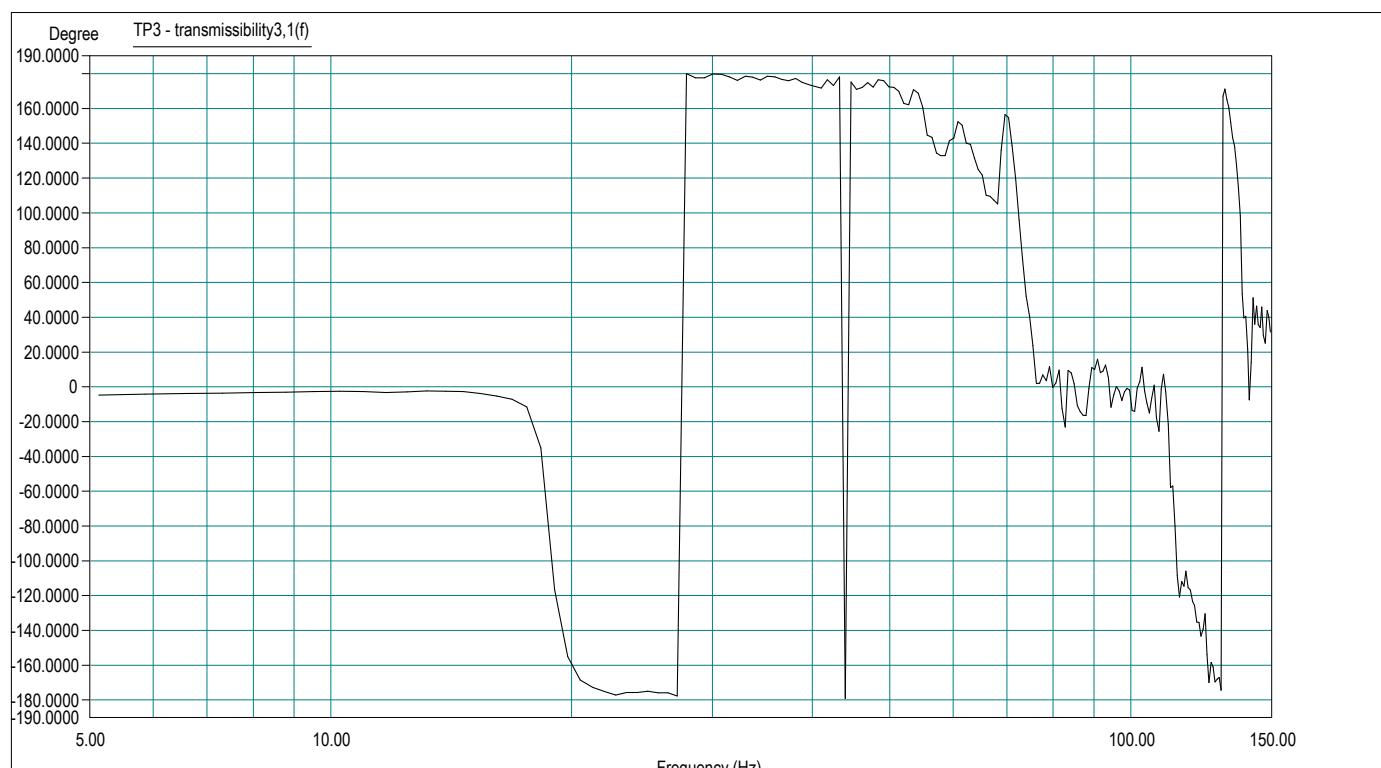
Rev. 0

Pag. 115 di 117

Project File Name: LONGITUDINAL X - FINAL MEASURE.prj

Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14-49-47

Test Type:



Level: 0 dB

Control RMS: 5.650515 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

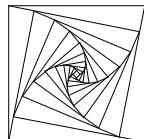
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:44 , mercoledì, settembre 23, 2015



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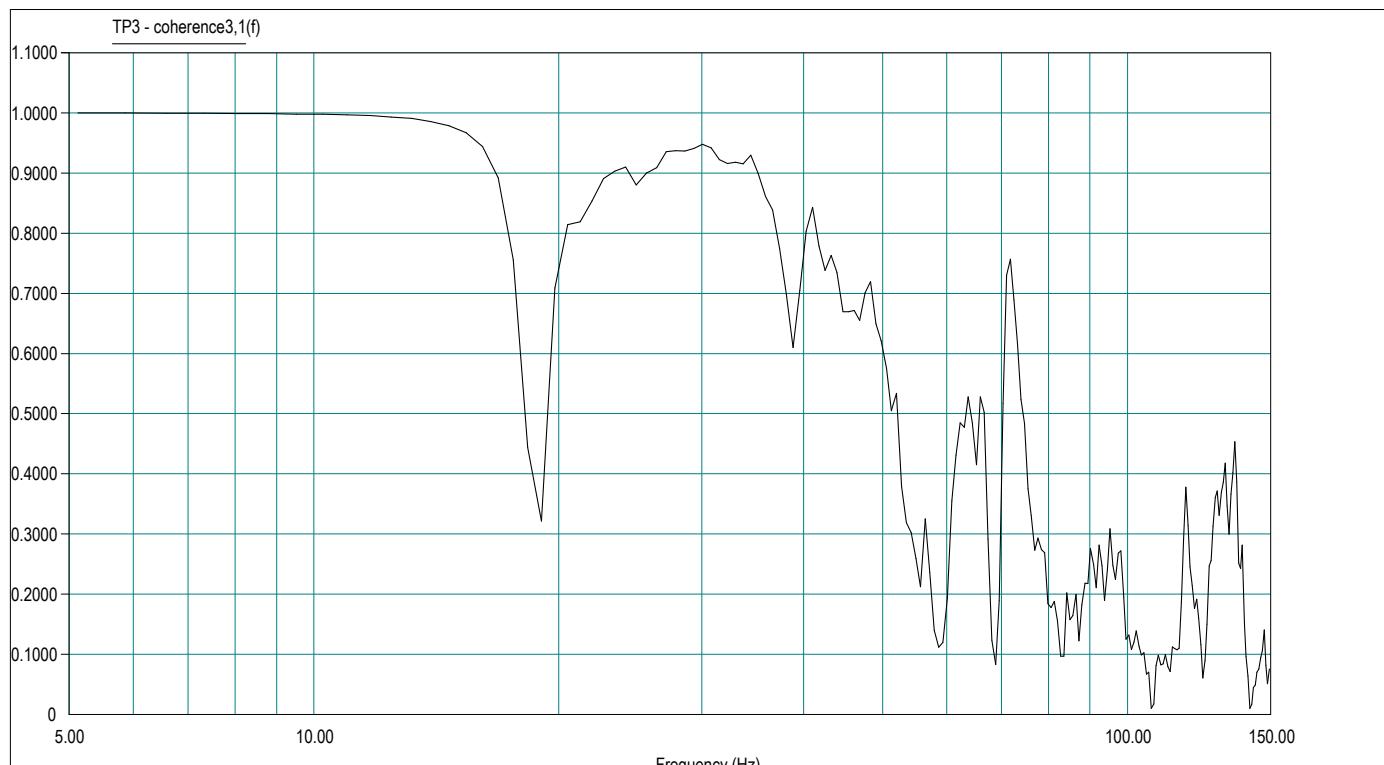
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Pag. 116 di 117

Project File Name: LONGITUDINAL X - FINAL MEASURE.prj

Profile Name: RUN 15 FINAL MEASURE ON ASSE LONGITUDINALE (X) - PROFILO VERTICALE  
Random Run Folder: .\RUN 15 F.M. - X Sep 23, 2015 14:49:47

Test Type:



Level: 0 dB

Control RMS: 5.650515 m/s<sup>2</sup>  
1.365333 Seconds

Full Level Elapsed Time: 00:02:00

Lines: 200 Frame Time:

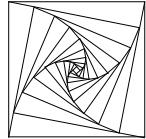
Demand RMS: 5.626908 m/s<sup>2</sup>  
0.732422 Hz

Remaining Time: 00:00:00

DOF: 154 dF:

Data saved at 02:53:41 PM, Wednesday, September 23, 2015

Report created at 02:53:44 , mercoledì, settembre 23, 2015



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Rev. 0

Pag. 117 di 117

## FINE REPORT

**SPECIFICA DI TEST / TEST SPECIFICATION****PROVE DI SERIE E DI TIPO /  
TYPE & ROUTINE TEST****E402A**

Type	<b>Disconnector Switch</b>
Customer	CAF
Cod.	<b>D344640</b>



Emesso da F. De Venz	Controllato da A. Biraghi	Approvato da S. Zuffetti	Data / Date
Firma 	Firma 	Firma 	30.03.15

## INDICE / INDEX

1. CONTROLLO DOCUMENTO / DOCUMENT CHECK .....	3
1.1. Revisioni / Revisions.....	3
1.2. Norme di riferimento .....	3
1.3. Documenti di Riferimento / Reference Standards .....	3
1.4. Acronimi, Abbreviazioni e Sigle / Acronyms, Abbreviations and Initials.....	3
2. DATI GENERICI / GENERIC DATA .....	4
2.1. Scopo del documento / Scope of the document.....	4
3. PROVE DI SERIE / ROUTINE TESTS .....	4
3.1. Controllo visivo e dimensionale / Visual and dimensional inspection .....	4
3.2. Prova funzionale / Functional test .....	5
3.3. Prova di funzionamento meccanico / Mechanical functional test.....	5
3.4. Prove dielettriche / Dielectric test .....	6
3.4.1. Rigidità dielettrica / Dielectric strength.....	6
3.4.2. Prova di isolamento elettrico circuiti ausiliari / Insulation test.....	6
3.5. Misura della resistenza di contatto dei contatti A.T./ HV Contact resistance .....	6
4. Prove di tipo / TYPE TESTS.....	7
4.1. Controllo visivo e dimensionale / Visual & Dimensional Inspection .....	7
4.2. Prova funzionale / Functional test .....	7
4.3. Prova funzionamento meccanico / Mechanical functional test.....	7
4.4. Prova della forza di azionamento / Lever force test .....	7
4.5. Prova delle prestazioni funzionali / Functional performance test (life time test) .....	8
4.5.1. Modalità di esecuzione / Execution Modality .....	8
4.5.2. Attività previste durante la prova / Activity during the test .....	8
4.5.3. Criterio di accettazione / Acceptability criteria .....	8
4.6. Prova di urti e vibrazioni / Shock and vibration test.....	9
4.7. Sovratemperatura / Temperature rise test .....	9
4.8. Prove dielettriche / Dielectric test .....	10
4.9. Misura della resistenza di contatto dei contatti A.T. / HV contact resistance .....	10
5. RISULTATI / RESULTS .....	11
5.1. Controllo visivo e dimensionale / Visual and dimensional inspection .....	11
5.2. Prova funzionale / Functional test .....	11
5.3. Prova della forza di azionamento / Lever force test .....	11
5.4. Prova delle prestazioni funzionali / Functional performance test (life time test) .....	11
5.5. Prova di urti e vibrazioni / Shock and vibration test.....	11
5.6. Sovratemperatura / Temperature rise test .....	11
5.7. Prove dielettriche / Dielectric test .....	11
5.8. Misura della resistenza dei contatti A.T.....	11

## 1. CONTROLLO DOCUMENTO / DOCUMENT CHECK

### 1.1. Revisioni / Revisions

Stato /State	Modifica /Issue	Emesso da /Edited by	Descrizione delle modifiche /Revision Description	Approvato da /Approved by	Data /Date
Obsolete	00	F. De Venz	1st emission	S. Zuffetti	30/03/2015
Obsolete	01	F. De Venz	Updated standard references	S. Zuffetti	08/04/2015
Obsolete	02	F. De Venz	@par. 4.7, standard 60077-2 par. 8.2.2	S. Zuffetti	14/04/2015
Issued	03	F. De Venz	Updated par. 1.3 reference, modified par. 4.5.1 in according to table A4,C2 of EN60077-2, modified par. 4.4	S. Zuffetti	20/10/2015

### 1.2. Norme di riferimento

Rif.	Titolo	Rev.
EN 60077-1	Railway applications. Electric equipment for rolling stock. General service conditions and general rules	2002
EN 60077-2	Railway applications. Electric equipment for rolling stock. Electro technical components. General rules	2002
EN 50155	Railway applications – Electronic equipment used on rolling stock	2008
EN 61373	Railway applications - Rolling stock equipment - Shock and vibration tests	2011
EN 50125-1	Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock	2000
EN 50153	Railway applications. Rolling stock. Protective provisions relating to electrical hazards	1997
EN 50163	Railway applications. Supply voltages of traction systems	2006
EN 60721	Classification of environmental conditions. Classification of groups of environmental parameters and their severities. Ground vehicle installations	2003
EN 50124	Railway applications. Insulation coordination. Basic requirements. Clearances and creepage distances for all electrical and electronic equipment	2001
EN 50343	Railway applications - Rolling stock - Rules for installation of cabling	2003

### 1.3. Documenti di Riferimento / Reference Standards

Ref.	Author	Title	Rev.
D344640	SPII	Earthing Switch – 3d model	-
D344639	SPII	Overall dimension for Earthing Switch E402A CAF	05
D344920	SPII	Technical specification for Earthing Switch E402A CAF	04
D345265	SPII	Functional test procedure for Earthing switch	01

### 1.4. Acronimi, Abbreviazioni e Sigle / Acronyms, Abbreviations and Initials

Sigla	Descrizione / Description
AT / HV	Alta tensione / High Voltage
MT / MV	Media tensione / Medium Voltage
BT / LV	Bassa tensione / Low Voltage

## 2.DATI GENERICI / GENERIC DATA

### 2.1. Scopo del documento / Scope of the document

Il presente documento definisce le prove di tipo, di serie ed i limiti di accettabilità da applicare durante il collaudo del sezionatore A.T. a comando manuale

*This document describes the tests and acceptability limits to be applied during the testing of the Manual Disconnector switch*

## 3.PROVE DI SERIE / ROUTINE TESTS

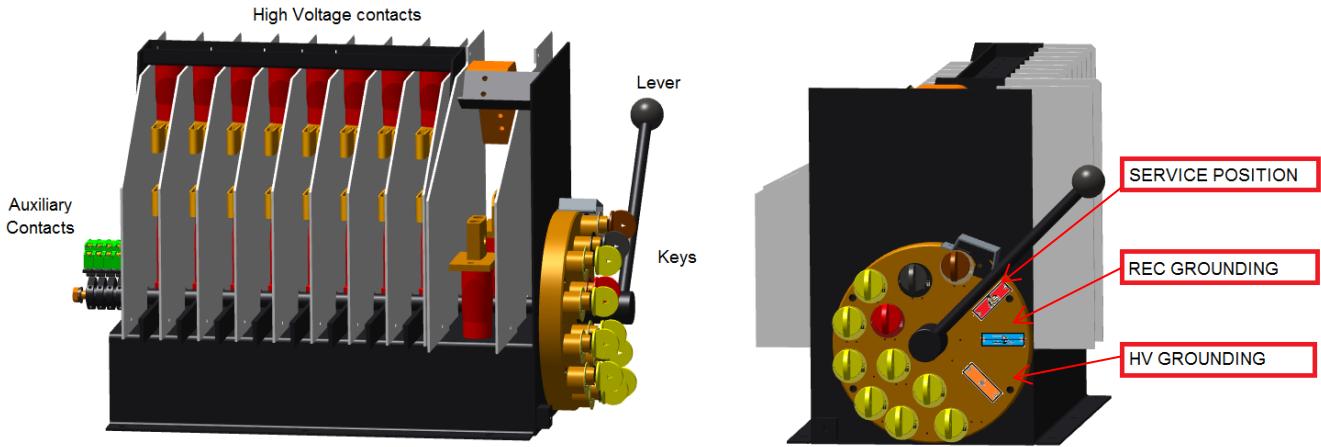
<b>3.1. Controllo visivo e dimensionale / Visual and dimensional inspection</b>	
Disegno di riferimento / Reference drawing	D344639
Norma di riferimento / Reference standard	EN 60077 -1 par. 9.2.3
<b>Strumentazione / Instrumentation and tools</b>	
Calibro digitale con risoluzione 0.01mm / <i>Digital caliper 0,01 mm resolution</i>	
Flessimetro con risoluzione di 0.001 m / <i>Fleximeter, 1mm resolution.</i>	
Bilancia con risoluzione di 10 g / <i>Balance with 10g resolution</i>	
<b>Verifica / Verify</b>	
1) Congruenza tra le dimensioni riportate sul disegno di riferimento e quelle effettive <i>Congruence between the dimensions shown in the reference drawing and actual dimensions.</i>	
2) Congruenza tra la massa riportata sul disegno di riferimento e quella effettiva. <i>Congruence between the mass shown in the reference drawing and actual mass.</i>	
3) Il prodotto è completo in ogni sua parte. <i>The product is complete in all of its components.</i>	
4) Corretta identificazione sulla targhetta del prodotto secondo le informazioni seguenti <i>Correct identification on the label where reported the following information</i>	
	- <b>Tipo / Type</b> .....
	- <b>Anno / Year</b> .....
	- <b>S/N</b> .....
	- <b>Specifiche /</b> .....
5) Verificare che il componente non presenti alcun difetto costruttivo <i>The components are free of construction defects</i>	
6) Verificare la corretta lunghezza dei cavi di connessioni esterne <i>Check the correct execution of the cables and their termination</i>	
7) Verificare il corretto posizionamento delle targhette identificative <i>Check the correct placement of the identification plates</i>	
8) Limiti di accettabilità <i>Acceptability limits</i>	
- <b>Dimensioni meccaniche /</b> <b>Mechanical dimensions</b>	Conforme alle tolleranze / <i>compliance with the tolerance indicated in Reference drawing</i>
- <b>Massa / Mass</b>	Scostamento del ±10% dal valore nominale / <i>±10% from nominal value</i>

### 3.2. Prova funzionale / Functional test

Documenti di riferimento / Reference document

D345265

#### Prove previste / Tests



<b>Key</b>	Chiaviere / Contacts group	Verificare la corretta sequenza di rotazione delle chiavi <i>Verify the correct sequence of the key rotation</i>
<b>Lever</b>	Leva di comando / Main Lever	Verificare la corretta movimentazione della leva dalla posizione di SERVICE, GROUNDING REC ed AT GROUNDING e viceversa . <i>Verify the correct movement of the lever from the SERVICE position to GROUNDING REC and AT GROUNDING position and vice versa</i>
<b>Contatti AT / High Voltage contact</b>		verificare il corretto contatto tra polo fisso e polo mobile <i>Verify proper contact between poles fixed and movable poles</i>
<b>Contatti ausiliari / Auxiliary contact</b>		Verificare la congruenza tra il segnale generato dai contatti ausiliari e la posizione della leva di comando <i>Check the consistency between the signal generated by the auxiliary contacts and the position of the control lever</i>

### 3.3. Prova di funzionamento meccanico / Mechanical functional test

Norma di riferimento / Standard reference	EN 60077-1 par. 9.3.1
Numero di cicli / Number of cycle	20
<b>Verifica</b>	
<ul style="list-style-type: none"> <li>– Chiaviere: verificare la corretta sequenza di rotazione delle chiavi / <i>Verify the correct sequence of the key rotation</i></li> </ul>	

- Verificare la corretta movimentazione della leva dalla posizione di SERVICE, GROUNDING REC ed AT GROUNDING e viceversa / Verify the correct movement of the lever from the SERVICE position to GROUNDING REC and AT GROUNDING position and vice versa
- verificare il corretto contatto tra polo fisso e polo mobile / Verify proper contact between poles fixed and movable poles

### **3.4. Prove dielettriche / Dielectric test**

Norma di riferimento / Standard reference	EN 60077-1 par. 9.3.3
---	-----------------------

#### **3.4.1. Rigidità dielettrica / Dielectric strength**

Eseguire la prova con il sezionatore in posizione di "SERVICE", ovvero con contatti tutti aperti.  
Perform the test with the disconnector switch is in "SERVICE" position with all open contacts.

##### **Modalità di esecuzione / Execution modality**

Tensione nominale / Nominal voltage	Tensione di prova / Test Voltage	Acceptance criteria
3000 V d.c.	12000 V – 50 Hz – 60s	I ≤ 20 mA

#### **3.4.2. Prova di isolamento elettrico circuiti ausiliari / Insulation test**

Norma di riferimento / Standard reference	EN 50155
---	----------

##### **Modalità di esecuzione / Execution modality**

Tensione nominale / Nominal voltage	Tensione di prova / Test voltage	Acceptance criteria
24 V dc	500 Vcc	R≥100MΩ

### **3.5. Misura della resistenza di contatto dei contatti A.T./ HV Contact resistance**

Effettuare la misura della resistenza di contatto e verificare che il valore sia inferiore ai limiti prefissati  
Perform the measurement of contact resistance and verify that the value is lower than the limits

##### **Strumentazione / Instrumentation**

Alimentatore / Power Supply
-----------------------------

N° 2 multimetri / 2 Multimeter
--------------------------------

Shunt per la verifica della corrente impostata / Shunt in order to verify the setting current
---

Conduttori per i collegamenti necessari / Cables
--

Contatto / Contact	Verifica / Verify
--------------------	-------------------

1R – 2R	Verificare che la resistenza di contatto sia inferiore a 0,5 mΩ / Verify that the contact resistance is less than 0,5mΩ
---------	---

High voltage contacts	Verificare che la resistenza di contatto sia inferiore a 10 mΩ / Verify that the contact resistance is less than 10 mΩ
-----------------------	--

## 4.PROVE DI TIPO / TYPE TESTS

### 4.1. Controllo visivo e dimensionale / Visual & Dimensional Inspection

Vedere paragrafo 3.1 / See par. 3.1

### 4.2. Prova funzionale / Functional test

Vedere paragrafo 3.2 / See par. 3.2

### 4.3. Prova funzionamento meccanico / Mechanical functional test

Vedere paragrafo 3.3 / See par. 3.3

### 4.4. Prova della forza di azionamento / Lever force test

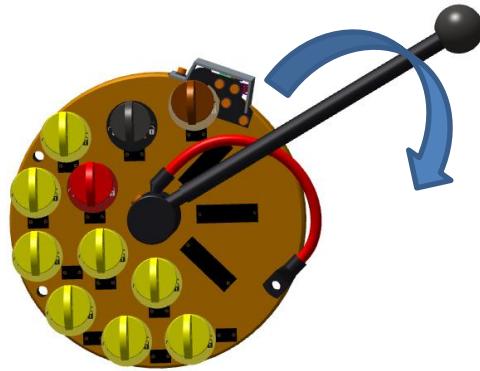
#### Strumentazione / Instrumentation

Dinamometro con risoluzione di 0.5 N / Dynamometer with a resolution of 0.5 N

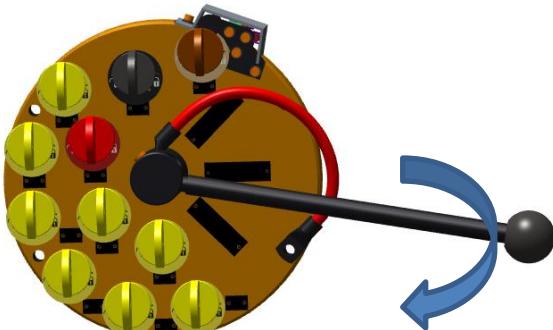
#### Esecuzione della prova / Execution test

- Abilitare il sezionatore / Enabling the disconnector switch
- Verificare lo sforzo necessario per spostare la leva:

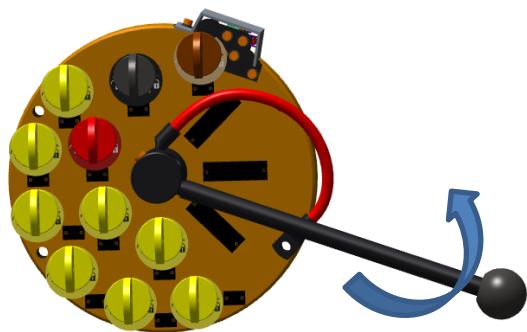
- Verso il basso, in uscita dalla posizione SERVICE / Down, out of the SERVICE position



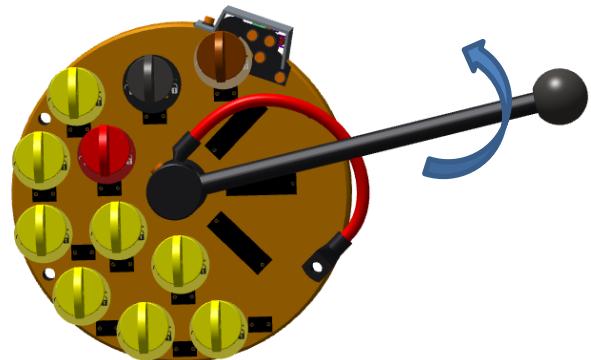
- Verso il basso, in uscita dalla posizione REC GROUNDING / Down, out of the REC GROUNDING position



- Verso l'alto, in uscita dalla posizione HV GROUNDING / Up, out of the HV GROUNDING position



- Verso l'alto, in uscita dalla posizione REC GROUNDING / Up, out of the REC GROUNDING position



#### Verifica

La forza di azionamento misurata deve essere inferiore a 250 N.

*The driving force measured must be less than 250 N.*

#### 4.5. Prova delle prestazioni funzionali / Functional performance test (life time test)

Norma di riferimento / Reference Standard	EN 60077-2. par. 8.2.8, tab 6 cat. A4, frequency class C2
---	---

##### 4.5.1. Modalità di esecuzione / Execution Modality

N° totale di cicli / Total cycles	125.000
N° cicli per sequenza / Cycles per sequence	25.000

##### 4.5.2. Attività previste durante la prova / Activity during the test

Ispezione visiva / Visual inspection	Tale attività verrà effettuata all'inizio, durante ed a fine della prova
Pulizia del sezionatore / Clean the Disconnector switch	<i>This task will be perform before the start, during and up to the end the test</i>

##### 4.5.3. Criterio di accettazione / Acceptability criteria

Il componente deve funzionare correttamente e non deve riportare alcun tipo di danneggiamento in nessuna delle sue parti  <i>The disconnector switch shall continue to operate as intended during and after the test. Doesn't show any type of failure in all of its parts</i>	Secondo la EN 60077-1 par. 9.3.4.4  <i>As indicated in EN 60077-1 par. 9.3.4.4</i>
--	--

#### 4.6. Prova di urti e vibrazioni / Shock and vibration test

Norma di riferimento / Reference Standard	EN 61373 par.8, 9
Classe / Class	B
Categoria / Category	1

Le prove si considerano superate se, al termine dei test, il componente non riporta nessun tipo di danneggiamento in nessuna delle sue parti, e se lo stesso supera tutte le prove di serie.

*The test is considered passed if, at the end of all the tests, the disconnector doesn't report any type of failure in any of its parts and the disconnector passes the series tests.*

#### 4.7. Sovratemperatura / Temperature rise test

Norma di riferimento / Reference Standard	EN 60077-2 par. 8.2.2
Disegno di riferimento / Reference drawing	D344639
La sovratemperatura dovuta al funzionamento delle parti dell'apparecchiatura, e misurata durante la prova eseguita alla corrente di 800 A non deve superare i seguenti limiti di temperatura	EN 60077-2 par. 8.2.2 tab 2
Parti accessibili	Limiti di sovratemperatura / Temperature rise limits
Mezzi operativi manuali metallici / <i>Manual operating means metallic</i>	75 K

#### Esecuzione della prova / Execution test

La prova viene condotta mettendo il sezionatore nella posizione di SERVICE alla seguente condizione:

- 800 A fintanto che la temperatura ha raggiunto un valore di regime

La sovratemperatura causata dal passaggio della corrente nominale non deve superare i 75K.

La conclusione del test è decretata dal fatto che il transitorio termico del dispositivo sia esaurito; questa condizione è verificata quando l'incremento della massima sovratemperatura registrata sia inferiore o uguale al 1K in 1 ora

*Temperature rise test is performed in SERVICE position about Disconnector Switch at the following conditions:*

- 800 A until the temperature reaches a steady value

*The over-temperature achieved at thermal transient concluded must not exceed 75 K.*

*Referring to the normal operating temperature and ventilation, this limit (fixed for the laboratory test) ensures that the device doesn't reach temperature values causing a change to the component behavior.*

*The test ends when the thermal transient is concluded; in particular, this condition is considered verified when the increase of the max overtemperature reached, is less than 1k per 1 hour.*

**4.8. Prove dielettriche / Dielectric test**

Vedere paragrafo 3.4 / see par. 3.4

**4.9. Misura della resistenza di contatto dei contatti A.T. / HV contact resistance**

Vedere paragrafo 3.5 / see par. 3.5

## 5.RISULTATI / RESULTS

Di seguito sono elencati i risultati delle prove di tipo eseguite sul sezionatore, di cui al capitolo 4.



<b>5.1. Controllo visivo e dimensionale / Visual and dimensional inspection</b>	
Paragrafo di riferimento / Reference paragraph	4.1
Procedura e Report di riferimento / Reference docs	D345899, D346003
Esito/Result	<b>CONFORME / COMPLIANT</b>
<b>5.2. Prova funzionale / Functional test</b>	
Paragrafo di riferimento / Reference paragraph	4.2, 4.3
Procedura e Report di riferimento / Reference docs	D345900, D346005
Esito/Result	<b>CONFORME / COMPLIANT</b>
<b>5.3. Prova della forza di azionamento / Lever force test</b>	
Paragrafo di riferimento / Reference paragraph	4.4
Procedura e Report di riferimento / Reference docs	D345901, D346004
Esito/Result	<b>CONFORME / COMPLIANT</b>
<b>5.4. Prova delle prestazioni funzionali / Functional performance test (life time test)</b>	
Paragrafo di riferimento / Reference paragraph	4.5
Procedura e Report di riferimento / Reference docs	D345902, D345904
Esito/Result	
<b>5.5. Prova di urti e vibrazioni / Shock and vibration test</b>	
Paragrafo di riferimento / Reference paragraph	4.6
Report di riferimento / Reference report	VR1527001SP; D345265 Report – Routest – DSC_D344640 – After Shock & Vibration
Esito/Result	<b>CONFORME / COMPLIANT</b>
<b>5.6. Sovratesteratura / Temperature rise test</b>	
Paragrafo di riferimento / Reference paragraph	4.7
Report di riferimento / Reference report	D345992
Esito/Result	<b>CONFORME / COMPLIANT</b>
<b>5.7. Prove dielettriche / Dielectric test</b>	
Paragrafo di riferimento / Reference paragraph	4.8
Procedura e Report di riferimento / Reference docs	D345905 , D346007
Esito/Result	<b>CONFORME / COMPLIANT</b>
<b>5.8. Misura della resistenza dei contatti A.T.</b>	
Paragrafo di riferimento / Reference paragraph	4.9
Procedura e Report di riferimento / Reference report	D345906, D346006
Esito/Result	<b>CONFORME / COMPLIANT</b>

D345265 -Report - Routest - DSC\_D344640 - After Shock &amp; Vibration - E402A sn A1506999

**ROUTINE TEST REPORT AFTER SHOCK & VIBRATION TEST  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**



S/N:

A1506999

**1. CONTROLLO VISIVO-DIMENSIONALE / VISUAL AND DIMENSIONAL INSPECTION**

ESITO / RESULT:

OK

**2. PROVE DIELETTRICHE / DIELECTRIC TESTS**

Circuit type	Prova Test	SPII Code	Next Calib.	Misura Measure	ESITO Result	
Auxiliary Circuits (Low voltage)	Isolamento / Electrical Insulation Test Minimum Resistance (500Vdc)	1164	10/15	>2000 MΩ	OK	
	Rigidità dielettrica / Dielectric Strength Test Maximum Current (750Vac)	666	10/15	0,1 mA	OK	
	Isolamento / Electrical Insulation Test Minimum Resistance (500Vdc)	1164	10/15	>2000 MΩ	OK	
Main Circuits (High voltage)	Prova di Rigidità dielettrica / Dielectric Strength Test Maximum Current (12000Vac)	TEST#1 TEST#2 TEST#3 TEST#4	666 666 666 666	10/15 10/15 10/15 10/15	0,5 mA 0,5 mA 0,5 mA 0,5 mA	OK OK OK OK

**3. PROVA DI FUNZIONAMENTO MECCANICO/ ELECTRICAL FUNCTIONALITY TEST**

Componente / Components	Esito Result
Leva di manovra / Drive Lever	OK
Interblocchi meccanici / Meccanical InterLocks	OK
Chiave / Key BEIGE	OK
Chiave / Key BLACK with bracelet	OK
Chiave / Key RED	OK
N°8 Chiavi / N°8 Keys YELLOW	OK

#### 4. PROVA DI FUNZIONALITA' ELETTRICA / ELECTRICAL FUNCTIONALITY TEST

Componente / Components	Esito Result
Disconnecter Position Signals (μSw. A, B, C, D, F1 - F2)	OK
HV GND contacts (1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16)	OK
HV REC contacts (1R-2R. 2R-3R)	OK

#### 5. RESISTENZE DI CONTATTO / CONTACT RESISTANCES

Componente / Components	Misura Measure	Esito Result
Contatto / Contact #1	2,600 mΩ	OK
Contatto / Contact #2	1,400 mΩ	OK
Contatto / Contact #15	2,060 mΩ	OK
Contatto / Contact #16	1,030 mΩ	OK
Contatto / Contact 2R-3R	0,043 mΩ	OK
Contatto / Contact 1R-3R	0,044 mΩ	OK

#### 6. DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY

<b>Il Collaudatore Responsabile</b> The Inspector	<b>Collaudo/Test</b>
<b>Nome/Name:</b> Andrea Biraghi	<b>Data/Date:</b> 25/09/2015
Firma/Signature	
	

D345904\_00 - Report - LIFT - DSC\_D344640 Type\_Test\_Report E402A

**TYPE TEST REPORT  
FUNCTIONAL PERFORMANCE TEST  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**



### 1. DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS

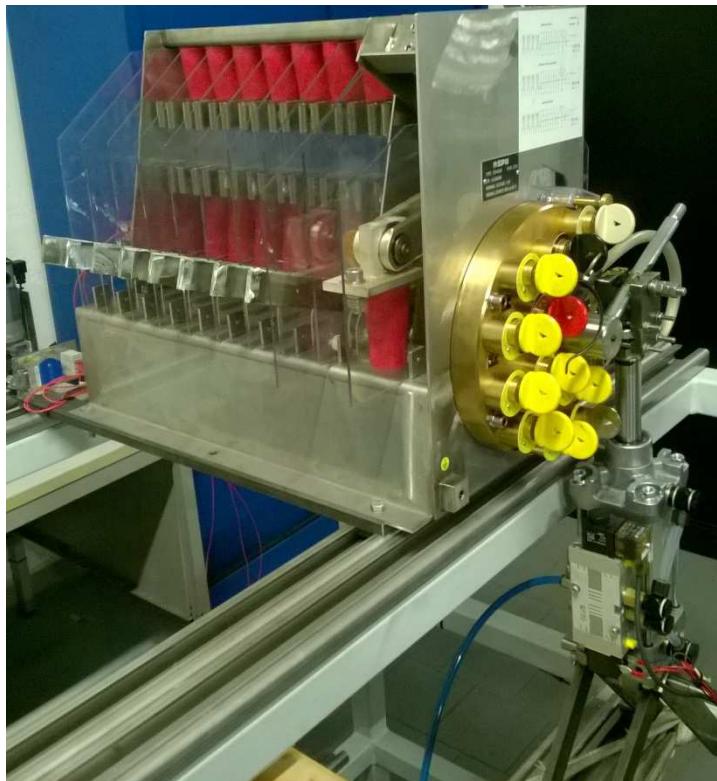
Documenti / Documents	
Type Test Procedure	D346902
Functional Test Procedure	D345265
User Manual	D346027

### 2. CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	From 20/11/2015 to 20/01/2016
Temperatura / Temperature [°C]	20°C
Umidità / Humidity [% UR]	65% UR

### 3. OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST

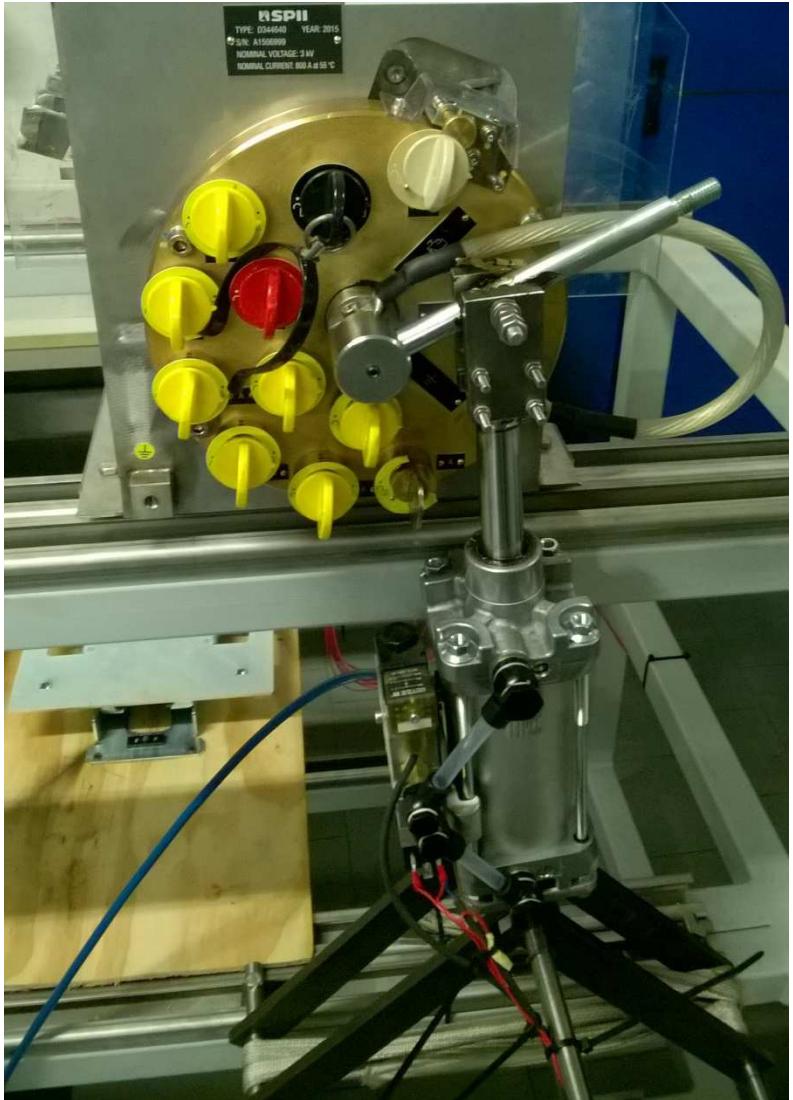
Tipo / Type	DISCONNECTOR SWITCH
Codice / ID	D344640
SN	A1506999

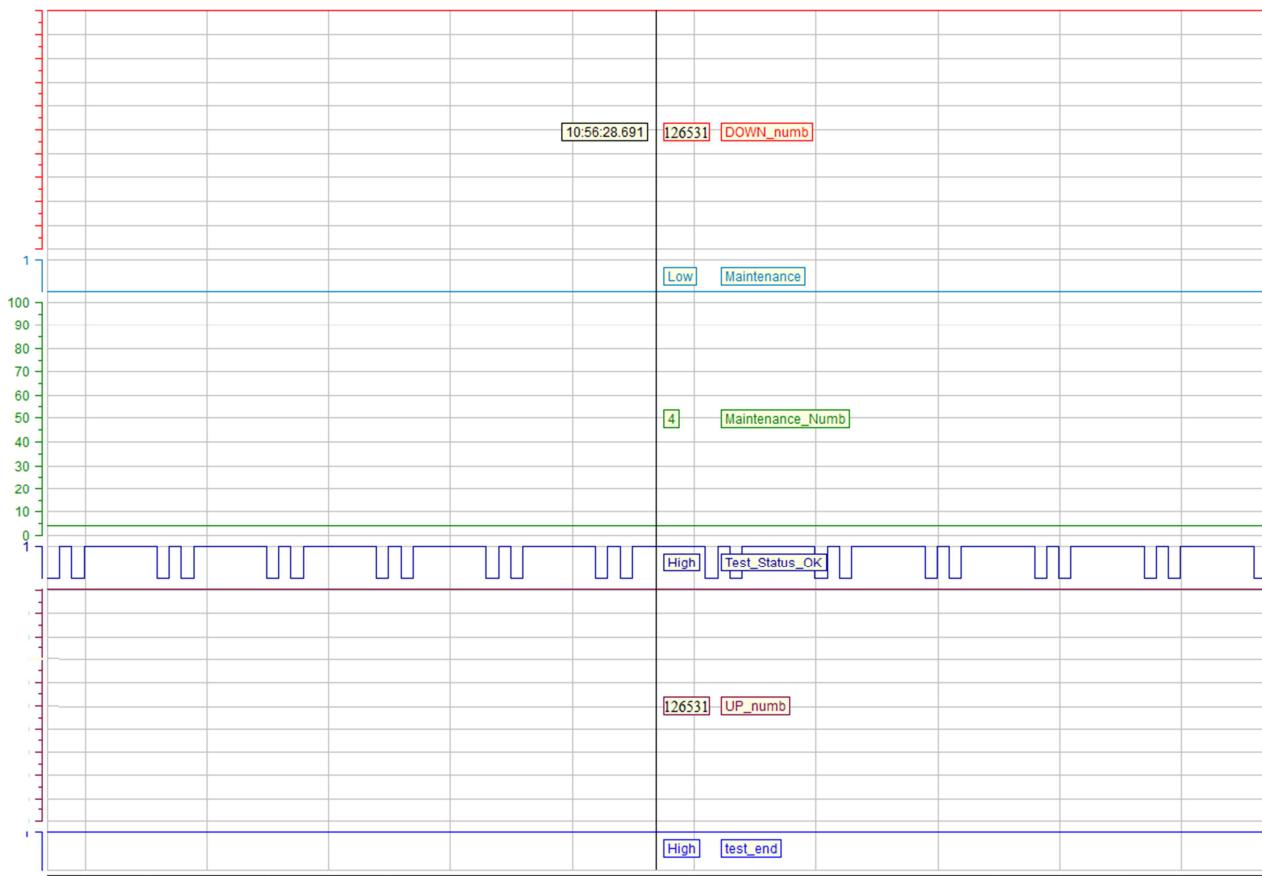


#### 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

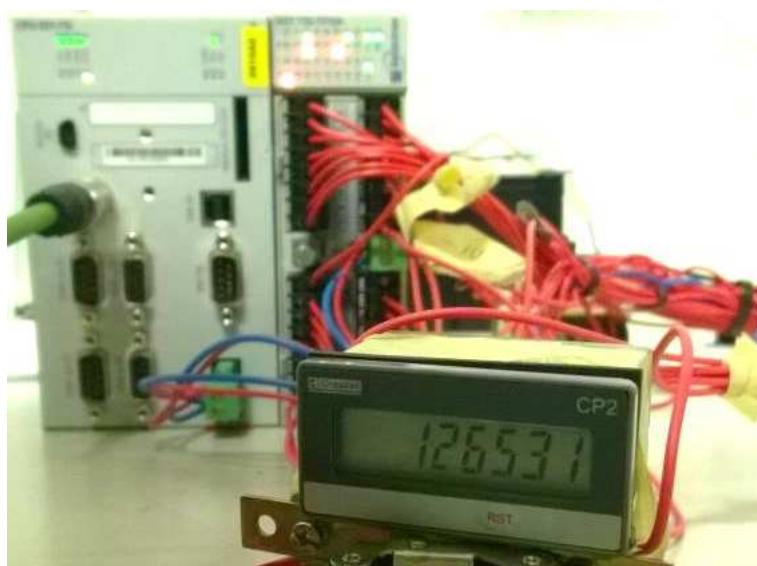
#	Strumenti / Instruments	Caratteristiche / Characteristics
1	Type: Stabilized Power Supply code SPII : 916 Next Calibration: 09/16	Model GW Insteek GPS 3030
2	Type: PLC	Model Selectron CPU 831 TG
3	Type: Pneumatic Cyclinder	Model Rexroth Bosch 80mm 3000N max
4	Type: Counter	Model 1x Crouzet CP2

#### 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

Type Test	Note / Notes
	

**PLC Data Log Result:**

LogItem	X	Y
DOWN_numb	10:56:28.691	126531
Maintenance	10:56:28.691	Low
Maintenance_Numb	10:56:28.691	4
Test_Status_OK	10:56:28.691	High
UP_numb	10:56:28.691	126531
test_end	10:56:28.691	High



**Functional Performance Test Summary**

Category	Number
Number of Downward position	126.531
Number of Upward position	126.531
Maintenance (Visual Check/Lubricant)	4

**Functional Tests after 125.000 Cycles**

Category	Result			
Visual Inspection	OK			
Mechanical Functionality Test	OK			
Effort lever test	Closing to Earthing	Opening from Earthing	OK	
	$F_{AV} = 162,0 \text{ N}$	$F_{AV} = 140,5 \text{ N}$	OK	
Electrical Functionality Test	OK			
Contact Resistance Test - Target: 1) HV contacts - MAT=10mΩ 2) HV 1R - 2R/3R =0,5mΩ	HVs - MAT max	1R_2R	1R_3R	OK
	3mΩ	0,16mΩ	0,25mΩ	

## RISULTATI / RESULTS

<b>Functional performance Test</b>	
EuT	DSC D344640
Standard Reference	EN 60077-2 - 8.2.8
<b>Esito / Result</b>	<b>COMPLIANT</b>

## 6.CONCLUSIONI / CONCLUSIONS

Conclusioni / Conclusions	<i>DSC is compliant against EN 60077-2- 8.2.8.</i>
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## 7.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY

<b>Il Collaudatore Responsabile</b> The Inspector	<b>Test</b>
<b>Nome/Name:</b> Andrea Biraghi	<b>Data/Date:</b> 20/01/2016
<b>Firma/Signature</b> 	

D345992\_00 TEMPRISE - DSC\_D344640 Type\_Test\_Report Temp Rise Test E402A

**TYPE TEST REPORT  
TEMPERATURE RISE TEST  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**

**1.DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS**

Documenti / Documents	
Type Test Procedure	D345903
Drawing	D344640

**2.CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS**

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	14/10/2015
Temperatura / Temperature [°C]	19°C
Umidità / Humidity [% UR]	65% UR

**3.OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST**

Tipo / Type	Earthing Manual Disconnector Switch
Codice / ID	D344640
S/N	A1506999



## 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

#	Strumenti / Instruments															
1	Power Supply: Current source Type: GWinstek Multi-Range DC power Supply 1080W PSW30-108 GE089, next calibration 03/2015															
2	Power Supply: Current source Type: Giussani 9909R10 <table border="1"> <thead> <tr> <th></th> <th>Voltage</th> <th>Frequency</th> <th>Current</th> <th>type</th> </tr> </thead> <tbody> <tr> <td>Input</td> <td>400 V a.c.</td> <td>50Hz</td> <td>-</td> <td>3 Phases</td> </tr> <tr> <td>Output</td> <td>6 V d.c.</td> <td>-</td> <td>Up to 4000A dc</td> <td>Direct Current</td> </tr> </tbody> </table>		Voltage	Frequency	Current	type	Input	400 V a.c.	50Hz	-	3 Phases	Output	6 V d.c.	-	Up to 4000A dc	Direct Current
	Voltage	Frequency	Current	type												
Input	400 V a.c.	50Hz	-	3 Phases												
Output	6 V d.c.	-	Up to 4000A dc	Direct Current												
3	Temperature Acquisition & Data-Log System equipped with thermo-couple probes. Type: Plasma Spark <table border="1"> <thead> <tr> <th colspan="2">Temperature Probes &amp; Acquisition "Plasma Spark"</th> </tr> </thead> <tbody> <tr> <td>Analogical Input</td> <td>16 Channel input</td> </tr> <tr> <td>Sensors</td> <td>Thermocouples</td> </tr> <tr> <td>Resolution</td> <td>±0,1K</td> </tr> <tr> <td>Digital Output</td> <td>LPT parallel port</td> </tr> <tr> <td>Sampling Rate</td> <td>1 S/s per channel</td> </tr> <tr> <td>Data-Log</td> <td>Dedicated PC</td> </tr> </tbody> </table>	Temperature Probes & Acquisition "Plasma Spark"		Analogical Input	16 Channel input	Sensors	Thermocouples	Resolution	±0,1K	Digital Output	LPT parallel port	Sampling Rate	1 S/s per channel	Data-Log	Dedicated PC	
Temperature Probes & Acquisition "Plasma Spark"																
Analogical Input	16 Channel input															
Sensors	Thermocouples															
Resolution	±0,1K															
Digital Output	LPT parallel port															
Sampling Rate	1 S/s per channel															
Data-Log	Dedicated PC															
4	#1 Multimeter Fluke 189 cod. GE026, next calibration 03/2016															
5	#1 Multimeter Fluke 177 cod. 1250, next calibration 01/2016															
6	#1 Shunt resistance 100A 60mV cod. GE091, next calibration 04/2017															
7	#2 Conduttori con S = 240mm <sup>2</sup> / #2 Conductors with S = 240mm <sup>2</sup>															

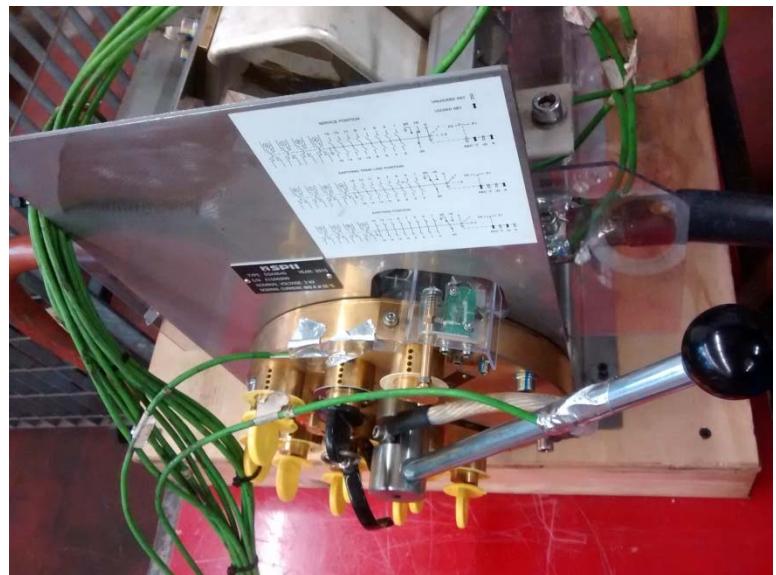
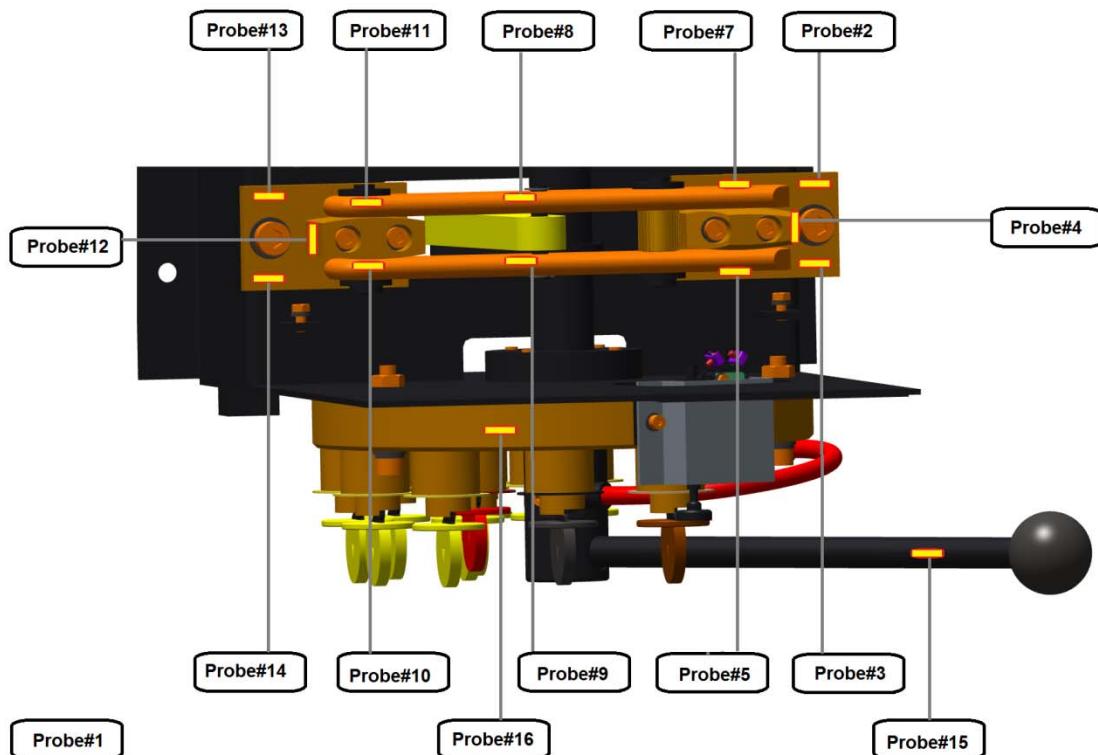
## 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

Type Test	Note / Notes
<p>1) Misura Resistenza di Contatto su contatto REC 1R-2R con DSC in posizione "SERVICE"  <i>/ Measurement of electrical resistance between REC 1R-2R contact; DSC in "SERVICE" position.</i></p> <p>2) Prova di Sovratesteratura alimentando il DSC in posizione "SERVICE" con I=In=800A ai contatti REC 1R-2R fino a raggiungimento del regime termico. /  <i>Temperature Rise Test to the DSC in "SERVICE" position, with I=In=800A between REC 1R-2R contact until the thermal transient is extinguished.</i></p> <p>3) Misura della caduta di tensione con I=In=800A sul contatto REC 1R-2R con DSC in posizione "SERVICE"  <i>/ Measurement of voltage drop with I=In=800A between REC 1R-2R contact with DSC in "SERVICE" position.</i></p> <p>4) Misura Resistenza di Contatto alla conclusione della prova di Sovratesteratura /  <i>Measurement of electrical resistance at the end of Temperature Rise Test.</i></p>	<p>Prova superata se /  <i>Test Passed if:</i></p> <ul style="list-style-type: none"> <li>- La sovratesteratura <math>\Delta T</math> causata dalla corrente nominale non eccede 75K (come affermato dalla EN 60077-2) dopo il raggiungimento del regime termico:  <math display="block">\frac{\Delta(\Delta T)}{1h} \leq 1K/h</math> </li> </ul> <p><i>The <math>\Delta T</math> overtemperature caused by nominal current must not exceed 75K (according to EN 60077-2) after thermal transient:</i></p> $\frac{\Delta(\Delta T)}{1h} \leq 1K/h$

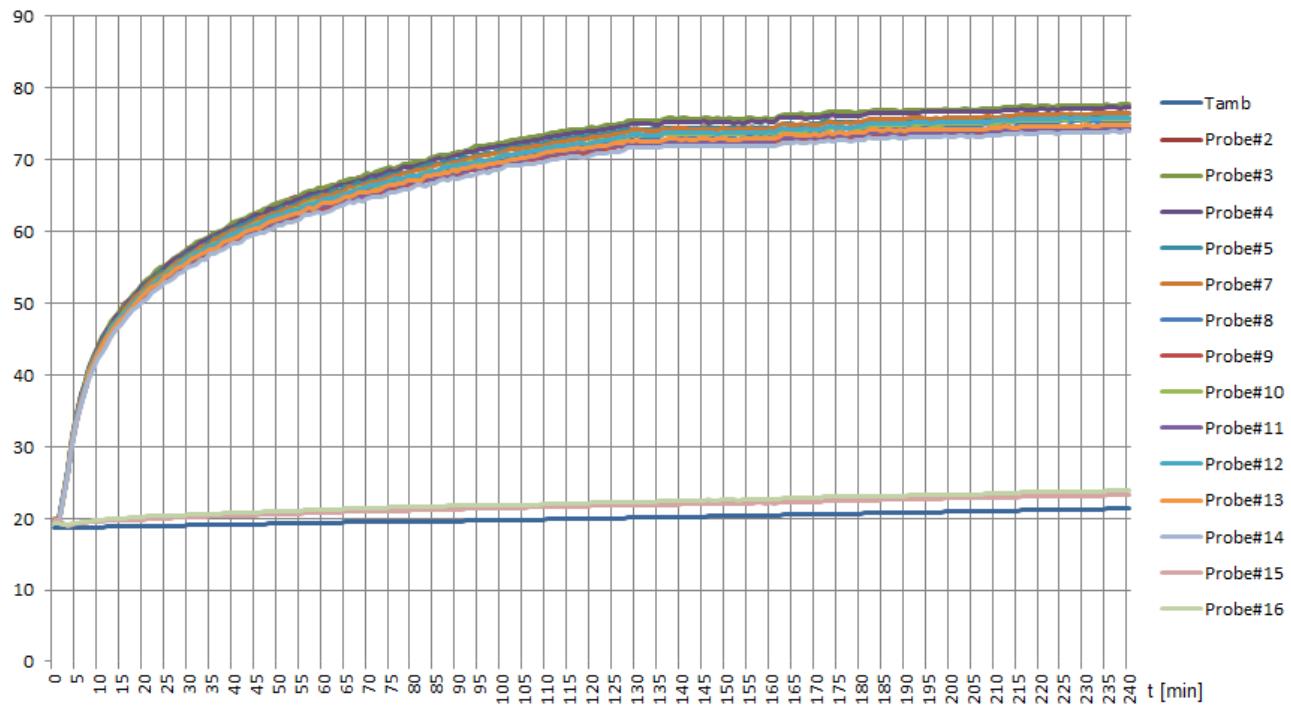
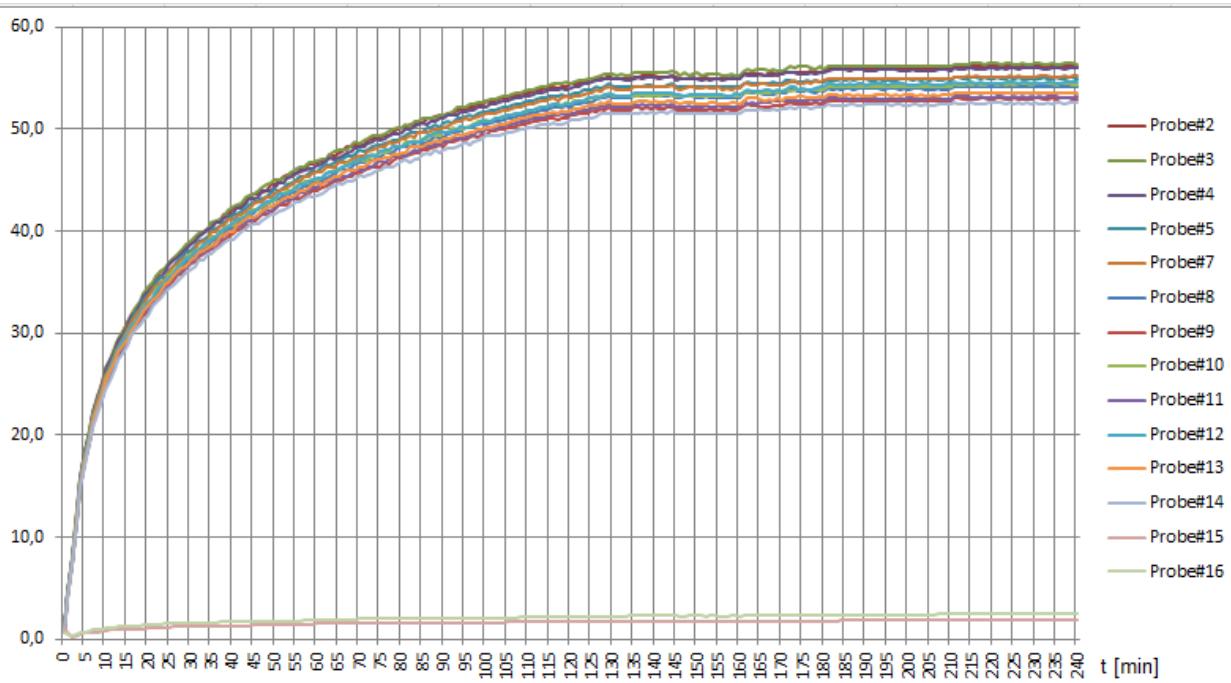
Type Test	Note / Notes
<p>1) Misura Resistenza di Contatto su contatto REC 1R-2R con DSC in posizione "SERVICE" <i>/ Measurement of electrical resistance between REC 1R-2R contact; DSC in "SERVICE" position.</i></p>  <p>Instrument Used: [1], [4], [5], [6], [7].</p>	
<p><b>Esito / Result:</b></p> <p><math>I_S = 100A</math> <math>V_1 = \Delta V = 4,432mV</math></p> <p>Resistance Measured = <math>R_{1R-2R} = 0,044\text{ m}\Omega</math></p>	

Type Test	Note / Notes
<p>2) Prova di Sovratesteratura alimentando il DSC in posizione "SERVICE" con <math>I=I_N=800A</math> ai contatti REC 1R-2R fino a raggiungimento del regime termico. / <i>Temperature Rise Test to the DSC in "SERVICE" position, with <math>I=I_N=800A</math> between REC 1R-2R contact until the thermal transient is extinguished.</i></p>	
<p>Strumenti Utilizzati / Instrument Used: [2], [3], [7].</p> <p>Test Setup:</p> 	

Posizionamento delle sonde di temperatura / Temperature probes arranging:



NB: Probe#1 = Temperature Ambient

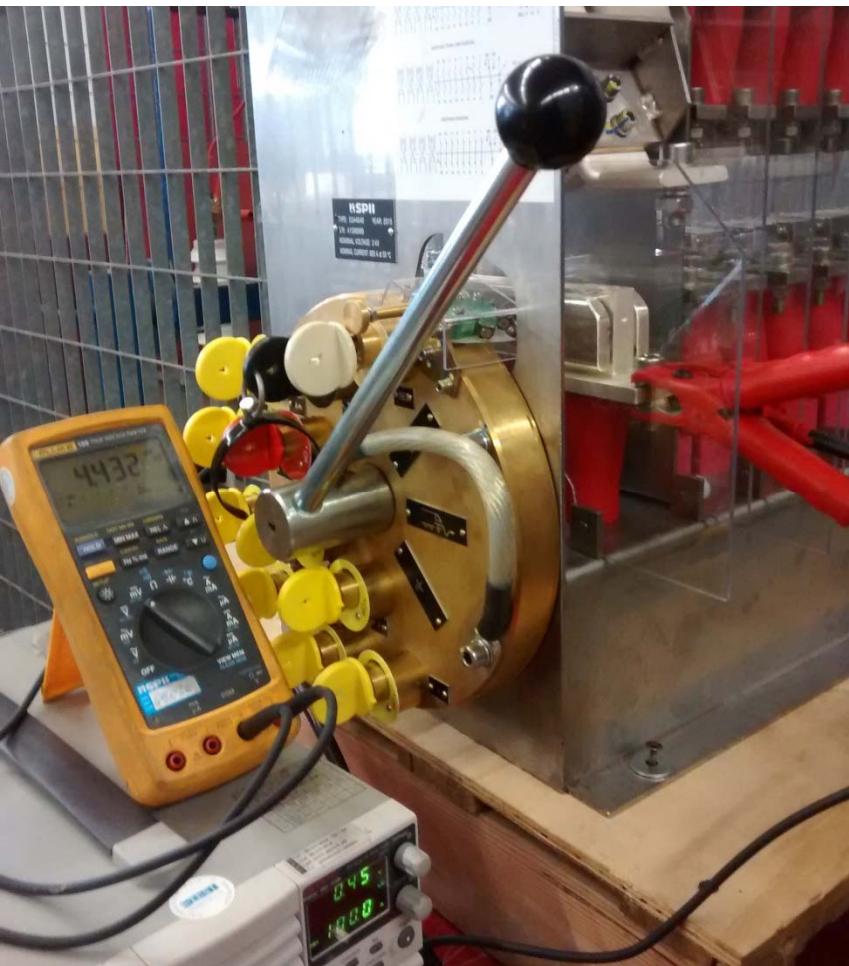
**Esito / Result:****Temperature Rilevate [°C] / Sampled Temperature [°C]****Sovrateperature  $\Delta T$  [K] / Over-Temperature  $\Delta T$  [K]**

**Massime Sovrateperature raggiunte  $\Delta T$  [K] / Maximum Over-Temperature reached  $\Delta T$  [K]:**

Probe#1	-
Probe#2	56,2 K
Probe#3	56,4 K
Probe#4	56,0 K
Probe#5	55,1 K
Probe#7	55,2 K
Probe#8	54,2 K
Probe#9	53,0 K
Probe#10	54,4 K
Probe#11	53,2 K
Probe#12	54,6 K
Probe#13	53,6 K
Probe#14	52,6 K
Probe#15	01,9 K
Probe#16	02,5 K

**Durata transitorio termico / Thermal Transient Duration: 180 minutes**

Type Test	Note / Notes
3) Misura della caduta di tensione con $I=I_N=800A$ sul contatto REC 1R-2R con DSC in posizione "SERVICE" <i>Measurement of voltage drop with <math>I=I_N=800A</math> between REC 1R-2R contact with DSC in "SERVICE" position.</i>  <i>Instrument Used: [2], [4].</i>	
<b>Esito / Result:</b>  $I_S = 800A$ $V_1 = \Delta V = 35,21 \text{ mV}$	

Type Test	Note / Notes
<p>4) Misura Resistenza di Contatto su contatto REC 1R-2R con DSC in posizione "SERVICE" <i>/ Measurement of electrical resistance between REC 1R-2R contact; DSC in "SERVICE" position.</i></p>  <p>Instrument Used: [1], [4], [5], [6], [7].</p>	
<p><b>Esito / Result:</b></p> <p><math>I_S = 100A</math> <math>V_1 = \Delta V = 4,444 \text{ mV}</math></p> <p>Resistance Measured = <math>R_{1R-2R} = 0,044 \text{ m}\Omega</math></p>	

## 6.RISULTATI / RESULTS

<b>HV Contact Resistance</b>	
Documento di riferimento / <i>Reference document</i>	D345903 par. 4.1
<b>Esito / Result</b>	<b>CONFORME / COMPLIANT</b>
<b>Temperature Rise Test</b>	
Documento di riferimento / <i>Reference document</i>	D345903 par. 4.2
<b>Esito / Result</b>	<b>CONFORME / COMPLIANT</b>
<b>Voltage Drop at 800A</b>	
Documento di riferimento / <i>Reference document</i>	D345903 par. 4.3
<b>Esito / Result</b>	<b>CONFORME / COMPLIANT</b>
<b>HV Contact Resistance</b>	
Documento di riferimento / <i>Reference document</i>	D345903 par. 4.4
<b>Esito / Result</b>	<b>CONFORME / COMPLIANT</b>

## 7.CONCLUSIONI / CONCLUSIONS

Conclusioni / Conclusions	Il DSC D344640 ha superato la prova di sovratemperatura in accordo con lo standard EN 60077 - 2. <i>The DSC D344640 has passed the Temperature Rise Test according to EN 60077 - 2.</i>
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## 8.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY

<b>Il Collaudatore Responsabile</b> The Inspector	<b>Collaudo/Test</b>
<b>Nome/Name:</b> Andrea Biraghi	<b>Data/Date:</b> 16/10/2015
<b>Firma/Signature</b>  .....	.....

D345899\_00 - Type\_Test\_Proc - DSC\_D344640 Visual &amp; Dimensional Inspection E402A

**TYPE TEST REPORT  
VISUAL AND DIMENSIONAL INSPECTION  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**

**1.DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS**

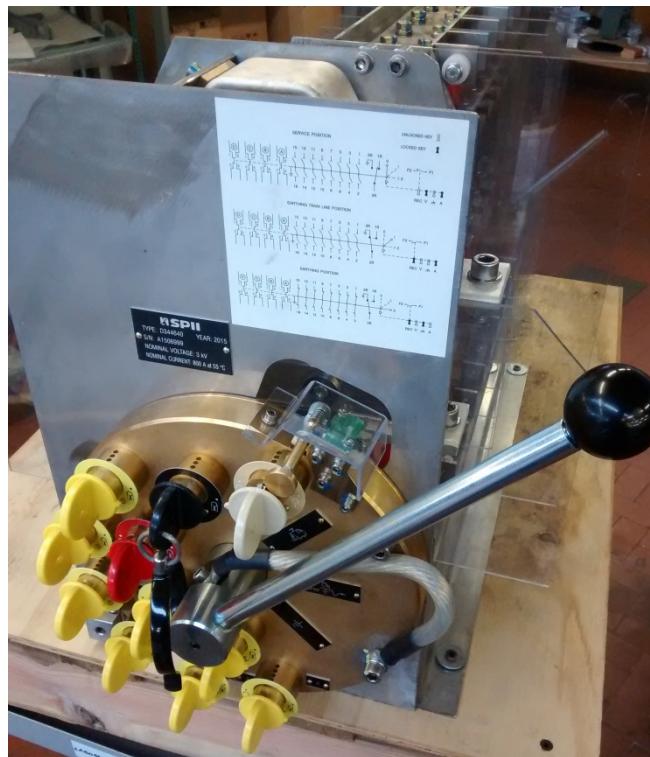
Documenti / Documents	
Type Test Procedure	D345899
Drawing	D345886

**2.CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS**

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	04/11/2015
Temperatura / Temperature [°C]	25°C
Umidità / Humidity [% UR]	55% UR

**3.OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST**

Tipo / Type	Earthing Manual Disconnector Switch
Codice / ID	D344640
S/N	A1506999

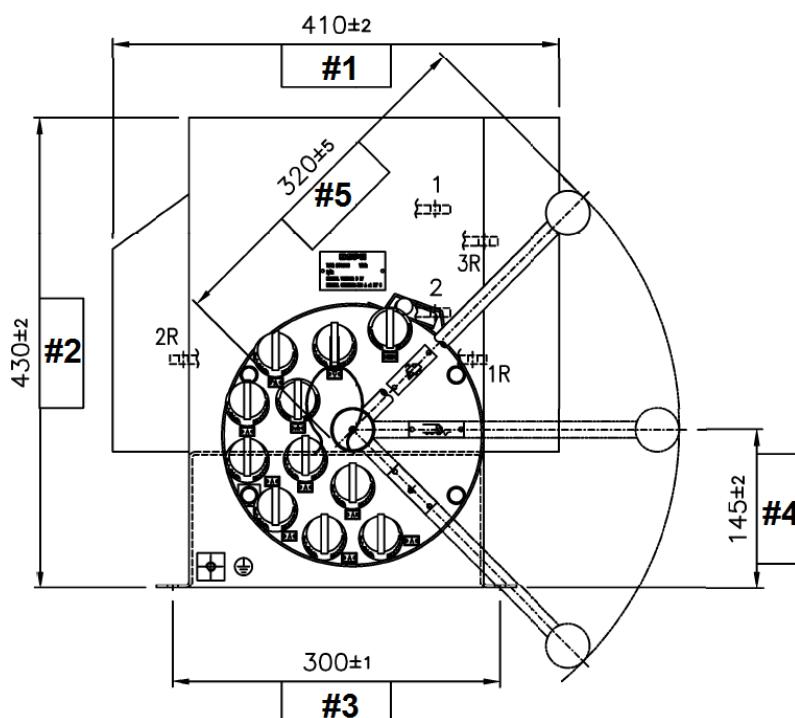


## 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

#	Strumenti / Instruments	Caratteristiche / Characteristics
1	Caliper 885, scad 04/16	Portata / Range: 650 mm Sensibilità / sensibility: 0.01 mm
2	Caliper 994, scad 04/16	Portata / Range: 300 mm Sensibilità / sensibility: 0.01 mm
3	Caliper 1260, scad 05/17	Portata / Range: 510 mm Sensibilità / sensibility: 0.01 mm
4	Bilancia / Balance – DINI ARGEO (codice / code SPII 1217) Scad. Taratura: 05/16	Portata / Range: 15 kg Sensibilità / sensibility: 0.01 kg

## 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

Type Test	Note / Notes
A. Controllo visivo / Visual Check	1. Integrità del prodotto / Product integrity 2. Assenza di difetti costruttivi / Absence of constructive defect 3. Targhette Identificative / Identification plates 4. Chiavi Accessorie / Keys
B. Controllo della massa del DSC / Check of DSC Weight: Nominal Mass: $52,5 \pm 5\%$ kg	5. Massa Misurata / Actual Mass: 52,5 kg
Quote / Quotas	
C. Controllo dimensionale / Dimensional Inspection	6. Vedi / See doc. D345886
Quote / Quotas	



<i>Misure sperimentali / experimental measurements</i>	<i>Risultato/ Result</i>	<i>Note</i>																						
<p><u>#1:</u> Acceptability criteria: <math>(410 \pm 2,0)</math></p> <table border="1"> <thead> <tr> <th>#</th><th>Measure [mm]</th></tr> </thead> <tbody> <tr><td>1</td><td>409,8</td></tr> <tr><td>2</td><td>409,6</td></tr> <tr><td>3</td><td>409,7</td></tr> <tr><td>4</td><td>409,9</td></tr> <tr><td>5</td><td>409,7</td></tr> <tr><td>6</td><td>409,8</td></tr> <tr><td>7</td><td>410,2</td></tr> <tr><td>8</td><td>409,8</td></tr> <tr><td>9</td><td>410,2</td></tr> <tr><td>10</td><td>410,2</td></tr> </tbody> </table>	#	Measure [mm]	1	409,8	2	409,6	3	409,7	4	409,9	5	409,7	6	409,8	7	410,2	8	409,8	9	410,2	10	410,2	409,89 mm	<i>Direct measure of the size</i>
#	Measure [mm]																							
1	409,8																							
2	409,6																							
3	409,7																							
4	409,9																							
5	409,7																							
6	409,8																							
7	410,2																							
8	409,8																							
9	410,2																							
10	410,2																							
<p><u>#2:</u> Acceptability criteria: <math>(430 \pm 2,0)</math></p> <table border="1"> <thead> <tr> <th>#</th><th>Measure [mm]</th></tr> </thead> <tbody> <tr><td>1</td><td>430,5</td></tr> <tr><td>2</td><td>430,5</td></tr> <tr><td>3</td><td>430,5</td></tr> <tr><td>4</td><td>430,7</td></tr> <tr><td>5</td><td>430,3</td></tr> <tr><td>6</td><td>430,5</td></tr> <tr><td>7</td><td>430,6</td></tr> <tr><td>8</td><td>430,3</td></tr> <tr><td>9</td><td>430,6</td></tr> <tr><td>10</td><td>430,3</td></tr> </tbody> </table>	#	Measure [mm]	1	430,5	2	430,5	3	430,5	4	430,7	5	430,3	6	430,5	7	430,6	8	430,3	9	430,6	10	430,3	430,48 mm	<i>Direct measure of the size</i>
#	Measure [mm]																							
1	430,5																							
2	430,5																							
3	430,5																							
4	430,7																							
5	430,3																							
6	430,5																							
7	430,6																							
8	430,3																							
9	430,6																							
10	430,3																							
<p><u>#3:</u> Acceptability criteria: <math>(300 \pm 1,0)</math></p> <table border="1"> <thead> <tr> <th>#</th><th>Measure [mm]</th></tr> </thead> <tbody> <tr><td>1</td><td>299,50</td></tr> <tr><td>2</td><td>299,83</td></tr> <tr><td>3</td><td>299,88</td></tr> <tr><td>4</td><td>300,12</td></tr> <tr><td>5</td><td>299,64</td></tr> <tr><td>6</td><td>300,26</td></tr> <tr><td>7</td><td>299,48</td></tr> <tr><td>8</td><td>300,16</td></tr> <tr><td>9</td><td>300,21</td></tr> <tr><td>10</td><td>299,82</td></tr> </tbody> </table>	#	Measure [mm]	1	299,50	2	299,83	3	299,88	4	300,12	5	299,64	6	300,26	7	299,48	8	300,16	9	300,21	10	299,82	299,89 mm	<i>Direct measure of the size</i>
#	Measure [mm]																							
1	299,50																							
2	299,83																							
3	299,88																							
4	300,12																							
5	299,64																							
6	300,26																							
7	299,48																							
8	300,16																							
9	300,21																							
10	299,82																							

#4:

Acceptability criteria:  $(145 \pm 2,0)\text{mm}$ 

#	Measure [mm]
1	144,48
2	144,58
3	144,44
4	144,28
5	144,51
6	145,16
7	145,08
8	144,46
9	145,20
10	144,72

144,69 mm

*Direct measure of the size*

#5:

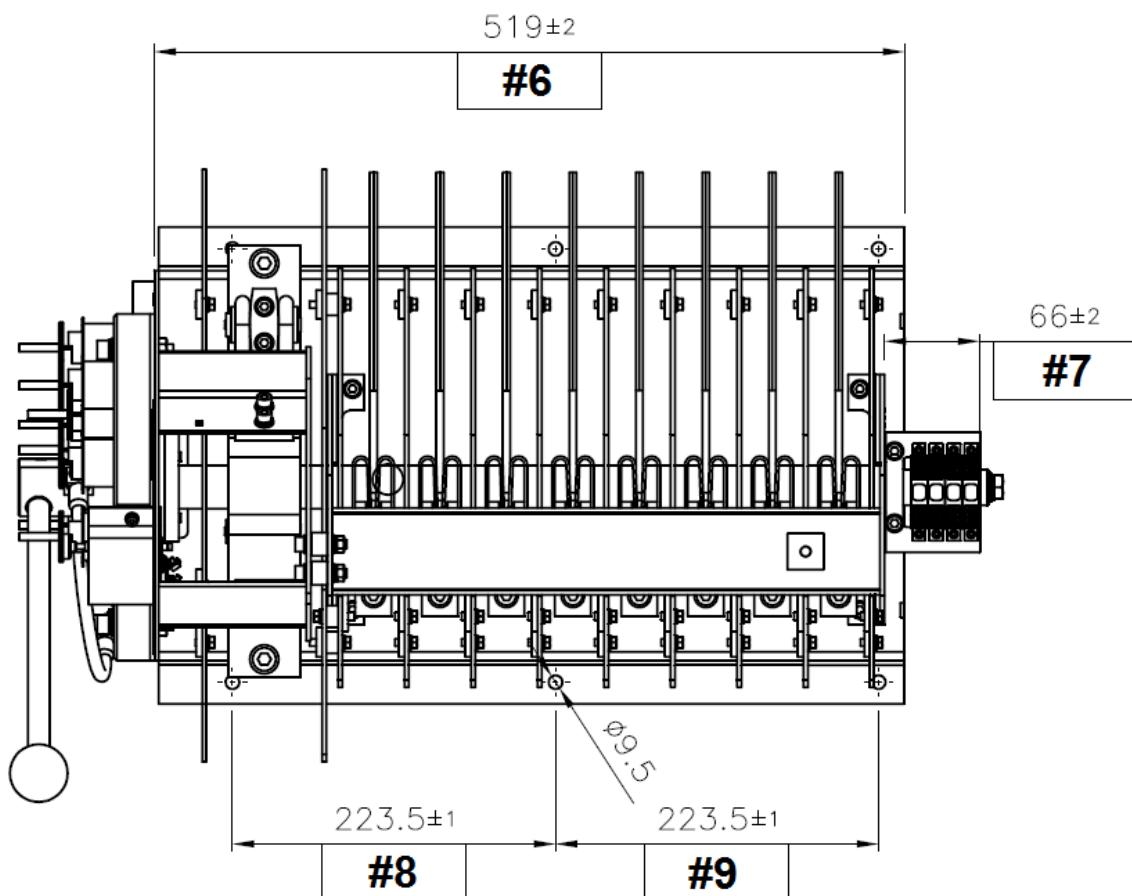
Acceptability criteria:  $(320 \pm 5,0)\text{mm}$ 

#	Measure [mm]
1	318,30
2	318,32
3	318,35
4	318,30
5	318,40
6	318,35
7	318,27
8	318,33
9	318,34
10	318,40

318,33 mm

*Direct measure of the size*

## Quote / Quotas



Misure sperimentali / experimental measurements	Risultato/ Result	Note																						
<p><u>#6:</u> Acceptability criteria: <math>(519 \pm 2,0)\text{mm}</math></p> <table border="1"> <thead> <tr> <th>#</th><th>Measure [mm]</th></tr> </thead> <tbody> <tr><td>1</td><td>519,90</td></tr> <tr><td>2</td><td>519,20</td></tr> <tr><td>3</td><td>518,75</td></tr> <tr><td>4</td><td>519,11</td></tr> <tr><td>5</td><td>518,91</td></tr> <tr><td>6</td><td>519,07</td></tr> <tr><td>7</td><td>518,96</td></tr> <tr><td>8</td><td>518,50</td></tr> <tr><td>9</td><td>519,03</td></tr> <tr><td>10</td><td>518,92</td></tr> </tbody> </table>	#	Measure [mm]	1	519,90	2	519,20	3	518,75	4	519,11	5	518,91	6	519,07	7	518,96	8	518,50	9	519,03	10	518,92	519,03 mm	<i>Direct measure of the size</i>
#	Measure [mm]																							
1	519,90																							
2	519,20																							
3	518,75																							
4	519,11																							
5	518,91																							
6	519,07																							
7	518,96																							
8	518,50																							
9	519,03																							
10	518,92																							

#7:

Acceptability criteria:  $(66 \pm 2,0)\text{mm}$ 

#	Measure [mm]
1	65,89
2	66,32
3	66,35
4	65,84
5	66,17
6	65,91
7	66,06
8	65,90
9	66,16
10	65,85

66,04 mm

*Direct measure of the size*

#8:

Acceptability criteria:  $(223,5 \pm 1,0)\text{mm}$ 

#	Measure [mm]
1	223,11
2	223,26
3	223,45
4	223,04
5	223,18
6	223,35
7	223,37
8	223,28
9	223,18
10	223,11

223,23 mm

*Direct measure of the size*

#9:

Acceptability criteria:  $(223,5 \pm 1,0)\text{mm}$ 

#	Measure [mm]
1	223,21
2	223,28
3	223,45
4	223,61
5	223,54
6	223,09
7	223,18
8	223,53
9	223,61
10	223,48

223,39 mm

*Direct measure of the size*

## 6.RISULTATI / RESULTS

<b>Controllo Visivo / Visual Check</b>	
Scopo / Scope	Controllo Visivo / Visual Check
Disegni di riferimento <i>Reference drawings</i>	D345886 D344640
Documento di riferimento / <i>Reference document</i>	D344920 D345899
<b>Esito / Result</b>	<b>COMPLY / CONFORME</b>
<b>Massa del DSC / DSC Mass</b>	
Scopo / Scope	Controllo della massa del DSC / DSD Mass Check
Disegni di riferimento <i>Reference drawings</i>	D345886
<b>Esito / Result</b>	<b>COMPLY / CONFORME</b>
<b>Controllo Dimensionale / Dimensional Inspection</b>	
Scopo	Controllo delle dimensioni del DSC / DSD Dimensional Inspection
Disegni di riferimento <i>Reference drawings</i>	D345886
<b>Esito / Result</b>	<b>COMPLY / CONFORME</b>

## 7.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY

<p><b>Il Collaudatore Responsabile</b> <b>The Inspector</b></p> <p><b>Nome/Name:</b> .....FABIO DE VENZ.....</p> <p><b>Firma/Signature</b></p>  <p>.....</p>	<p><b>Collaudo/Test</b></p> <p><b>Data/Date:</b> .....04/11/2015.....</p>
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D345901\_00 - Type\_Test\_Proc - DSC\_D344640 Lever Force Test

**TYPE TEST REPORT  
LEVER FORCE TEST  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**



### 1.DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS

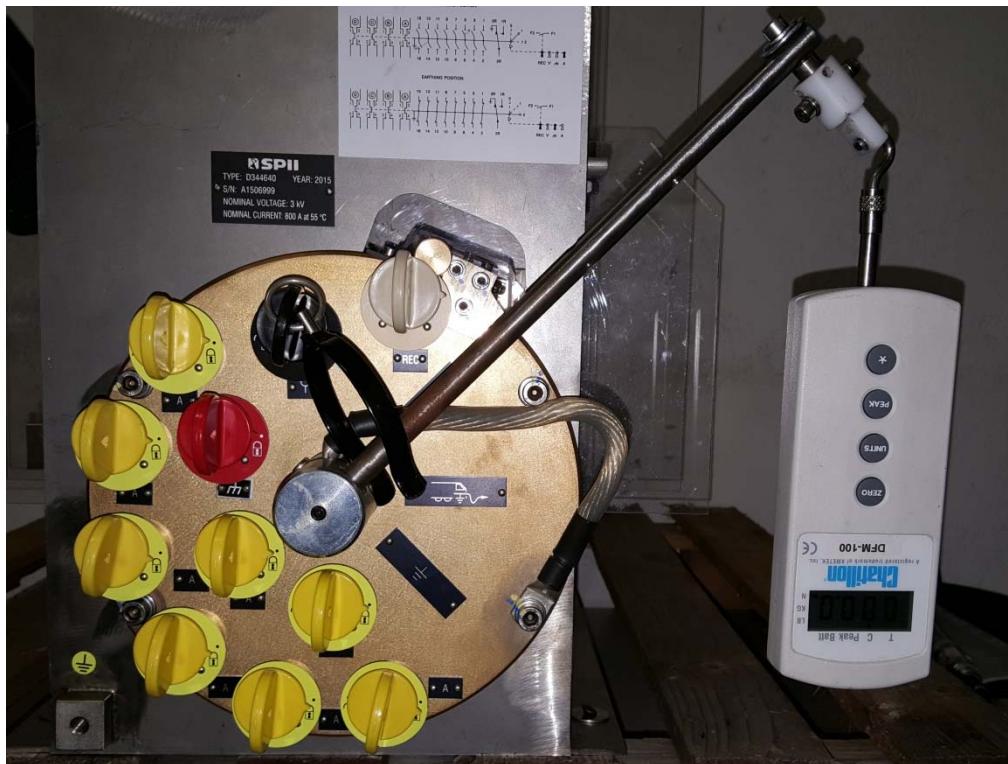
Documenti / Documents	
Type Test Procedure	D345901
Drawing	D344640

### 2.CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	23/11/2015
Temperatura / Temperature [°C]	24°C
Umidità / Humidity [% UR]	55% UR

### 3.OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST

Tipo / Type	Earthing Manual Disconnector Switch
Codice / ID	D344640
S/N	A1507001



#### 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

#	Strumenti / Instruments	Caratteristiche / Characteristics
1	Dinamometro digitale / Digital Dinamometer – CHATILLON – DFM100 Codice SPII / SPII code 979 Scadenza taratura / next calibration : 01/16	Portata / Range: 500 N Sensibilità / Sensibility: 0.5 N

#### 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

Misure Sperimentali	Risultato / Result												
5.1. Verso il basso, in uscita dalla posizione SERVICE / Down, out of the SERVICE position  Acceptability criteria: ≤ 250 N  <table border="1"><thead><tr><th>#</th><th>Misura / Measure [N]</th></tr></thead><tbody><tr><td>1</td><td>75</td></tr><tr><td>2</td><td>70</td></tr><tr><td>3</td><td>70</td></tr><tr><td>4</td><td>75</td></tr><tr><td>5</td><td>75</td></tr></tbody></table>	#	Misura / Measure [N]	1	75	2	70	3	70	4	75	5	75	73 N
#	Misura / Measure [N]												
1	75												
2	70												
3	70												
4	75												
5	75												
5.2. Verso il basso, in uscita dalla posizione REC GROUNDING / Down, out of the REC GROUNDING position  Acceptability criteria: ≤ 250 N  <table border="1"><thead><tr><th>#</th><th>Misura / Measure [N]</th></tr></thead><tbody><tr><td>1</td><td>235</td></tr><tr><td>2</td><td>230</td></tr><tr><td>3</td><td>240</td></tr><tr><td>4</td><td>235</td></tr><tr><td>5</td><td>230</td></tr></tbody></table>	#	Misura / Measure [N]	1	235	2	230	3	240	4	235	5	230	234 N
#	Misura / Measure [N]												
1	235												
2	230												
3	240												
4	235												
5	230												

5.3. Verso l'alto, in uscita dalla posizione HV GROUNDING / Up, out of the HV GROUNDING position

Acceptability criteria: ≤ 250 N

#	Misura / Measure [N]
1	180 N
2	175 N
3	180 N
4	185 N
5	175 N

179 N

5.4. Verso l'alto, in uscita dalla posizione REC GROUNDING / Up, out of the REC GROUNDING position

Acceptability criteria: ≤ 250 N

#	Misura / Measure [N]
1	60
2	65
3	55
4	60
5	60

60 N

**6.RISULTATI / RESULTS**

<b>Lever force test</b>	
Scopo / Scope	Prova di azionamento della leva / Lever force test
Disegno di riferimento <i>Reference drawings</i>	D344640
Documento di riferimento / <i>Reference document</i>	D345901
<b>Esito / Result</b>	<b>CONFORME / COMPLY</b>

**7.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY**

<b>Il Collaudatore Responsabile The Inspector</b>  <b>Nome/Name:</b> .....FABIO DE VENZ.....  <b>Firma/Signature</b> .....	<b>Collaudo/Test</b>  <b>Data/Date:</b> .....23/11/2015.....
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D345900\_00 - Type\_Test\_Proc - DSC\_D344640 Functional Test E402A

**TYPE TEST REPORT  
FUNCTIONAL TEST  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**



### 1.DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS

Documenti / Documents	
Type Test Procedure	D345900
Drawing	D344640

### 2.CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	20/10/2015
Temperatura / Temperature [°C]	26°C
Umidità / Humidity [% UR]	56% UR

### 3.OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST

Tipo / Type	Earthing Manual Disconnector Switch
Codice / ID	D344640
S/N	A1506999



#### 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

#	Strumenti / Instruments	Caratteristiche / Characteristics
1	Type: Multimeter code SPII :1250 Next Calibration 01/16	Fluke 177

#### 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

Type Test	Note / Notes
A. PROVA DI FUNZIONAMENTO MECCANICO / <i>MECHANICAL OPERATION TEST</i>	✓
B. PROVA DI FUNZIONALITA' ELETTRICA / <i>ELECTRICAL FUNCTIONALITY TEST</i>	✓

## 6.RISULTATI / RESULTS

<b>Mechanical Test</b>	
Scopo / Scope	Prova di Funzionamento Meccanico / Mechanical Operation Test
Disegno di riferimento <i>Reference drawings</i>	D344640
Documento di riferimento / <i>Reference document</i>	D345900
Esito / Result	<b>CONFORME / COMPLY</b>
<b>Electrical Test</b>	
Scopo / Scope	Prova di Funzionalita' Elettrica / Electrical Functionality Test
Disegni di riferimento <i>Reference drawings</i>	D344640
Esito / Result	<b>CONFORME / COMPLY</b>

## 7.CONCLUSIONI / CONCLUSIONS

Conclusioni / Conclusions	<i>L'oggetto risulta conforme alla prova funzionale / The equipment results comply for the functional test</i>
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## 8.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY

<b>Il Collaudatore Responsabile The Inspector</b>  <b>Nome/Name:</b> .....ANDREA BIRAGHI.....  <b>Firma/Signature</b> ..... 	<b>Collaudo/Test</b>  <b>Data/Date:</b> .....20/10/2015.....
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D345906\_00 - Type\_Test\_Proc - DSC\_D344640 CNTRES Test E402A

**TYPE TEST REPORT  
CONTACT RESISTANCES MEASUREMENT TEST  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**

**1.DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS**

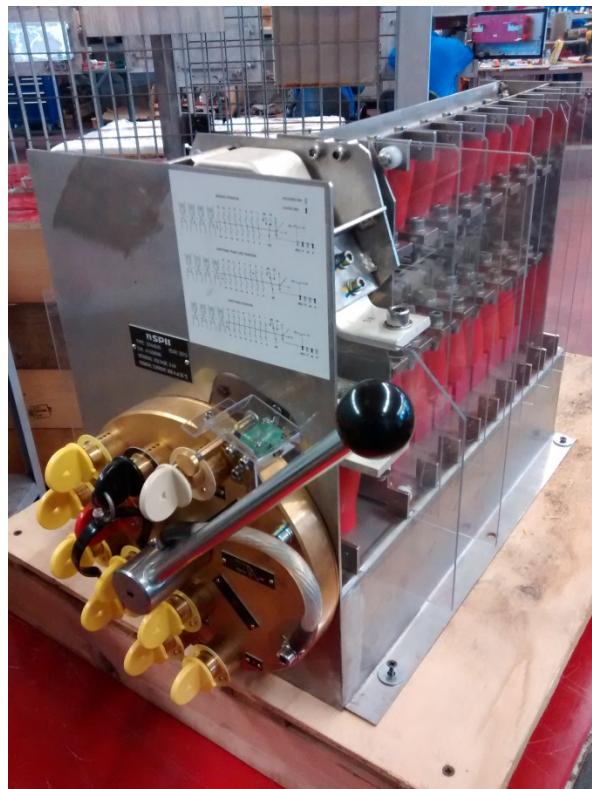
Documenti / Documents	
Type Test Procedure	D345906
Drawing	D344640

**2.CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS**

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	27/10/2015
Temperatura / Temperature [°C]	24°C
Umidità / Humidity [% UR]	52% UR

**3.OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST**

Tipo / Type	Earthing Manual Disconnector Switch
Codice / ID	D344640
S/N	A1506999



#### 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

#	Strumenti / Instruments	Caratteristiche / Characteristics
1	Multimeter, SPII code: 1250, Scad. 01/16	Fluke 177
2	Power Supply	100A
3		
4		
5		

#### 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

Type Test	Note / Notes
<p>Misura della resistenze di contatto / Contact Resistances Measurement</p> <p>Si utilizza il metodo volt-amperometrico / <i>It was used the Volt- Amperometric method:</i></p> <ol style="list-style-type: none"><li>1) Si alimenta ciascun contatto con 100A dc; / <i>For each contact, power supply with 100A dc.</i></li><li>2) Si misura, mediante multimetro, la c.d.t. V1 [mV] sui morsetti considerati./ <i>Using a multimeter, it's to be measured the voltage drop V1 [mV] between the contact considered.</i></li><li>3) Si calcola la resistenza di contatto. <math>V1/100 = [\text{m}\Omega]</math> / <i>It's to be calculated the Contact Resistance: <math>V1/100 = [\text{m}\Omega]</math>.</i></li></ol>	<p>7) Si è ripetuta la misura di ciascun contatto per 5 volte. / <i>It was repeated the measurement of each contact for 5 times</i></p> <p>8) Per il valore di ciascuna resistenza si è calcolato il valore medio <math>R_{AV}</math> e scarto quadratico medio "e": / <i>For each resistance, the average value <math>R_{AV}</math> and the standard deviation "e" was calculated as follow:</i></p> $\bar{R} = \frac{1}{5} \sum_{i=1}^{10} R_i$ $e = \frac{1}{5-1} \sum_{i=1}^{10} (R_i - \bar{R})^2$

			Note / Notes												
#1: 01 - GND Poles Acceptability criteria: R ≤10,0mΩ	<table border="1"><thead><tr><th>#</th><th>Measure [mΩ]</th></tr></thead><tbody><tr><td>1</td><td>0,194</td></tr><tr><td>2</td><td>0,195</td></tr><tr><td>3</td><td>0,190</td></tr><tr><td>4</td><td>0,195</td></tr><tr><td>5</td><td>0,195</td></tr></tbody></table>	#	Measure [mΩ]	1	0,194	2	0,195	3	0,190	4	0,195	5	0,195	0,1938 mΩ	<i>Volt-Amperometric Method</i>
#	Measure [mΩ]														
1	0,194														
2	0,195														
3	0,190														
4	0,195														
5	0,195														
#2: 02 - GND Poles Acceptability criteria: R ≤10,0mΩ	<table border="1"><thead><tr><th>#</th><th>Measure [mΩ]</th></tr></thead><tbody><tr><td>1</td><td>0,194</td></tr><tr><td>2</td><td>0,193</td></tr><tr><td>3</td><td>0,193</td></tr><tr><td>4</td><td>0,194</td></tr><tr><td>5</td><td>0,195</td></tr></tbody></table>	#	Measure [mΩ]	1	0,194	2	0,193	3	0,193	4	0,194	5	0,195	0,1938 mΩ	<i>Volt-Amperometric Method</i>
#	Measure [mΩ]														
1	0,194														
2	0,193														
3	0,193														
4	0,194														
5	0,195														
#3: 03 - GND Poles Acceptability criteria: R ≤10,0mΩ	<table border="1"><thead><tr><th>#</th><th>Measure [mΩ]</th></tr></thead><tbody><tr><td>1</td><td>0,190</td></tr><tr><td>2</td><td>0,189</td></tr><tr><td>3</td><td>0,191</td></tr><tr><td>4</td><td>0,189</td></tr><tr><td>5</td><td>0,189</td></tr></tbody></table>	#	Measure [mΩ]	1	0,190	2	0,189	3	0,191	4	0,189	5	0,189	0,1896 mΩ	<i>Volt-Amperometric Method</i>
#	Measure [mΩ]														
1	0,190														
2	0,189														
3	0,191														
4	0,189														
5	0,189														

## #4: 04 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,194
2	0,194
3	0,195
4	0,194
5	0,194

0,1942 mΩ

*Volt-Amperometric Method*

## #5: 05 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,191
2	0,191
3	0,190
4	0,191
5	0,190

0,1906 mΩ

*Volt-Amperometric Method*

## #6: 06 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,187
2	0,185
3	0,186
4	0,185
5	0,184

0,1854 mΩ

*Volt-Amperometric Method*

## #7: 07 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,183
2	0,184
3	0,185
4	0,184
5	0,183

0,1838 mΩ

*Volt-Amperometric Method*

## #8: 08 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,180
2	0,179
3	0,177
4	0,178
5	0,177

0,1782 mΩ

*Volt-Amperometric Method*

## #9: 09 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,179
2	0,178
3	0,178
4	0,177
5	0,176

0,1776 mΩ

*Volt-Amperometric Method*

## #10: 10 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,178
2	0,178
3	0,177
4	0,176
5	0,175

0,1768 mΩ

*Volt-Amperometric Method*

## #11: 11 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,177
2	0,178
3	0,175
4	0,174
5	0,174

0,1756 mΩ

*Volt-Amperometric Method*

## #12: 12 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,174
2	0,175
3	0,174
4	0,173
5	0,174

0,174 mΩ

*Volt-Amperometric Method*

## #13: 13 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,171
2	0,171
3	0,172
4	0,171
5	0,170

0,171 mΩ

*Volt-Amperometric Method*

## #14: 14 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,169
2	0,168
3	0,169
4	0,168
5	0,168

0,1684 mΩ

*Volt-Amperometric Method*

## #15: 15 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,168
2	0,165
3	0,167
4	0,167
5	0,168

0,167 mΩ

*Volt-Amperometric Method*

## #16: 16 - GND Poles

Acceptability criteria:  $R \leq 10,0\text{m}\Omega$ 

#	Measure [mΩ]
1	0,165
2	0,164
3	0,164
4	0,162
5	0,164

0,1638 mΩ

*Volt-Amperometric Method*

## #17: 1R - 2R REC Poles

Acceptability criteria:  $R \leq 0,5\text{m}\Omega$ 

#	Measure [mΩ]
1	0,047
2	0,046
3	0,047
4	0,046
5	0,045

0,0462 mΩ

*Volt-Amperometric Method*

## #18: 1R - 3R REC Poles

Acceptability criteria:  $R \leq 0,5\text{m}\Omega$ 

#	Measure [mΩ]
1	0,052
2	0,049
3	0,050
4	0,051
5	0,050

0,0504 mΩ

*Volt-Amperometric Method***6.RISULTATI / RESULTS**

Contacts Resistance Test	
Scope	Contact Resistances Measurement
Reference document	D345906
Esito / Result	<b>COMPLIANCE</b>

**7.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY**

**Il Collaudatore Responsabile  
The Inspector**

**Nome/Name:**  
.....FABIO DE VENZ.....

**Firma/Signature**



**Collaudo/Test**

**Data/Date:**  
.....27/10/2015.....

D345905\_00 - Type\_Test\_Proc - DSC\_D344640 DIELT\_TEST E402A

**TYPE TEST REPORT  
DIELECTRIC TESTS  
HV MANUAL EARTHING DISCONNECTOR SWITCH  
DSC - D344640 - Loco E402A - CAF**

**1.DOCUMENTI DI RIFERIMENTO / REFERENCE DOCUMENTS**

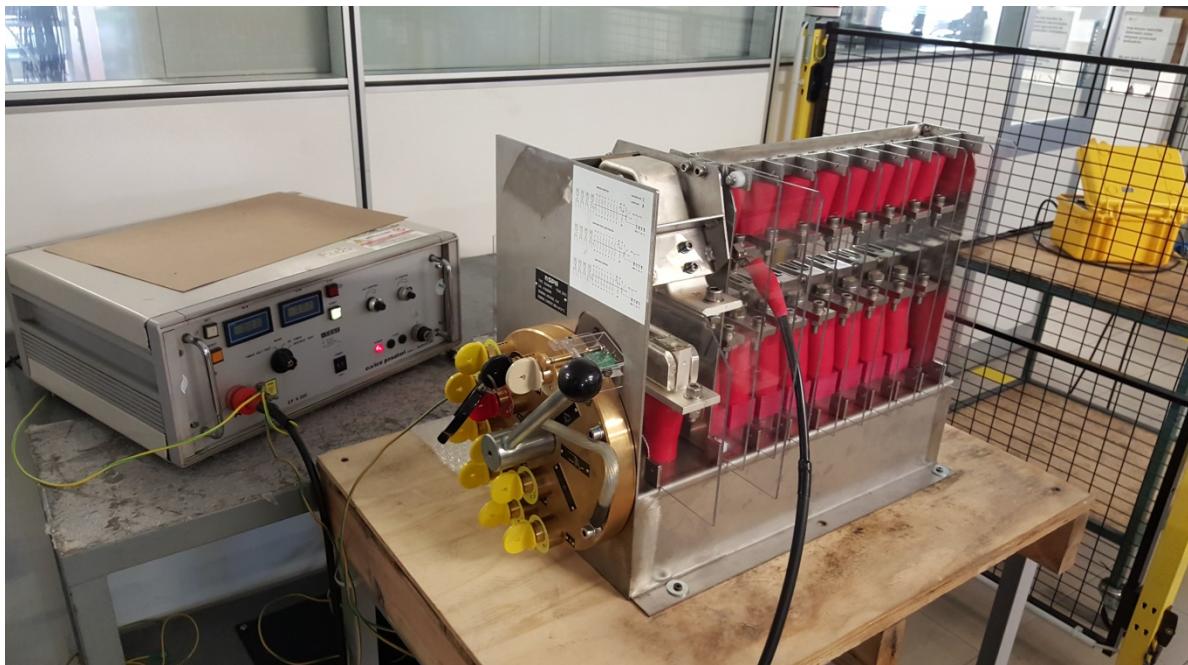
Documenti / Documents	
Type Test Procedure	D345905
Drawing	D344640

**2.CONDIZIONI AMBIENTALI / ENVIRONMENTAL CONDITIONS**

Dati ambientali / Environmental Data	
Data esecuzione Test / Test performance Date	29/10/2015
Temperatura / Temperature [°C]	24°C
Umidità / Humidity [% UR]	55% UR

**3.OGGETTO IN PROVA / EQUIPMENT UNDER THE TEST**

Tipo / Type	Earthing Manual Disconnector Switch
Codice / ID	D344640
S/N	A1506999



#### 4.STRUMENTAZIONE UTILIZZATA / INSTRUMENTATION USED

#	Strumenti / Instruments
1	C.A. 6547 Megaohmeter, SPII code: 1164, next calib: 10/16
2	Rigidohmeter Enirco Pesatori, SPII code 666 , next calib: 10/16

#### 5.ESECUZIONE DELLA PROVA / TEST EXECUTION

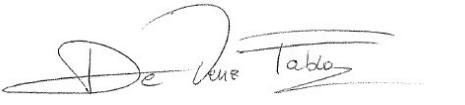
Type Test	Descrizione della prova / Test Description	
Dielectric Test	A. Test#1: EN 50155 - Isolamento Circuiti BT / <i>LV Insulation Test 500Vdc</i>	500Vdc
	B. Test#2: EN 60077-1 - Rigità Dielettrica Circuiti BT / <i>LV Dielectric Strength Test 750Vac 50Hz 60s</i>	750Vac 50Hz 60s
	C. Test#3: EN 50155 - Isolamento Circuiti BT dopo Rigità Dielettrica / <i>LV Insulation Test after Dielectric Strength Test</i>	500Vdc
	D. Test#4: EN 60077-1 - Rigità Dielettrica Circuiti AT / <i>HV Dielectric Strength Test</i>	12000Vac 50Hz 60s
Criterio di Accettabilità / Acceptance Criteria		
A. Test#1: $R \geq 100M\Omega$		
B. Test#2: $I \leq 20mA$		
C. Test#3: $R \geq 100M\Omega$		
D. Test#4: $I \leq 20mA$		

## 6.RISULTATO DEI TEST / TEST RESULTS

<b><i>Dielectric Tests</i></b>			Note / Notes	
Circuiti Circuits	Prova Test	SPII Code	Misura Measure	Esito Result
Auxiliary Circuits (Low voltage)	TEST#1 <i>Electrical Insulation Test</i> Minimum Resistance (500Vdc)	1164	>2000 MΩ	✓
	TEST#2 <i>Dielectric Strength Test</i> Maximum Current (750Vac)	666	0,1 mA	✓
	TEST#3 <i>Electrical Insulation Test</i> Minimum Resistance (500Vdc)	1164	>2000 MΩ	✓
Main Circuits (High voltage)	TEST A) 01 - GND	666	0,5 mA	✓
	TEST B) 02 - GND		0,5 mA	✓
	TEST C) 03 - GND		0,4 mA	✓
	TEST D) 04 - GND		0,4 mA	✓
	TEST E) 05 - GND		0,5 mA	✓
	TEST F) 06 - GND		0,5 mA	✓
	TEST G) 07 - GND		0,5 mA	✓
	TEST J) 08 - GND		0,5 mA	✓
	TEST K) 09 - GND		0,4 mA	✓
	TEST H) 10 - GND		0,4 mA	✓
	TEST I) 11 - GND		0,5 mA	✓
	TEST L) 12 - GND		0,5 mA	✓
	TEST M) 13 - GND		0,4 mA	✓
	TEST N) 14 - GND		0,4 mA	✓
	TEST O) 15 - GND		0,5 mA	✓
	TEST P) 16 - GND		0,5 mA	✓
	TEST Q) 01 - 02		0,4 mA	✓
	TEST R) 1R - 3R		0,5 mA	✓
	TEST S) 2R - 3R		0,5 mA	✓

Dielectric Test	
Esito / Result	COMPLY

**7.DICHIARAZIONE DI CONFORMITA' / DECLARATION OF CONFORMITY**

<b>Il Collaudatore Responsabile The Inspector</b>  <b>Nome/Name:</b> .....FABIO DE VENZ.....  <b>Firma/Signature</b>  .....	<b>Collaudo/Test</b>  <b>Data/Date:</b> .....29/10/2015.....
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