IA – CERTIFICATE

(Review required by MASC as per ARP 0108)

IN TERMS OF REGULATION 21.17.2 OF THE MINERALS ACT (INCORPORATION THE MINE HEALTH AND SAFETY ACT) AND REGULATION 9 (1) OF THE ELECTRICAL MACHINERY REGULATIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

Ex – Type Examination

Certificate number:	MASC M/16-0230X
Equipment:	HS-100 Series Accelerometer
Serial No:	(See "Conditions of Certification")
Applicant:	Hansford Sensors SA
Address:	Unit 31-32 Bueno Vista Office Park Durbanville 7560
Manufacturer:	Hansford Sensors Limited
Address:	Artisan Hillbottom Road Sands Industrial Estate Bucks HP12 4HJ United Kingdom

DESCRIPTION:

The HS-100 Series Accelerometer is designed to measure acceleration, shock or vibration by converting the signal generated by the compression of a Piezo Electric Crystal by a given seismic mass and outputting a broadband ac signal to the monitoring equipment.

The accelerometer comprises a piezo electric crystal connected to a signal conditioning board all contained within a stainless steel enclosure of various shapes measuring approximately 25cm^3. The enclosure is a fully welded construction.

Electrical connections are made to the apparatus either via an IP65 rated connector or via an integral cable which is encapsulated in the end of the apparatus.

The non-fused version of the apparatus (HS-100Mxxxxxxx and HS-100MSxxxxxxx) has the following terminal parameters:

Connector only	10m of Cable	92m of Cable
U_i = 28V	U_i = 28V	U_i = 28V
I_i = 93mA	I_i = 93mA	I_i = 93mA
P_i = 0.65W	P_i = 0.65W	P_i = 0.65W
C_i = 1.0nF	C_i = 19.9nF	C_i = 83nF
L_i = negligible	L_i = 6µH or L_i/P_i = 15.4µ H/Ω	L_i/P_i = 15.4µ H/Ω

/. The fused…

The fused version of the apparatus (HS-100MFxxxxxxx and HS-100SFxxxxxxx) has the following terminal parameters:

Connector only	10m of Cable	92m of Cable
U_i = 16.5V	U_i = 16.5V	U_i = 16.5V
C_i = 1.0nF	C_i = 5nF	C_i = 41nF
L_i = negligible	L_i = 6µH or L_i/P_i = 15.4µ H/Ω	L_i/P_i = 15.4µ H/Ω

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 6.1

To permit additional terminal parameters to be added for connector only variants (no cable included) and 10m of cable. The Annex containing the terminal parameters has been removed and the terminal parameters have been included in the equipment description.

MARKING:

SGS Baseefa marking remains applicable. The following MASC Certificate number (IA number) must be additionally applied to the equipment.

IA No: MASC M/16-0230X

COMPLIANCE:

The equipment as described above and in MASC letter 16-0230 is hereby certified "Explosion Protected" Ex ia I Ma (-55ºC ≤ Ta ≤ +110ºC) and is suitable for use in hazardous locations as stated below and as tested, assessed and inspected in accordance with the relevant requirements of SANS / IEC Standards:

The evaluation was conducted according to the requirements of:

i) **SANS (IEC) 60079-0 : 2012 "Explosive atmospheres – Part 0: Equipment — General requirements"**
ii) **SANS (IEC) 60079-11 : 2012 "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"**

Location	Zone 0, 1 & 2	Mining: Underground
Hazard Frequency	---	Continuous as could occur under normal operating conditions in hazardous area
Environment	Group I	Methane and Coal dust
Surface Temperature		
Service/Ambient Temperature	-55ºC ≤ Ta ≤ +110ºC	

/. The use...

The use of apparatus in hazardous locations is subject to the following provisions as applicable, which shall be adhered to:

i. SANS 10086 requirements;
ii. Any conditions mentioned in the above document;
iii. Codes of Practice enforced in terms of Regulations 21.17.2 of Minerals Act, by Chief Inspector of Mines;
iv. Any restrictions and conditions enforced by Chief Inspectors of Mines, Principal Inspector (Group I equipment) of Chief Inspector of Factories (Group II equipment);
v. Any relevant requirements of the MHS Act or the OHS Act.

CONDITIONS OF MANUFACTURE:

- None

SPECIAL CONDITIONS OF USE (X):

- The Ci of the non-fused version of the equipment (HS-100Mxxxxxxx and HS-100MSxxxxxxx) when fitted with 92m of cable has been increased from 41nF to 83nF.

CONDITIONS OF CERTIFICATION:

1. This Certificate remains valid based on a three yearly review covered by an official MASC letter.
2. The apparatus must be additionally marked with the MASC marking details above.
3. This approval only covers the equipment as certified above and does not include any scheduled additions or variations / amendments / new issues to the certificate(s), made after the above date.
4. The equipment does not need to be re-tested when used on the conditions and with such restrictions as prescribed by SGS Baseefa and in this approval.
5. The SGS Baseefa certification must remain valid.
6. The extent of the requirements in the ARP 0108 (or regulations) and SANS 10108 on the certification of the equipment must remain unchanged.
7. The Ex quality assurance notification/report for the equipment must remain valid.

A. Koekemoer
TECHNICAL OFFICER

F du Toit
TECHNICAL SPECIALIST

Mining And Surface Certification

Mining And Surface Certification (Pty) Ltd

2015/021934/07

GOVERNMENT APPROVED INSPECTION AUTHORITY

Our ref: 16-0230
Enquiries: F du Toit
Tel: (012) 653 2959
Fax: 086 605 8568
Date: 23 February 2016

Hansford Sensors SA
Unit 31-32
Bueno Vista Office Park
Durbanville
7560

HS-100 Series Accelerometer
(Group I - Mining)

This letter is based on the IECEx BAS 07.0037X certificate.

Further to your request, we have evaluated the supplied documentation. The following is applicable:

Description	**Detail**
Requested By :	Hansford Sensors SA Unit 31-32, Bueno Vista Office Park, Durbanville, 7560
Equipment :	Accelerometer
Manufacturer :	Hansford Sensors Limited
Model(s) / Type(s) :	HS-100 Series
Rating :	Ex ia I Ma (-55ºC ≤ Ta ≤ +110ºC)
Certification body :	SGS Baseefa Limited (SGS Baseefa)
Type Certificate No :	IECEx BAS 07.0037X
Variations/Issue/Amendment :	6
Assessment Report No :	GB/BAS/ExTR07.0076/00 GB/BAS/ExTR08.0237/00 GB/BAS/ExTR11.0045/00 GB/BAS/ExTR12.0254/00 GB/BAS/ExTR13.0101/00
Quality Assurance report (QAR) / Notification (QAN) :	GB/BAS/QAR07.0040/06

Standards:	- IEC 60079-0	(2011)	"Explosive atmospheres – Part 0: Equipment — General requirements"
	- IEC 60079-11	(2011)	"Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"

/. The evaluation...

The evaluation was conducted according to the requirements of:

- **SANS (IEC) 60079-0 : 2012 "Explosive atmospheres – Part 0: Equipment — General requirements"**
- **SANS (IEC) 60079-11 : 2012 "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"**

DESCRIPTION OF EQUIPMENT (According to SGS Baseefa Certificate):

The HS-100 Series Accelerometer is designed to measure acceleration, shock or vibration by converting the signal generated by the compression of a Piezo Electric Crystal by a given seismic mass and outputting a broadband ac signal to the monitoring equipment.

The accelerometer comprises a piezo electric crystal connected to a signal conditioning board all contained within a stainless steel enclosure of various shapes measuring approximately 25cm^3. The enclosure is a fully welded construction.

Electrical connections are made to the apparatus either via an IP65 rated connector or via an integral cable which is encapsulated in the end of the apparatus.

The non-fused version of the apparatus (HS-100Mxxxxxxx and HS-100MSxxxxxxx) has the following terminal parameters:

Connector only	10m of Cable	92m of Cable
U_i = 28V	U_i = 28V	U_i = 28V
I_i = 93mA	I_i = 93mA	I_i = 93mA
P_i = 0.65W	P_i = 0.65W	P_i = 0.65W
C_i = 1.0nF	C_i = 19.9nF	C_i = 83nF
L_i = negligible	L_i = 6µH or L_i/P_i = 15.4µ H/Ω	L_i/P_i = 15.4µ H/Ω

The fused version of the apparatus (HS-100MFxxxxxxx and HS-100SFxxxxxxx) has the following terminal parameters:

Connector only	10m of Cable	92m of Cable
U_i = 16.5V	U_i = 16.5V	U_i = 16.5V
C_i = 1.0nF	C_i = 5nF	C_i = 41nF
L_i = negligible	L_i = 6µH or L_i/P_i = 15.4µ H/Ω	L_i/P_i = 15.4µ H/Ω

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 6.1

To permit additional terminal parameters to be added for connector only variants (no cable included) and 10m of cable. The Annex containing the terminal parameters has been removed and the terminal parameters have been included in the equipment description.

/. MASC MARKING...

MASC MARKING:

SGS Baseefa marking remains applicable. The following MASC Certificate number (IA number) must be additionally applied to the equipment.

IA No: MASC M/16-0230X

PROCESS / ASSESSMENT:

The SGS Baseefa documentation was selectively evaluated for technical content and was studied for authenticity.

SGS Baseefa is an EXTL and ACB under the IECEx system. South Africa is a member of the IECEx scheme. The Certificate's validity and acceptability is acknowledged. An IA certificate is issued for the product.

CONDITIONS OF MANUFACTURE:

- None

SPECIAL CONDITIONS OF USE (X):

- The Ci of the non-fused version of the equipment (HS-100Mxxxxxxx and HS-100MSxxxxxxx) when fitted with 92m of cable has been increased from 41nF to 83nF.

CONDITIONS OF CERTIFICATION:

1. This letter covers all units sold from the date of this letter to 23 February 2019.
2. The apparatus must be additionally marked with the MASC marking details above.
3. This approval only covers the equipment as certified above and does not include any scheduled additions or variations / amendments / new issues to the certificate(s), made after the above date.
4. The equipment does not need to be re-tested when used on the conditions and with such restrictions as prescribed by SGS Baseefa and in this approval.
5. The SGS Baseefa certification must remain valid.
6. The extent of the requirements in the ARP 0108 (or regulations) and SANS 10108 on the certification of the equipment must remain unchanged.
7. The Ex quality assurance notification/report for the equipment must remain valid.

/. CONCLUSION…

CONCLUSION:

From the above and the selective examination of the documentation, nothing contrary to the requirements of the applicable standards was found, provided that the equipment/component is used as described in the above document/certificate and according to the MASC conditions below. A MASC IA certificate is issued based on the work done by SGS Baseefa.

The routine tests for production units according to the SGS Baseefa Certificate must be complied with (if applicable).

Yours faithfully

A. Koekemoer
TECHNICAL OFFICER

F du Toit
TECHNICAL SPECIALIST

Mining And Surface Certification

IA – CERTIFICATE

(Review required by MASC as per ARP 0108)

IN TERMS OF REGULATION 21.17.2 OF THE MINERALS ACT (INCORPORATION THE MINE HEALTH AND SAFETY ACT) AND REGULATION 9 (1) OF THE ELECTRICAL MACHINERY REGULATIONS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

Ex – Type Examination	
Certificate number:	**MASC S/16-0231X**
Equipment:	HS-100 Series Accelerometer
Serial No:	(See "Conditions of Certification")
Applicant:	Hansford Sensors SA
Address:	Unit 31-32 Bueno Vista Office Park Durbanville 7560
Manufacturer:	Hansford Sensors Limited
Address:	Artisan Hillbottom Road Sands Industrial Estate Bucks HP12 4HJ United Kingdom

DESCRIPTION:

The HS-100 Series Accelerometer is designed to measure acceleration, shock or vibration by converting the signal generated by the compression of a Piezo Electric Crystal by a given seismic mass and outputting a broadband ac signal to the monitoring equipment.
The accelerometer comprises a piezo electric crystal connected to a signal conditioning board all contained within a stainless steel enclosure of various shapes measuring approximately 25cm3. The enclosure is a fully welded construction.
Electrical connections are made to the apparatus either via an IP65 rated connector or via an integral cable which is encapsulated in the end of the apparatus.

The apparatus has the following terminal parameters:

Connector only	10m of Cable	92m of Cable
U_i = 28V	U_i = 28V	U_i = 28V
I_i = 93mA	I_i = 93mA	I_i = 93mA
P_i = 0.65W	P_i = 0.65W	P_i = 0.65W
C_i = 1.0nF	C_i = 9.9nF	C_i = 82nF
L_i = zero	L_i = 6µH or L_i/P_i = 15.4µ H/Ω	L_i/P_i = 15.4µ H/Ω

/. DETAILS…

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 5.1

To permit additional terminal parameters to be added for connector only variants (no cable included). The Annex containing the terminal parameters has been removed and the terminal parameters have been included in the equipment description.

MARKING:

SGS Baseefa marking remains applicable. The following MASC Certificate number (IA number) must be additionally applied to the equipment.

IA No: MASC S/16-0231X

COMPLIANCE:

The equipment as described above and in MASC letter 16-0231 is hereby certified "Explosion Protected" Ex ia IIC T4 Ga (-55ºC ≤ Ta ≤ +110ºC), Ex ia IIIC T130ºC IP65 Da (-55ºC ≤ Ta ≤ +110ºC), Ex ia IIC T6 Ga (-55ºC ≤ Ta ≤ +60ºC), Ex ia IIIC T80ºC IP65 Da (-55ºC ≤ Ta ≤ +60ºC) and is suitable for use in hazardous locations as stated below and as tested, assessed and inspected in accordance with the relevant requirements of SANS / IEC Standards:

The evaluation was conducted according to the requirements of:

i) SANS (IEC) 60079-0 : 2012 "Explosive atmospheres – Part 0: Equipment — General requirements"
ii) SANS (IEC) 60079-11 : 2012 "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"

Location	Zone 0, 1 & 2	Gas Surface
	Zone 20, 21 & 22	Dust
Hazard Frequency	---	Intermittent as could occur under normal operating conditions in hazardous area
Environment	Group IIC	Propane to Hydrogen / Acetylene
	Group IIIC	Dust (Conductive Dust)
Surface Temperature	T6 or T4	T130ºC or T80ºC (As Applicable)
Service/Ambient Temperature	-20ºC to +60ºC	

The use of apparatus in hazardous locations is subject to the following provisions as applicable, which shall be adhered to:

i. SANS 10086 requirements;
ii. Any conditions mentioned in the above document;
iii. Codes of Practice enforced in terms of Regulations 21.17.2 of Minerals Act, by Chief Inspector of Mines;
iv. Any restrictions and conditions enforced by Chief Inspectors of Mines, Principal Inspector (Group I equipment) of Chief Inspector of Factories (Group II equipment);
v. Any relevant requirements of the MHS Act or the OHS Act.

/. CONDITIONS...

CONDITIONS OF MANUFACTURE:

- None

SPECIAL CONDITIONS OF USE (X):

- The free end of the cable on the integral cable version of the apparatus must be terminated in an appropriately certified dust proof enclosure when dust protection is required.
- The C_i of the equipment when fitted with 92m of cable has been increased from 41nF to 83nF.

CONDITIONS OF CERTIFICATION:

1. This Certificate remains valid based on a three yearly review covered by an official MASC letter.
2. The apparatus must be additionally marked with the MASC marking details above.
3. This approval only covers the equipment as certified above and does not include any scheduled additions or variations / amendments / new issues to the certificate(s), made after the above date.
4. The equipment does not need to be re-tested when used on the conditions and with such restrictions as prescribed by SGS Baseefa and in this approval.
5. The SGS Baseefa certification must remain valid.
6. The extent of the requirements in the ARP 0108 (or regulations) and SANS 10108 on the certification of the equipment must remain unchanged.
7. The Ex quality assurance notification/report for the equipment must remain valid.

A. Koekemoer
TECHNICAL OFFICER

F du Toit
TECHNICAL SPECIALIST

Mining And Surface Certification (Pty) Ltd
2015/021934/07
GOVERNMENT APPROVED INSPECTION AUTHORITY

Our ref: 16-0231
Enquiries: F du Toit
Tel: (012) 653 2959
Fax: 086 605 8568
Date: 23 February 2016

Hansford Sensors SA
Unit 31-32
Bueno Vista Office Park
Durbanville
7560

HS-100 Series Accelerometer
(Group IIC/IIIC - Surface)

This letter is based on the IECEx BAS 07.0035X certificate.

Further to your request, we have evaluated the supplied documentation. The following is applicable:

Description	**Detail**
Requested By :	Hansford Sensors SA Unit 31-32, Bueno Vista Office Park, Durbanville, 7560
Equipment :	Accelerometer
Manufacturer :	Hansford Sensors Limited
Model(s) / Type(s) :	HS-100 Series
Rating :	Ex ia IIC T4 Ga (-55ºC ≤ Ta ≤ +110ºC) Ex ia IIIC T130ºC IP65 Da (-55ºC ≤ Ta ≤ +110ºC) Ex ia IIC T6 Ga (-55ºC ≤ Ta ≤ +60ºC) Ex ia IIIC T80ºC IP65 Da (-55ºC ≤ Ta ≤ +60ºC)
Certification body :	SGS Baseefa Limited (SGS Baseefa)
Type Certificate No :	IECEx BAS 07.0035X
Variations/Issue/Amendment :	5
Assessment Report No :	GB/BAS/ExTR07.0076/00 GB/BAS/ExTR11.0045/00 GB/BAS/ExTR12.0254/00 GB/BAS/ExTR13.0101/00
Quality Assurance report (QAR) / Notification (QAN) :	GB/BAS/QAR07.0040/06

Standards:	- IEC 60079-0	(2011)	"Explosive atmospheres – Part 0: Equipment — General requirements"
	- IEC 60079-11	(2011)	"Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"

/. The evaluation...

The evaluation was conducted according to the requirements of:

- **SANS (IEC) 60079-0 : 2012 "Explosive atmospheres – Part 0: Equipment — General requirements"**
- **SANS (IEC) 60079-11 : 2012 "Explosive atmospheres – Part 11: Equipment protection by intrinsic safety 'i'"**

DESCRIPTION OF EQUIPMENT (According to SGS Baseefa Certificate):

The HS-100 Series Accelerometer is designed to measure acceleration, shock or vibration by converting the signal generated by the compression of a Piezo Electric Crystal by a given seismic mass and outputting a broadband ac signal to the monitoring equipment.

The accelerometer comprises a piezo electric crystal connected to a signal conditioning board all contained within a stainless steel enclosure of various shapes measuring approximately 25cm^3. The enclosure is a fully welded construction.

Electrical connections are made to the apparatus either via an IP65 rated connector or via an integral cable which is encapsulated in the end of the apparatus.

The apparatus has the following terminal parameters:

Connector only	10m of Cable	92m of Cable
U_i = 28V	U_i = 28V	U_i = 28V
I_i = 93mA	I_i = 93mA	I_i = 93mA
P_i = 0.65W	P_i = 0.65W	P_i = 0.65W
C_i = 1.0nF	C_i = 9.9nF	C_i = 82nF
L_i = zero	L_i = 6µH or L_i/P_i = 15.4µ H/Ω	L_i/P_i = 15.4µ H/Ω

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 5.1

To permit additional terminal parameters to be added for connector only variants (no cable included). The Annex containing the terminal parameters has been removed and the terminal parameters have been included in the equipment description.

MASC MARKING:

SGS Baseefa marking remains applicable. The following MASC Certificate number (IA number) must be additionally applied to the equipment.

IA No: MASC S/16-0231X

PROCESS / ASSESSMENT:

The SGS Baseefa documentation was selectively evaluated for technical content and was studied for authenticity.

SGS Baseefa is an EXTL and ACB under the IECEx system. South Africa is a member of the IECEx scheme. The Certificate's validity and acceptability is acknowledged. An IA certificate is issued for the product.

/. CONDITIONS...

CONDITIONS OF MANUFACTURE:

- None

SPECIAL CONDITIONS OF USE (X):

- The free end of the cable on the integral cable version of the apparatus must be terminated in an appropriately certified dust proof enclosure when dust protection is required.
- The C_i of the equipment when fitted with 92m of cable has been increased from 41nF to 83nF.

CONDITIONS OF CERTIFICATION:

1. This letter covers all units sold from the date of this letter to 23 February 2019.
2. The apparatus must be additionally marked with the MASC marking details above.
3. This approval only covers the equipment as certified above and does not include any scheduled additions or variations / amendments / new issues to the certificate(s), made after the above date.
4. The equipment does not need to be re-tested when used on the conditions and with such restrictions as prescribed by SGS Baseefa and in this approval.
5. The SGS Baseefa certification must remain valid.
6. The extent of the requirements in the ARP 0108 (or regulations) and SANS 10108 on the certification of the equipment must remain unchanged.
7. The Ex quality assurance notification/report for the equipment must remain valid.

CONCLUSION:

From the above and the selective examination of the documentation, nothing contrary to the requirements of the applicable standards was found, provided that the equipment/component is used as described in the above document/certificate and according to the MASC conditions below. A MASC IA certificate is issued based on the work done by SGS Baseefa.

The routine tests for production units according to the SGS Baseefa Certificate must be complied with (if applicable).

Yours faithfully

A. Koekemoer
TECHNICAL OFFICER

F du Toit
TECHNICAL SPECIALIST

Mining And Surface Certification