



**IECEX/ATEX
QUALITY ASSESSMENT
REPORT**



Electrosuisse
Product Testing

CONFIDENTIAL

IECEX QAR reference no.: **CH/SEV/QAR16.0001/03**

ATEX audit report reference no.: **17-Ex-0089.X02**

ExCB Project No.:	ExCB Report No. & revision
Manufacturer Include Address with post code and country	Wandfluh Hydraulik + Elektronik AG Helkenstrasse 13 3714 Frutigen SWITZERLAND
Production Site(s) audited Include Address with post code and country	Wandfluh Hydraulik + Elektronik AG Helkenstrasse 13 3714 Frutigen SWITZERLAND
Product Description	Solenoids and valves
Employee count	Wandfluh Hydraulik + Elektronik AG Total onsite: ~250 Total involved in Ex products: ~30
Scope of Audit	Initial Assessment <input type="checkbox"/> Re-Assessment <input type="checkbox"/> Surveillance Assessment <input checked="" type="checkbox"/>
List all applicable European certificates:	See clause 2.10.
List all applicable IECEx certificates:	See clause 2.9.
Electrical equipment with type(s) of protection of	d <input checked="" type="checkbox"/> e <input type="checkbox"/> h <input type="checkbox"/> i <input checked="" type="checkbox"/> m <input type="checkbox"/> n <input type="checkbox"/> o <input type="checkbox"/> op <input type="checkbox"/> q <input type="checkbox"/> t <input checked="" type="checkbox"/>
Non electrical equipment with type(s) of protection of:	fr <input type="checkbox"/> d <input type="checkbox"/> c <input type="checkbox"/> b <input type="checkbox"/> p <input type="checkbox"/> k <input type="checkbox"/>
Audit Team Leader	Christian Ettlin
Audit Date	2019-04-10

	Eurofins Electrosuisse Product Testing AG Swiss Qualification and Certification Body, ATEX Notified Body 1258 Luppenstrasse 3, 8320 Fehraltorf, SWITZERLAND www.electrosuisse.ch		



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Contents:

1. Summary report
2. Audit information
3. Documentation review and assessment of implementation
4. Observations
5. Non conformity report
6. Appendices (optional)

1. Summary Report

Assessment Summary and Conclusions:

*(State the most important **results** and **conclusions** of the quality assessment)*

Wandfluh Hydraulik + Elektronik AG, is on the one hand the development and manufacturing plants for valves, electronics and basic powerpacks, on the other hand it runs its own department which designs, calculates and implements hydraulic solutions.

The QMS of Wandfluh Hydraulik + Elektronik AG is well implemented and maintained.

The audit conducted by Eurofins on Wandfluh Hydraulik + Elektronik AG was conducted using OD 005-2 and was done in sufficient detail.

Issuing of the ATEX QAN and IECEx QAR is recommended.

Next Quality Audit due: September 2020

Non-Conformities

(Indicate the Serial No.(s) of non-conformities recorded. Individual non-conformities are recorded on the non-conformity reports)

NCR No.(s):

None



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Audit Team Leader Recommendations

(Delete where not applicable)

- Certification to be issued/maintained** once satisfactory technical assessment of the product is completed and a test report is issued
- Certification to be issued/maintained*** following receipt of satisfactory documentary evidence supporting effective corrective action, and a test report is issued. Corrective action to be verified at next surveillance visit
- Certification to be issued/maintained*** following a **satisfactory follow-up visit** and verification that corrective actions have been effectively documented and implemented, and test report issued.
- Certification to be refused/suspended*** A further complete assessment to be conducted
- Certification to be refused/suspended*** Close the application/withdraw the notification and inform the Scheme Administrator

		
2019-04-26	2019-04-26	2019-04-26
Audit team leader signature and date	Certification body <i>Sign to accept Lead Assessor recommendations</i>	Manufacturer representative <i>Sign to accept audit team leader recommendations and QAR</i>



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2. Audit Information

2.1 Scope of Audit:

- Type A initial assessment/reassessment of manufacturer with a certified QMS* ISO 9001:2015.....
- Type B initial assessment/reassessment of manufacturer without a certified QMS.....
- Type C surveillance of manufacturer with a certified QMS* ISO 9001:2015.....
- Type D surveillance of manufacturer without a certified QMS.....

** where manufacturer has a certified quality system, include certification/registration body, date of registration, certificate No. and scope or append a copy of the certificate (including scope)*

2.2 Audit Criteria

List any other reference documents, against which Audit was conducted in addition to IECEx OD 005

ISO/IEC 80079-34:2018

Explosive atmospheres - Part 34: Application of quality systems for equipment manufacture

2.3 Date(s) and Duration of Audit

Include total number of auditor days on site

10th April 2019, one day assessment

2.4 ISO 9001 certificate:

ISO 9001 certificate No	Certified by	Expiry date	Scope
10632	SQS	2021-03-11	

If ISO 9001 certified, are non-conformities from latest ISO 9001 audit reviewed?

Yes No N/A (no NCs)

Comments to ISO 9001 non-conformities.

At Wandfluh Hydraulik + Elektronik AG the last surveillance audit took place on 2019-03-05 to 2019-03-06. No non-conformities are listed.

2.5 Composition of Audit Team:

Name	Position	Role in Audit (Sole Auditor, Team Leader, Auditor, Technical Specialist, etc)
Christian Ettlin	Auditor / Test engineer of Explosion protection (EEPT)	Sole Auditor



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2.6 Interviewed Representatives of Manufacturer (Audited):

Name	Position
Tobias Krause	Head of Technology, Explosion Protection Officer
Harris Elayathamby	Head of Management System
Peter Kallen	Assembly workers

2.7 Critical Suppliers: *(List critical suppliers reviewed during audit of supplier evaluation)*

Name of Supplier	Critical item or service provided
Elektrisola Feindraht AG	Enamelled copper wire
Marcel Bützer AG	Bobbin
Adolf Krämer GmbH	Zinc nickel coating of housing parts
Wandfluh Produktions Gesellschaft	Housings
Elektrisola Feindraht AG	Enamelled copper wire

2.8 Manufacturers Documentation: *(List manufactures documentation related to this Quality Audit Report)*

Document No.	Document Name	Rev.	Date
001	Zertifikat ISO 9001:2015	---	2019-03-12
002	Organigramm	---	2018-12-21
003	Massnahmen_SQS-AA_2019	---	2019-03-14
004	Terminplan Managementsystem_19_20	---	2019-03-03
005	Bericht_ExSchutz_2018	---	2018-12-11
006	2019_Bewertung_EX-Schutz	---	2019-04-15
007	Kaderverzeichnis	---	2019-04-15
008	Technical description MKY45	04	2018-10-30
009	Installations- und Betriebsanleitung MKY45	---	Ed. 18 25
010	Übersicht Zertifikat MKY45	---	2019-03-15
011	Schulung Explosionsschutz	---	2018-08-17
012	Arbeitsanweisung Magnetspule MDZ	02	2019-03-25
013	Arbeitsanweisung Magnetspule MKY45	23	2017-10-25



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2.9 Manufacturers IECEx Certificates of Conformity:

IECEX Certificate No.	Description of Ex equipment	Ex marking
IECEX PTB 10.0020	Solenoid type MKY45/18x60-*/L****#*	Ex db IIC T6, T4 Gb Ex tb IIIC T80 °C, T139 °C Db
IECEX BVS 09.0047	Solenoid coil type **Z45-***	Ex ia I Ma Ex ia IIC T5 Ga Ex ia IIC T6 Ga
IECEX BVS 11.0018X	Solenoid type MKY45/18x60-**-**-**#*	Ex db I Mb
IECEX ITA 12.0027X	Solenoid type MKY45/18x60-...-L.-.	Ex d IIC T6 or T4 Gb Ex tb IIIC T80 °C or T130 °C db IP65 Ex d I Mb
IECEX SEV 16.0005X	Solenoid coil type M*Z45-***-***	Ex ia I Ma Ex ia IIC T5 Ga Ex ia IIC T6 Ga

2.10 Manufacturers ATEX EU-Type Examination Certificates:

ATEX Certificate No.	Description of Ex equipment	Ex marking
PTB 07 ATEX 1023	Magnetspule Typ MKY45/18x60-*/L****#*	II 2G Ex db IIC T6, T4 Gb II 2D Ex tb IIIC T80 °C, T139 °C Db
BVS 11 ATEX E 037 X	Magnetspule type MKY45/18x60-**-**-**#*	I M2 Ex db I Mb
SEV 16 ATEX 0127 X	Solenoid coil type M*Z45-***-***	I M1 Ex ia I Ma II 1G Ex ia IIC T5 Ga II 1G Ex ia IIC T6 Ga



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3. Documentation Review and Assessment of Implementation

(For surveillance audits, major document changes only may be reviewed)

NOTE 1: **Manufacturer's Document References** need only to reference the document number (and if desired the title) as the title and revision status is listed in 2.7. **Comments** are entered by the auditor to document compliance or noncompliance of a clause.

NOTE 2: Even when there are no additional IEC/ISO 80079-34:2018 requirements to ISO 9001:2005 the auditor shall provide a verdict in accordance with the Note 3 below.

NOTE 3: Possible audit verdicts: P = Pass, F = Fail, NCN number against a clause means Non-conformity

Clause	Requirement	Documents reference and/or comments	Verdict
4.1	Understanding the organization and its context 4.1 of ISO 9001:2015 applies with the following addition:		P
	In regard to this document, the context of the organization is to ensure that any Ex Product is in accordance with its certificate and technical documentation.	Quality goals and quality policy put a focus on the ex-certified products. <i>See attached documents: Doc. No. 04 - Doc. No. 06</i>	P
4.2	Understanding the needs and expectations of interested parties	Manufacturers ISO 9001 QMS complies.	align="center"> P
	4.2 of ISO 9001:2015 applies.		
4.3	Determining the scope of the quality management system	Manufacturers ISO 9001 QMS complies.	align="center"> P
	4.3 of ISO 9001:2015 applies.		
4.4	Quality management system and its processes 4.4 of ISO 9001:2015 applies with the following addition:		P
	The quality management system shall ensure that the Ex Product conforms to the type described in the certificate and the technical documentation.	The quality management system fully complies with the requirements out of this standard.	P
5.1.1	General	Manufacturers ISO 9001 QMS complies.	align="center"> P
	5.1.1 of ISO 9001:2015 applies.		
5.1.2	Customer focus	Manufacturers ISO 9001 QMS complies.	align="center"> P
	5.1.2 of ISO 9001:2015 applies.		
5.2.1	Establishing the quality policy	Manufacturers ISO 9001 QMS complies.	align="center"> P
	5.2.1 of ISO 9001:2015 applies.		
5.2.2	Communicating the quality policy	Manufacturers ISO 9001 QMS complies.	align="center"> P
	5.2.2 of ISO 9001:2015 applies.		
5.3	Organizational roles, responsibilities and authorities 5.3 of ISO 9001:2015 applies with the following additions:		P
	Ex authorized person(s) shall be appointed with defined and documented responsibilities and authority to ensure the following requirements are met:		
	a) the effective co-ordination of activities with respect to Ex Products;	Mr Tobias Krause as the responsible person for several years and coordinates all Ex	P
	b) the liaison with the issuer of the certificate		P



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	(when not issued by the manufacturer) with respect to any proposed change to the design defined in the certificate and the technical documentation;	relevant activities. He has contact with the notified body and has to approve changes to ex related products.	
	c) the liaison with the body responsible for the verification of the quality management system with respect to intended updating of the quality management system;		
	NOTE It is not practicable for the manufacturer to inform the body responsible for the verification of the quality management system each time the quality management system is updated. It is only practicable to inform them of "substantial" updating of the quality management system relevant to the Type of Protection. Similarly, it is not practicable to specify in general terms what types of updating are or are not "substantial". It is therefore normal that the manufacturer informs the body responsible for the verification of the quality management system on any update of the quality management system having consequences on Ex Product compliance. The change of an Ex authorized person is considered as a "substantial" change.		P
	d) the authorization of initial approval and changes to related drawings, where appropriate;		P
	e) the authorization of concessions (see 8.7 f));		P
	f) the accuracy of relevant information regarding Ex Product given to the customer for any sales literature and installation instructions (which shall include applicable Specific Conditions of Use and any Schedule of Limitations);		P
	NOTE Ex Equipment Certificate numbers with a suffix "X" contain Specific Conditions of Use. Ex Component certificates numbers, with a suffix "U" may contain a Schedule of Limitations.		
	g) the effective coordination of manufacturing processes related to Ex Products including externally provided products, services and processes detailed in 8.4; In the case of a manufacturer with multiple manufacturing sites an Ex authorized person with relevant responsibilities shall be appointed for each site.		P
	Records demonstrating this shall be available and be maintained as documented information.	P	
6.1	Actions to address risks and opportunities		
	6.1 of ISO 9001:2015 applies.	Manufacturers ISO 9001 QMS complies.	P



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6.2	Quality objectives and planning to achieve them	Manufacturers ISO 9001 QMS complies.	P
	6.2 of ISO 9001:2015 applies.		
6.3	Planning of changes	Manufacturers ISO 9001 QMS complies.	P
	6.3 of ISO 9001:2015 applies.		
7.1.1	General (Support and Resources)	Manufacturers ISO 9001 QMS complies.	P
	7.1.1 of ISO 9001:2015 applies.		
7.1.2	People	Manufacturers ISO 9001 QMS complies.	P
	7.1.2 of ISO 9001:2015 applies.		
7.1.3	Infrastructure	Manufacturers ISO 9001 QMS complies.	P
	7.1.3 of ISO 9001:2015 applies.		
7.1.4	Environment for the operation of processes	Manufacturers ISO 9001 QMS complies.	P
	7.1.4 of ISO 9001:2015 applies.		
7.1.5	Monitoring and measuring resources	Measurement equipment is checked every year. The equipment is calibrated external in accredited Calibration Labs. The scanning platform is calibrated every 2 year. Regular in-house calibration with reference objects. Everything is well documented.	P
	7.1.5 of ISO 9001:2015 applies with the following addition:		
	When monitoring or measuring is used to verify the conformity of Ex Products, the measuring equipment shall be calibrated and a valid calibration certificate shall exist. Verification of measuring equipment against calibrated equipment is also permitted as long as it is properly documented. The calibration certificate shall meet one of the following requirements:		
	a) Where a calibration certificate bears an accreditation, logo issued by an accredited calibration laboratory (which can demonstrate that it operates in compliance with an internationally recognized standard and is covered by a multilateral international agreement) the calibration laboratory need not be subjected to further evaluation.		
	b) Where a calibration certificate does not bear the accreditation logo of a national accreditation authority, each calibration certificate shall include at least the following information: • an unambiguous identification of the item calibrated; • evidence that the measurements are traceable to international or national measurement standards; • the method of calibration;		P



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	<ul style="list-style-type: none"> • a statement of compliance with any relevant specification; • the calibration results; • the uncertainty of measurement, where necessary; • the environmental conditions, where relevant; • the date of calibration; • the signature of the person under whose authority the certificate was issued; • the name and address of the issuing organization and the date of issue of the certificate; • a unique identification of the calibration certificate. 		
	c) Where a calibration certificate does not bear the accreditation logo of a national accreditation authority or does not contain the information listed in 7.1.5 b), the manufacturer shall demonstrate a valid relationship to international or national measurement standards by other means (e.g. a documented site assessment).		N/A
7.1.6	Organizational knowledge 7.1.6 of ISO 9001:2015 applies.	Manufacturers ISO 9001 QMS complies.	P
7.2	Competence 7.2 of ISO 9001:2015 applies with the following addition:		P
	<p>The manufacturer shall have a documented process to identify and ensure that all persons having an impact on the compliance of Ex Products are trained and competent.</p> <p>NOTE 1 Parties who might have an impact on the compliance of Ex Products are the Ex authorized person(s), manufacturing, inspecting, testing, sales, marketing, supply management, calibration and quality control services and other services.</p> <p>NOTE 2 Competence requirements of 7.2 also address the awareness of 7.3.</p>	<p>Training plan and knowledge matrix for each person available.</p> <p>For people involved with certified products training is done by the Ex-responsible person.</p> <p>The Ex-responsible person himself does external training to get informed about actual changes according to standards and the directive.</p> <p>Document reviewed: "Ausbildungsmatrix" as Excel file.</p>	P
7.3	Awareness 7.3 of ISO 9001:2015 applies.	Manufacturers ISO 9001 QMS complies.	P
7.4	Communication 7.4 of ISO 9001:2015 applies with the following addition:		P



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	<p>Internal and external communication relating to Ex Products shall be controlled.</p> <p>NOTE 1 Communication includes manufacturer documentation, technical documentation, certificates, nonconforming products placed on the market, etc.</p> <p>NOTE 2 External communication includes communication with clients, certification bodies, providers, economic operators (authorised representatives, importers, distributors, external providers ...), authorities etc.</p>	Due to the flat hierarchy, short communication paths between the different departments.	P
7.5.1	(Documented information) General		P
	7.5.1 of ISO 9001:2015 applies with the following addition:		
	All requirements and provisions adopted by the manufacturer to ensure compliance of Ex Products with their certificates and technical documentation, and to demonstrate compliance to this document, shall be appropriately documented in a systematic and orderly manner. This may be achieved in the form of manuals, policies, procedures, instructions, flowcharts, spread sheets, forms, or other appropriate means. The quality management system documentation shall permit a consistent interpretation of quality programs, plans, manuals and records	The actual valid quality manual is available on the work stations and according to ISO 9001.	P
7.5.2	Creating and updating	Manufacturers ISO 9001 QMS complies.	P
	7.5.2 of ISO 9001:2015 applies.		
7.5.3	Control of documented Information		P
	7.5.3 of ISO 9001:2015 applies with the following addition:		
	a) technical documentation and manufacturer's documentation shall be controlled;	Drawings for Ex-components are accordingly marked. Changes have to be approved by Ex-responsible person.	P
	b) documented procedures shall ensure that information contained within manufacturer's documentation is compatible with the technical documentation. The manufacturer shall not initially approve or subsequently amend related drawings unless they are in compliance with the schedule drawings;		Document control managed through ERP system in responsibility of Mr Krause. Ex-Drawings specially marked.
	c) the quality management system shall ensure that no factor (type, characteristic, position etc.) defined within the certificate and technical documentation (e.g. schedule drawings) is modified unless otherwise permitted by the issuer of the certificate;	All required quality records stored in ERP system for at least 10 years. Documents reviewed	P
	d) there shall be a documented system that refers all related drawings to the relevant schedule drawings;		P



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	<p>e) where there are common schedule drawings associated with more than one certificate, there shall be a documented system to ensure simultaneous supplementary action in the event of an amendment to such drawings;</p> <p>NOTE Some manufacturers use common components with common drawing numbers on more than one product and then have more than one person responsible for the end products. A compliant QMS would assure that the change to the component for the one product is not implemented without approval from the responsible persons for all end-products that use that component.</p>		P
	<p>f) where a manufacturer also has drawings for products that are not Ex Products, the manufacturer shall have a system that enables both the related drawings and schedule drawings to be clearly identified;</p> <p>NOTE The following examples indicate some methods to achieve this:</p> <ul style="list-style-type: none"> – the use of visual markers; – the use of a unique series of drawing numbers, e.g. all drawings concerning a certified Ex Product have an Ex prefix to the drawing number; – the use of a computerized relational database with indentured “Bills of Materials” that identify all Ex critical documents, components and controls unauthorized changes can also be acceptable. 		P
	<p>g) the manufacturer shall document the body responsible for the verification of the quality management system of each certificate;</p> <p>NOTE In some Certification Schemes, the body responsible for the verification of the quality management system associated with each certificate can be different from the body that issued the certificate.</p>		P
	<p>h) where technical documentation or manufacturer’s documentation are passed to a third party, they shall be provided in a way that is not misleading;</p>		P
	<p>i) the manufacturer shall have a documented process to annually check the validity of all Ex related certificates, standards, regulations and other external specifications;</p>		P



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	<p>j) the manufacturer shall retain adequate quality records to demonstrate conformity of the Ex Products. A minimum of 10 years retention after each Ex Product (batch) has been placed on the market is required. As a minimum, the list of quality records requiring control and retention, as far as applicable, shall be:</p> <ul style="list-style-type: none"> • those arising from regulatory requirements; • quality documented information; • responsibilities and authorities for Ex relevant roles assignment and communication within the organization; • customer order; • contract review; • training records; • design and development changes; • inspection and test data (per batch); • calibration data; • manufacturing traceability; • sub-contractor evaluation; • delivery data (customer, delivery date and quantity, including serial numbers where available); • other documented information, if needed. 		P
8.1	Operational planning and control		P
	8.1 of ISO 9001:2015 applies with the following addition:		
	The information in Annexes A and B for control and acceptance of processes for Ex Products are one method to ensure compliance with the requirements of the certificate. If other methods are used, they should be evaluated to ensure full compliance with the requirements of certification.	Methods according to Annexes A are used.	P
8.2.1	Customer Communications	Manufacturers ISO 9001 QMS complies.	P
	8.2.1 of ISO 9001:2015 applies.		
8.2.2	Determining the requirements for products and services	Manufacturers ISO 9001 QMS complies.	P
	8.2.2 of ISO 9001:2015 applies.		
8.2.3	Review of the requirements for products and services		P
	8.2.3 of ISO 9001:2015 applies with the following addition:		
	The review shall ensure that any stated customer requirement is compatible with the certificate e.g. equipment group, temperature class, Type of Protection, Equipment Protection Level (EPL) and ambient temperature range.	Ex-relevant aspects are checked by the ex-responsible person.	P



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	In some situations, such as internet sales, a formal review might be impractical. In such a case the appropriate information shall be made available to the customer.		
8.2.4	Changes to requirements for products and services 8.2.4 of ISO 9001:2015 applies with the following addition:		P
	The Ex authorized person(s) identified in 5.3 shall be involved in any changes (e.g. changes to the manufacturer's documentation, quality management system or marketing documents) that could affect Ex Product compliance.	Possible changes have to be approved by the Ex responsible person Mr Krause.	P
8.3.1	General (Design and development of products and services) 8.3.1 of ISO 9001:2015 is not within the scope of this document.		N/A
8.3.2	Design and development planning 8.3.2 of ISO 9001:2015 is not within the scope of this document.		
8.3.3	Design and development Inputs 8.3.3 of ISO 9001:2015 is not within the scope of this document.		
8.3.4	Design and development controls 8.3.4 of ISO 9001: 2015 is not within the scope of this document.		
8.3.5	Design and development outputs 8.3.5 of ISO 9001:2015 is not within the scope of this document.		
8.3.6	Design and development changes 8.3.6 of ISO 9001:2015 applies with the following addition:		P
	The Ex authorized person(s) identified in 5.3 shall be involved in the approval process of any substantial modification or change (e.g. changes to the manufacturer's documentation, quality management system or marketing documents) that could affect Ex Product compliance.	Possible changes have to be approved by the Ex responsible person Mr Krause.	P



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8.4.1	General (Control of externally provided processes, products and services) 8.4.1 of ISO 9001:2015 applies with the following addition:		P
	a) while manufacture, test and final inspection may be sub-contracted, the responsibility for ensuring conformance with the certificate and the technical documentation shall not be sub-contracted;	All parts including important product information ordered via ERP system. Suppliers are regularly re-evaluated.	P
	b) external providers providing a product, process, or service that can affect the Ex Product's compliance with the certificate shall only be selected after an evaluation has provided evidence that they have the capability of ensuring compliance with all specified requirements; 1) documented objective evidence that the external provider can provide product, process or service that is fit for purpose shall be made by one or more of the following methods: <ul style="list-style-type: none"> – the external provider has an acceptable Ex quality management system according to this document assessed by an accredited body, – the external provider has a quality management system certificate in accordance with the appropriate standard and with an acceptable scope, NOTE A certificate issued by an accredited body which can demonstrate that it operates in compliance with ISO/IEC 17021 is generally acceptable; depending on the nature of the product, process, or service, a quality management system in accordance with ISO 9001:2015 might not be sufficient. <ul style="list-style-type: none"> – a documented site assessment to ensure that all relevant controls are available, documented, understood and effective. NOTE The evaluation takes the following into account: <ul style="list-style-type: none"> – criticality of the product, process or service; – degree of difficulty, or variability in the manufacturing process; – location of the external provider and hence the effectiveness of communications; – subcontracting of the product, process or service. 	Specification documents will be sent with the order. Incoming components are verified using test instructions.	P



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	<p>2) where the features affecting the Type of Protection cannot be verified at a later stage or are not verified by the manufacturer e.g. encapsulated intrinsically safe circuits, then the product, process, or service shall only be accepted by one of the following methods:</p> <ul style="list-style-type: none"> – the manufacturer can demonstrate that the control process implemented by the external providers ensures Ex compliance, – the body responsible for the verification of the quality management system performs periodic audits at the external providers. 		N/A
	c) external providers providing calibration services (including verification on measuring devices by comparison with calibrated equipment) shall be evaluated on their ability to meet stated requirements as well as the requirements of 7.1.5;		P
	d) external providers not used for a period exceeding one year shall be re-evaluated in accordance with 8.4.1 b) prior to the placing of a contract or a purchase order;		N/A
	e) requirements 8.4.1 b) and 8.4.1 d) are not mandatory for products, processes or services where the manufacturer verifies conformance according to 8.4.2;		P
	<p>f) the ongoing ability of the external providers to provide conforming product, process or service shall be reviewed at periods not exceeding one year;</p> <p>NOTE 1 "Review" is a process by which the manufacturer demonstrates the ongoing suitability and performance in accordance with 8.4.1 b) and c) of their external providers e.g. receiving inspection report analysis.</p> <p>NOTE 2 The terms "re-evaluation" and "review" have different meanings.</p>		P



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	g) The manufacturer shall facilitate an arrangement whereby the body responsible for the verification of the Ex quality management system may also verify aspects of any external provider's operation that affects the Type of Protection.		P
8.4.2	Type and extent of control 8.4.2 of ISO 9001:2015 applies with the following addition:		P
	a) for purchased processes, products and services that can compromise the Type of Protection, the manufacturer shall determine and implement verification arrangements which demonstrate the product's compliance with the certificate, considering the nature of the product and the nature of the external provider;		P
	b) when deciding what type of verification is required for a particular purchased process, product or service, the manufacturer shall consider the nature of the purchased product, the external provider, and how critical it is to the Type of Protection. In considering whether the external provider should carry out the verification, the manufacturer should consider the results of their evaluation carried out under 8.4.1. The decision should reflect the competence of the external provider, including whether they have a quality management system that covers the activity, the resources, e.g. equipment, and the people with sufficient skill and experience to do it. This latter point is particularly significant when judgement is required, such as when inspecting a flameproof casting. When the manufacturer elects to have the external provider carry out test or inspection that is relevant to the Type of protection, the product may be supplied with a declaration of conformity that confirms it has been done;	<p>All parts including important product information ordered via ERP system. Suppliers are regularly re-evaluated.</p> <p>Specification documents will be sent with the order.</p> <p>Incoming components are verified using test instructions.</p>	P
	c) where the external provider has been evaluated and documented objective evidence has been obtained to demonstrate that the external provider is fully capable of producing and verifying the process, product or service, no further verification of the process, product or service is required, if a declaration of conformity is supplied for each batch		P



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	or product;		
	d) where the certificate specifies routine tests or inspections, these shall be carried out on each and every product. They may be carried out by either the external provider or the manufacturer. When carried out by the external provider they shall be specified on the purchasing documents, e.g. by a quality plan, and confirmed by the external provider e.g. by a declaration of conformity including test results, if required;		P
	e) where verification of a purchased product cannot be carried out after manufacture, e.g. the internal parts of an encapsulated intrinsically safe circuit, then the product shall only be accepted if supplied with a declaration of conformity. This shall specifically state compliance to the purchase documents, e.g. a quality plan, that lists the factors that together demonstrate conformity of the product;		N/A
	f) where sample inspections or tests are permitted, they shall be conducted in a manner which demonstrates conformity of the entire batch;		P
	g) where either the external provider or the manufacturer requires training or specialist skill or knowledge to carry out a verification, then the training material, specialist skill, knowledge or background shall be documented and training records maintained;		N/A
	h) where the manufacturer chooses not to carry out inspections and tests at its own premises, then inspections and tests shall be performed on the external provider's premises under the responsibility of the manufacturer;		N/A
	i) where an external provider provides product with evidence of conformity applicable to use in an explosive atmosphere, (e.g. certificate), then further verification is not required unless the manufacturer considers it necessary;		N/A



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	j) Where a verification of purchased product is relative to material (metals, alloys, nonmetallic parts, resins and similar), a specific analysis certificate or declaration shall be supplied;		P
	<p>k) One of the following processes shall be used to verify the continued conformity of the materials critical to the applied Type of Protection, used in the production of the Ex Products:</p> <p>1) Review the Declaration(s) of Conformity from the external provider of the material within the supply chain that can impact the material characteristics; as applicable; to demonstrate that the material used in the production of the Ex product is in accordance with the schedule drawings.</p> <p>2) Review the material manufacturer's confirmation that the material maintains the particular material properties of concern; e.g. flammability, CTI, RTI, or UV resistance, chemical composition, physical properties.</p> <p>3) Review the material manufacturer's process and data for the validation of material characteristics.</p> <p>4) Confirmation that equipment testing, necessary to confirm the material is in accordance with the certificate or schedule drawings, is repeated as required.</p> <p>Alternative processes may be utilized if it can be demonstrated that they provide the same level of conformity.</p> <p>Receipt or acceptance of a declaration of conformity does not absolve the manufacturer from responsibility to ensure continuing conformity.</p> <p>NOTE Annex C provides guidance for the development of an external provider's declaration of conformity.</p>		P



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8.4.3	Information for external providers 8.4.3 of ISO 9001:2015 applies with the following addition:		P
	a) the purchasing documents shall clearly describe the specific requirements pertaining to externally provided product set out in the certificate and the technical documentations (e.g. for process control, testing or inspection); NOTE For particular types of product e.g. castings, machined items and assemblies, the purchasing documents commonly include specific references to required drawings, test procedures, inspection procedures, material certificates, test reports and Declarations of Conformity.	Specification documents will be sent with the order.	P
	b) for items where conformance cannot be verified after manufacture (e.g. encapsulated intrinsically safe circuits), the purchasing information shall set out the specific quality procedures, resources and sequence of activities relevant to the particular item;		N/A
	c) the manufacturer shall define the method by which documents e.g. technical specifications, stated in a particular purchase order remain traceable to the order;		P
	d) where the manufacturer does not provide such documents with subsequent orders, then the manufacturer shall have documented procedures for ensuring that external providers have current copies of documents and that their integrity be maintained.		N/A
8.5.1	Production and service provision (Control of production and service provision) 8.5.1 of ISO 9001:2015 applies with the following addition:		P
	The manufacturer shall provide procedures, production equipment, working environments and inspection/testing facilities that together provide assurance with respect to the compliance of the Ex Product with its technical documentation.	Infrastructure and test equipment ensure Ex-compliant end products.	P
	Where a process can affect the integrity of a Type of Protection, and where the resulting integrity cannot be verified after manufacture (e.g. the environmental conditions required for curing an encapsulant), that specific process shall be		P



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	measured or monitored and documentary evidence shall be maintained to demonstrate compliance with required parameters (Annex A can be used to demonstrate compliance).		
8.5.2	Identification and traceability 8.5.2 of ISO 9001:2015 applies with the following addition:		P
	a) the manufacturer shall establish and maintain procedures for product identification during all stages of production, testing, final inspection and placing on the market;		P
	b) traceability is required with respect to the final product and its significant parts. Traceability can be achieved using serial number, batch or other acceptable method. NOTE Significant parts are, for example, a printed circuit board (PCB) and safety component of an intrinsically safe circuit, but not each electronic component on a PCB. The significant part can be defined in the technical documentation during the processes of the product assessment.	Traceability assured by incoming inspections, during production and end tests.	P
8.5.3	Property belonging to customers or external providers 8.5.3 of ISO 9001:2015 applies with the following addition:		N/A
	It is the responsibility of the manufacturer to verify the compatibility of a product supplied by a customer or an external provider with the requirements of the certificate.	No such orders.	N/A
8.5.4	Preservation 8.5.4 of ISO 9001:2015 applies.	Manufacturers ISO 9001 QMS complies.	P
8.5.5	Post-delivery activities 8.5.5 of ISO 9001:2015 applies.	Manufacturers ISO 9001 QMS complies.	P
8.5.6	Control of changes 8.5.6 of ISO 9001:2015 applies with the following addition:		P
	The Ex authorized person(s) identified in 5.3 shall be involved in changes (e.g. changes to the manufacturer's documentation, quality management system or marketing documents) that could affect Ex Product compliance.	Changes of certified equipment have to be approved by the ex-responsible person.	P
8.6	Release of products and services 8.6 of ISO 9001:2015 applies with the following addition:		P
	Where routine tests are required by the certificate and technical documentation, these tests shall be	Each product will be end tested	P



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	performed as specified. Unless specifically permitted by the certificate and the technical documentation, statistical methods shall not be used.	and results are stored in the ERP system. Name plate is attached after end test.	
	Ex Products shall only be released after final inspection and testing have been satisfactorily completed. The manufacturer shall provide customers with instructions prepared in accordance with the relevant standards or statutory and regulatory requirements, including any Specific Conditions of Use or particulars of possible misuse.	Each product will be delivered with complete instruction manual. <i>See attached document: Doc. No. 009</i>	P
8.7	Control of nonconforming outputs 8.7 of ISO 9001:2015 applies and the following shall be defined:		P
	a) the manufacturer shall maintain a documented system, such that in the event of an Ex Product not conforming to the certificate and having been supplied, then the manufacturer's customer can be identified;	Nonconforming products will be marked and rejected. A report lists faults which, if possible, will be corrected and retested. Otherwise product will be destroyed.	P
	b) the manufacturer shall take action, appropriate to the degree of risk, where nonconforming Ex Product has been supplied to a customer. It is recommended that the manufacturer liaise with the body responsible for the issue of the certificate;		P
	c) where unsafe nonconforming Ex Products have been supplied to a customer, the manufacturer shall, in writing, inform its customer and the body responsible for the verification of the quality management system and the issuer of the certificate;		P
	d) where it is not possible to trace unsafe nonconforming Ex Products (e.g. Ex Products supplied via a distributor, or for high volume Ex Products such as Cable Glands) then a notice shall be placed in appropriate publications providing recommended action to be taken;		P
	e) for all nonconforming Ex Products that have been supplied to a customer, the manufacturer shall maintain, for a minimum period of 10 years,		P



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	records of: <ul style="list-style-type: none"> serial numbers or identification of Ex Products supplied; the customer who received the Ex Products; the action taken to inform customers and the body responsible for the verification of the quality management system in the case of unsafe nonconforming Ex Products; the action taken to implement corrective and preventative action; 		
	f) concessions for Ex Products that take the Ex Products outside the design as defined in the certificate and technical documentation are not permitted.		P
9.1.1	General (Monitoring, measurement, analysis and evaluation)	Manufacturers ISO 9001 QMS complies.	P
	9.1.1 of ISO 9001:2015 applies.		
9.1.2	Customer satisfaction	Manufacturers ISO 9001 QMS complies.	P
	9.1.2 of ISO 9001:2015 applies.		
9.1.3	Analysis and evaluation	Manufacturers ISO 9001 QMS complies.	P
	9.1.3 of ISO 9001:2015 applies.		
9.2	Internal audit		P
	9.2 of ISO 9001:2015 applies with the following addition:		
	a) The audit program shall address the effectiveness of the elements of the quality management system as described in this document to ensure that the Ex products are in conformity with the certificate. The maximum period between audits shall not exceed 14 months.	An internal ex-audit is done every year and ensures ex-compliant products. <i>Document reviewed: "Terminplan Managementsystem" Doc. No. 004, 005, 006</i>	P
	b) One method of demonstrating effectiveness is the use of vertical auditing whereby an Ex Product awaiting dispatch is used to prove the system. The auditor examines all aspects of the system associated with the production of that Ex Product from a certification viewpoint. This normally includes appropriate documentation (drawings, inspection checklists, test records, material certificates etc.), Ex Product identification, handling, storage, training of staff and any other		N/A



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	elements of the system which can affect the compliance of the Ex Product to the certification parameters.		
	c) For those manufacturers that employ checklists to assist in their internal audit programs, the inclusion of the requirements of this document into the appropriate checklists, and the retention of internal audit records, is an alternative method of addressing this requirement. Manufacturers may employ either method or some other equivalent method.		P
9.3.1	Management review (General) 9.3.1 of ISO 9001:2015 applies with the following addition:		P
	a) the maximum intervals between reviews shall not exceed 14 months; b) top management shall chair the review; c) the Ex authorized person(s) responsible for the activities as detailed in 5.3 shall participate in the review. The review shall include the overall effectiveness of the quality management system with respect to Ex Products, including results of internal and external audits. NOTE Review of results of internal and external audits would provide evidence of the effectiveness of the quality management system.	A management review takes place once a year chaired by Mr Elayathamby. Mr Krause as ex-responsible person is involved. Documents reviewed.	P
9.3.2	Management review inputs 9.3.2 of ISO 9001: 2015 applies.	Manufacturers ISO 9001 QMS complies.	P
9.3.3	Management review outputs 9.3.3 of ISO 9001:2015 applies.	Manufacturers ISO 9001 QMS complies.	P
10.1	General (Improvement) 10.1 of ISO 9001:2015 applies.		P
	The organization shall retain documented information as evidence of: a) the nature of the nonconformities and any subsequent actions taken; b) the results of any corrective action.	Nonconformities and the results of the corrective action are tracked.	P



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10.2	Nonconformity and corrective action	Manufacturers ISO 9001 QMS complies.	P
	10.2 of ISO 9001:2015 applies.		
10.3	Continual improvement	Manufacturers ISO 9001 QMS complies.	P
	10.3 of ISO 9001:2015 applies.		



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Clause	Requirement	Documents reference and/or comments	Verdict
Annex A (informative)			
Information relevant to particular Types of Protection and specific Ex Products			

Clause	Requirement	Documents reference and/or comments	Verdict
A.1	Overview		
	<p>This annex provides information on those aspects that the quality management system should address with respect to particular types of protection. It does not add to or otherwise change the requirements of this document.</p> <p>This annex provides examples of how to meet the requirements of this document, recognizing that other methods which achieve the same objectives are equally acceptable; and draws attention to aspects of requirements that might not be readily apparent to those unfamiliar with quality management systems for products intended for use in explosive atmospheres.</p> <p>NOTE The following examples do not cover all Types of Protection but give some advice and will be supplemented in the next edition.</p>		P
A.2	General		
	<p>Schedule Drawings, which support the certificate of the Ex Product, may provide conditions for the particular Type of Protection. All markings should be in accordance with schedule drawings.</p> <p>For enclosures and other components forming part of the enclosure and for fans, fan hoods and ventilation screens, the manufacturer should verify the material composition (e.g. External Provider's Declaration of Conformity, see Annex C).</p> <p>Statistical bases are not appropriate for routine tests required by the certificate, except where the following currently permit such techniques:</p> <ul style="list-style-type: none"> • the relevant standard; or • appropriate interpretation and clarification sheets; <p>All measurements should consider temperature variations.</p>		P
A.3	Ex d – Flameproof enclosures covered by IEC 60079-1		
A.3.1	Verification		
	<p>Verification consists of a visual inspection and/or measurement.</p> <p>The measurement should be done with suitable</p>	<p>Visual inspection on each working step.</p> <p>Important dimensions of each enclosure measured by a</p>	P



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	measuring equipment. The persons doing this measurement should have the competence and knowledge of using this measuring equipment.	Scanning platform. All relevant persons are appropriately trained	
A.3.2	Castings		
	<p>Castings should be subject to verification that demonstrates conformity, e.g.:</p> <p>a) 100 % visual inspection should be done on each part;</p> <p>b) wall thickness (including those parts not subject to machining);</p> <p>c) flaws, inclusions, blow holes and porosity (by either a visual or test method depending upon the criticality).</p> <p>NOTE Verification can be accomplished by 100 % visual inspection, or by another means deemed appropriate based on the ability of the manufacturer to effectively control production.</p> <p>Recovery of porous castings by impregnation methods, e.g. silicone is not permitted. In the event that a casting is recovered by welding it will become subject to the requirements applicable to welded enclosures, e.g. routine pressure testing.</p>	No castings.	N/A
A.3.3	Machining		
	<p>Machining should be subject to verification by either 100 % inspection or statistical techniques as appropriate that demonstrates conformity, e.g. the following should be verified:</p> <p>a) flatness of flanged flamepaths;</p> <p>b) surface roughness of non-threaded flamepaths;</p> <p>c) fit of all threaded flamepaths (e.g. threaded entries and threaded access covers);</p> <p>d) depth of drilling and tapping of blind holes to ensure adequate residual wall thickness;</p> <p>e) dimensional requirements of all flamepaths.</p> <p>NOTE Suitable statistical techniques are used in ISO 2859-1,</p>	Testing of housing with calibre and coordinate measuring equipment.	P



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	ISO 3951-1 or equivalent standard.		
A.3.4	Cemented joints and potted assemblies		
	<p>Documented procedures should address the following, as applicable:</p> <p>a) shelf life and storage of cement, potting compounds;</p> <p>b) mixing;</p> <p>c) surface preparation (degreasing or equivalent is usually required immediately before the potting-operation to ensure good adhesion);</p> <p>d) application e.g. filling instructions, freedom from voids and temperature conditions;</p> <p>e) curing, which should include: curing period, any relevant environmental factors, provision to ensure product is undisturbed during the curing period;</p> <p>f) after curing, an inspection should be done on each potted assembly. Depending on the nature and repeatability of the process and the potted assembly, this could be for example using statistical techniques.</p>	<p>Potting is done according working instruction with potting equipment.</p>	P
A.3.5	Routine overpressure testing		
A.3.5.1	General		
	<p>The purpose of the test is to check that the enclosure does not suffer damage or permanent deformation.</p> <p>Leakage through cemented joints or potted assemblies would constitute a failure unless otherwise permitted by the issuer of the certificate.</p> <p>The test can be a single test conducted on a complete assembly, or a series of tests on each sub-assembly or component part. For the static routine overpressure test, it is sufficient to test the enclosure empty. The individual parts of a flameproof enclosure (for example, cover and base) can be tested separately. For enclosures that contain more than one discrete</p>	<p>The potted joints are checked visual on checkpoints on each unit.</p>	P



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	<p>compartment, each compartment should be tested individually. The method used should ensure that the assembly, sub-assembly or component parts are subjected to representative stress patterns e.g. actual fastening facilities are used. Clamping that affects the mechanical properties of the Type of Protection would invalidate the test results.</p> <p>Due to safety considerations and difficulty in detecting leakage, hydraulic rather than pneumatic methods are recommended.</p>		
A.3.5.2	Batch testing		
	<p>Where permitted by the certificate, the routine overpressure testing may be replaced by a batch test according to the following criteria, based on ISO 2859-1:</p> <p>a) For a production batch up to 100, a sampling of 8 should be tested at 1,5 times the reference pressure with no failures.</p> <p>b) For a production batch from 101 to 1 000, a sampling of 32 should be tested at 1,5 times the reference pressure with no failures.</p> <p>c) For a production batch from 1 001 up to 10 000, a sampling of 80 should be tested at 1,5 times the reference pressure with no failures.</p> <p>d) Batches above 10 000 should be subdivided into smaller batches.</p> <p>If there are any non-compliant test results, 100 % of all remaining samples in the batch should be tested at 1,5 times the reference pressure. Future batches should be routine tested at 1,5 times the reference pressure until confidence is established to reconsider batch testing.</p> <p>NOTE Upon non-compliant test results, reconsideration of this batch testing approach is at the discretion of the party issuing the certificate.</p>	<p>No routing overpressures testing.</p>	<p align="center">N/A</p>
A.3.5.3	Welded construction		
	<p>Where permitted by the certificate, the routine overpressure testing may be replaced by one of the following inspection methods:</p>	<p>No welded constructions.</p>	<p align="center">N/A</p>



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	a) radiographic weld inspection; or b) ultrasonic weld inspection; or c) magnetic particle weld inspection; or d) liquid penetrant weld inspection. NOTE ISO standards exist for each of the above weld inspection methods.		
A.3.6	Flanged joints		
	Flanged joints should be verified after final assembly to ensure the gap specified in the Schedule Drawings is not exceeded. If not practical, special measure should be taken during the production.	No flanged joints.	N/A
A.3.7	Elements, with non-measurable paths, of breathing and draining devices		
	For products containing elements like sintered metal, pressed metal wire or metal foam, see Annex B.	No such components.	N/A
A.4	Ex i – intrinsic safety covered by IEC 60079-11		N/A
A.4.1	Components for intrinsically safe products		
	The following features should be verified with respect to the following components for use in intrinsically safe apparatus and associated apparatus. This normally means verifying the marking on the components or packaging and may be achieved by using statistical techniques where appropriate, as shown in Table A.1:	Unit is considered intrinsically safe based on the construction of the unit. See Table A.1 below.	P



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Table	Table A.1 Component features requiring compatibility		
	Resistors:	value, power, type, tolerance, case size	N/A
	Capacitors:	value, tolerance, type, rated voltage, case size	N/A
	Piezo-electric devices:	manufacturer, type, capacitance	N/A
	Inductive components:	type, inductance, DC. resistance, number of turns, wire gauge and material, material specification of core and bobbin where appropriate	N/A
	Transformers:	type, manufacturer, isolation, voltage	N/A
	Optical isolator	Optical isolator type, isolation, voltage”	N/A
	Semiconductors: – Diodes – Zener diodes – Transistors – Integrated circuits – Thyristors	type number, power value and where appropriate, the manufacturer	P
	Cells and batteries:	manufacturer and type number, or IEC designation	N/A
	Fuses:	manufacturer, type, value	N/A
	Insulating materials:	specification, dimensions and where appropriate type number	N/A
	Connectors (e.g. plugs/ sockets and terminals):	type number and where appropriate, the manufacturer	P
A.4.2	Printed circuit boards (PCB)		
A.4.2.1	Non-populated PCBs		
	PCBs may be accepted with a declaration of conformity (see Annex C). The declaration should state compliance to the purchase documents e.g. a quality plan that lists the factors that together demonstrate conformity of the product. For simple single or double sided PCBs, the copper artwork may be visually verified using photographic negative (transparency), certified drawing or controlled inspection samples. Purchase documents should specify copper thickness with tolerances, PCB thickness with tolerances and CTI values.	PCB is already populated.	P
A.4.2.2	Populated PCBs		
	Varnish and coatings should be controlled with respect to the specification of material and effectiveness of the application. Documented procedures should ensure that the application of varnish and coatings are in	Simple PCB populated with diodes. PSB is potted in a steel enclosure. Visual verification.	P



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	<p>conformity with the certificate and/or schedule drawings.</p> <p>For PCBs the manufacturer should maintain a list of safety critical components used in production (e.g. resistors and Zener diodes) determined during Ex Equipment assessment. The safety critical components placed on the PCB should be verified on a 100 % basis.</p> <p>Specified distances and clearances on manually assembled PCBs should be verified on a 100 % basis.</p> <p>This may be conducted by one of the following methods:</p> <p>a) a visual verification;</p> <p>b) for surface mount components, by ensuring correct loading of the "pick and place" machines and a visual verification of correct placement;</p> <p>c) by automatic test equipment (ATE) if the ATE addresses each individual safety critical component and by a visual verification conducted to verify type number of components in shunt Zener diode/diode assemblies.</p> <p>Where the surface mount component "pick and place" machine selects the component reel based on measuring the component value, the measuring function should be calibrated.</p> <p>Documented procedures should be provided that ensure that workmanship standards are defined with respect to component mounting and soldering.</p> <p>Documented procedures should ensure that segregation of related parts (e.g. terminals) and wiring/cabling is maintained and that specified colours, cross-sectional area, insulation thickness are in conformity with the schedule drawings.</p>		
A.4.3	Sub-assemblies and assemblies		
	Documented procedures should ensure that	No such assemblies	P



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Product Testing

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IECEX QAR reference no.: **CH/SEV/QAR16.0001/03**

ATEX audit report reference no.: **17-Ex-0089.X02**

Clause	Requirement	Documents reference and/or comments	Verdict
	<p>production documentation includes all relevant variations to the product design.</p> <p>Production documentation should address all safety critical components, and in the case of encapsulated parts, the compound manufacturer, type, mix and minimum depth.</p> <p>Documented procedures should address the following:</p> <p>a) shelf life and storage of cement and potting compounds;</p> <p>b) mixing;</p> <p>c) surface preparation (degreasing or equivalent is usually required immediately before the potting-operation to ensure good adhesion);</p> <p>d) application e.g. filling instructions, freedom from voids and temperature conditions;</p> <p>e) curing, which should include: curing period, any relevant environmental factors, provision to ensure product is undisturbed during the curing period;</p> <p>f) after curing, an inspection should be done on each potted assembly. Depending on the nature and repeatability of the process and the potted assembly, this could be for example using statistical techniques.</p> <p>Documented procedures should also ensure that segregation of related parts (e.g. terminals) and wiring/cabling is maintained and that specified colours, cross-sectional area, insulation thickness and labels (where appropriate) are fitted.</p> <p>Sealing arrangements should be verified for compatibility with the product's ingress protection rating.</p>		
A.4.4	Enclosures for Group III or reduced spacing		
	For intrinsically safe apparatus for Group III, or for apparatus that relies on the enclosure for reduced	See 4.2.2	P



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	<p>spacing, demonstration of the conformity of the enclosure with the schedule drawings should include the following:</p> <p>a) depths of bore holes and tap holes;</p> <p>b) dimensional requirements for those enclosure parts relevant for sealing effectiveness or mechanical stability;</p> <p>c) insulating coatings and surface conditioning; material, layer thickness.</p> <p>Documented procedures should address the following:</p> <p>d) the gaskets correspond to the quoted specification;</p> <p>e) the sealing elements' effectiveness, e.g. by checking the sealing elements' correct fit.</p> <p>If a gasket's correct fit becomes apparent only after assembly, the imprint could be visually examined, e.g. by use of adequate methods such as use of chalk.</p>		
A.4.5	Routine verifications and tests		
	<p>Procedures for all routine verifications and tests specified in the schedule drawings should be reviewed, along with the results of those verifications and tests, e.g. high voltage tests on complete assemblies or individual components such as transformers, should be controlled by documented procedures and conducted on a 100 % basis unless otherwise permitted.</p>	<p>Tests are carried out according working instructions and check all relevant parameters.</p>	P
A.4.6	Intrinsically safe circuits and assemblies incorporated in Ex equipment of other types of protection		
	<p>Where Ex equipment contains intrinsically safe circuits then precautions should be taken as stated in the certificate to ensure that other items listed in the certificate are selected, mounted and installed in accordance with schedule drawings.</p>	<p>No equipment in other types of protection</p>	P



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A.5	Ex e – Increased safety covered by IEC 60079-7		
A.5.1	Ingress protection (IP)		
	<p>Documented procedures should ensure that the following is verified:</p> <ul style="list-style-type: none"> a) weld continuity; b) fitting of gaskets and seals; c) continuity of moulded grooves and tongues; d) application of cements including a visual inspection after curing. 	<p>Checked by visual inspection Welding lines are 100% controlled, gaskets and cable glands are verified according to drawings.</p>	P
A.5.2	Internal wiring and contact integrity		
	<p>Documented procedures should ensure that the following are verified:</p> <ul style="list-style-type: none"> a) wiring is clamped as specified in the schedule drawings; b) wiring is terminated as specified in the schedule drawings; c) wires are as specified in the schedule drawings; d) connections are tightened as specified in the schedule drawings; e) creepage distances and clearances are as specified in the schedule drawings and have not been compromised. 	<p>Verified during 100% end tests.</p>	P
A.5.3	Rotating machines		
	<p>Documented procedures should ensure that the following are verified:</p> <ul style="list-style-type: none"> a) rotor end connections and fixing bars are as specified in the schedule drawings; b) the fabrication process for die-cast rotors is as specified in the schedule drawings; c) production controls are in place for: 	<p>No such devices.</p>	N/A



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	<ul style="list-style-type: none"> – the air gap (rotor to stator) as specified in the schedule drawings; – the fan clearance as specified in the schedule drawings; – the bearing seal clearances as specified in the schedule drawings. <p>NOTE The schedule drawings might not specify a bearing seal clearance as not all Levels of Protection require a bearing seal clearance for all bearing seal designs.</p>		
A.5.4	Windings		
	<p>Documented procedures should ensure that the following are verified:</p> <ul style="list-style-type: none"> a) wire and insulation system are as specified in the schedule drawings; b) the impregnations process is as specified in the schedule drawings; c) insulation materials are as specified in the schedule drawings; d) mechanical securing of conductors are as specified in the schedule drawings; e) type and mounting of protective devices (e.g. thermal cut-outs) are as specified in the schedule drawings. 	No such windings.	N/A
A.5.5	Terminal boxes		
	<p>Documented procedures should ensure that the following are verified:</p> <ul style="list-style-type: none"> a) terminals are as specified in the schedule drawings; b) creepage distances and clearances as specified in the schedule drawings have not been compromised. 	No such boxes.	N/A
A.5.6	Cable Glands, terminals and other accessories		
	The dimensions specified in the schedule drawings should be confirmed on a statistical basis.	Only certified cable glands are used. Luminaries leave factory without mains cord. End user is	P



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	Where entry openings are secured by non-Ex temporary plugs (e.g. for transport only), additional information should be provided.	responsible to choose correct cable (mentioned in Instruction manual).	
A.5.7	Routine verifications and tests		
	Procedures for all routine verifications and tests specified in the schedule drawings should be reviewed, along with the results of those verifications and tests.	All test data are saved in the ERP system.	P
A.6	Ex p – Pressurized equipment covered by IEC 60079-2		N/A
A.7	Ex m – Encapsulation covered by IEC 60079-18		N/A
A.8	Ex o – Liquid immersion covered by IEC 60079-6		N/A
A.9	Ex q – Powder filling covered by IEC 60079-5		N/A
A.10	Equipment covered by IEC 60079-15		N/A
A.11	Ex t – Dust ignition protection by enclosure covered by IEC 60079-31		
A.11.1	Casting		
	Castings should be subject to verification that demonstrates conformity with the schedule drawing, e.g.: a) wall thickness (including the non-machinable parts); b) cracks, inclusions, bubbles and porosity.	No castings.	N/A
A.11.2	Enclosure parts		
	Enclosure parts should be subject to verification that demonstrates conformity with the schedule drawing, e.g.: a) depths of bore holes and tap holes; b) dimensional requirements for those enclosure parts relevant for sealing effectiveness or mechanical stability; c) insulating coatings and surface conditioning; material, layer thickness.	Testing of housing with calibre and measuring equipment.	P



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A.11.3	Gaskets		
	<p>Documented procedures should address the following:</p> <p>a) the gaskets correspond to the quoted specification;</p> <p>b) the sealing elements' effectiveness, e.g. by checking the sealing elements' correct fit.</p> <p>If a gasket's correct fit becomes apparent only after assembly, the imprint could be visually examined, e.g. by use of adequate tools such as chalk.</p>	<p>Possible gaskets according to specifications and visually checked during manufacturing process.</p>	P
A.11.4	Protection devices		
	<p>Protection devices should be subject to verification that demonstrates conformity with the schedule drawings. Wherever protection devices (e.g. thermal safety devices) are specified in the certificate, they should be verified according to type and placement.</p>	<p>No protection devices.</p>	N/A
A.11.5	Cemented and cast enclosure parts		
	<p>Documented procedures should address the following:</p> <p>a) shelf life and storage of cement, potting compounds;</p> <p>b) mixing;</p> <p>c) surface preparation (degreasing or equivalent is usually required immediately before the potting-operation to ensure good adhesion);</p> <p>d) application e.g. filling instructions, freedom from voids and temperature conditions;</p> <p>e) curing, which should include: curing period, any relevant environmental factors, provision to ensure product is undisturbed during the curing period;</p> <p>f) after curing, 100% visual inspection should be done on each assembly.</p>	<p>Potting is done according working instruction with potting equipment.</p>	P



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A.11.6	Ingress protection (IP)		
	Documented procedures should ensure that the following is verified: a) weld continuity; b) fitting of gaskets and seals; c) continuity of moulded grooves and tongues; d) application of cements including a visual inspection after curing.	Visually checked during manufacturing.	P
A.11.7	Routine verifications and tests		
	All tests should be documented. Typical tests include: a) the visual inspection; b) further verification and test requirements can result from the concepts of the dusts explosion protection standards. However, these can essentially be derived from the requirements for the types of protection listed so far.	Visual inspection on finished product. Test results are documented and stored in ERP system.	P
A.12	Ex op – Optical radiation covered by IEC 60079-28		N/A
A.13	Gas detectors covered by IEC 60079-29		N/A
A.14	Ex h – Non-electrical equipment covered by ISO 80079-36		N/A
A.15	Non-electrical equipment protected by constructional safety “c” covered by ISO 80079-37		N/A
A.16	Non-electrical equipment protected by control of ignition sources “b” covered by ISO 80079-37		N/A
A.17	Non-electrical equipment protected by liquid immersion “k” covered by ISO 80079-37		N/A
A.18	Flame arresters covered by ISO 16852		N/A



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Annex B (informative)

Verification criteria for elements with non-measurable paths used as an integral part of a Type of Protection

Note: Annex B may be deleted if not applicable

Annex ZB to EN ISO/IEC 80079-34:2011 European deviations for non-electrical products according EN 13463-1		Assessed (Y, N or N/A)	Comments <i>List any pertinent details / compliance with requirements of clause</i>	NCR Ref.
ZB	Annex ZB	N/A	---	---

4. Observations

*Additional assessor notes, Summary of audit trail (e.g. Who? What? Where? When? etc.) (Could be positive, negative, improvement, etc). **Include brief comments on each department/function audited.***

Well organized company, achieving high quality standards. Update to ISO 9001:2015 was done in 2018. The company is keeping their own high quality demands and continuously expands the internal production equipment and capacities. The quality management tools are on actual stage and well maintained by the responsible managers.

The audit took place at the production site of Wandfluh Hydraulik + Elektronik AG. At this site the complete production of the Solenoid coils is done.

Starting with the quality system with the introduction of the ISO 9001:2015 explained by Mr Elayathamby and Mr Krause. The last audit report of the ISO 9001:2015 recertification audit was checked and no Ex-relevant non-conformities are listed.

The management review as well as the quality objectives and the organizational chart of Wandfluh Hydraulik + Elektronik AG were discussed.

Mr. Elayathamby explained the organisation, management and resources of Wandfluh Hydraulik + Elektronik AG. The planning and control process are checked and fulfil the requirements.

During a tour of the production, the different stages of solenoids and coils manufacturing were examined. Wandfluh Hydraulik + Elektronik AG has a high degree of vertical integration and places the highest demands on the manufacturing of the components and solenoids.

The different workplaces are well structured and tidy.