ARP1717:2017 First Edition

Guide to the Regulatory Requirements for the Approval of Detonators, Initiators and Initiation Systems used in Mining and Civil Blasting Applications

mineral resources
Department:
Mineral Resources
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FOREWORD

This document was first published in November 2010.

Reference is made in 3.9, 4.2.1.1, 4.3.1, 4.3.2, 4.3.3 and 4.5.1.1 to the "relevant national legislation". In South Africa, this means:

- Section 11 and 21 of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996).

- Section 10 of the Occupational Health and Safety Act, (Act No. 85 of 1993).

Reference is made in 3.10 to "the relevant national regulators", in 4.1.2 and in A.10 to "the relevant national regulatory body", in 4.4.1.1, 4.4.1.2, 4.4.1.4 and 4.4.2.1 to "the relevant national regulatory authority". In South Africa, this means one or more of the following:

- The Chief Inspector of Explosives of the South African Police Service as specified in the Explosives Act, 2003 (Act No. 15 of 2003).

- The Chief Inspector of Mines of the Department of Mineral Resources as specified in the Mine Health and Safety Act, 1996 (Act No. 29 of 1996).

Reference is made in 6.3.1 to "the relevant national legislation'. In South Africa, this means

- Regulation 4.5 of the Mine Health and Safety Act, 2008 (Act No. 74 of 2008).

Reference is made in 6.3.2 to the "relevant national legislation". In South Africa, the legislation on explosives is referred to in chapter 4 of the Mine Health and Safety Act (MHSA), its Regulations and the referenced standards.

The correct usage of the radio frequency spectrum is regulated in terms of a general notice 432 in the Government Gazette No. 30955 of 7 April 2008 and General notice 890 in the Government Gazette No. 31264 of 22 July 2008.

This guideline is relevant to any application for inspection authority (IA) certification.

INTRODUCTION

An ATL will examine the technical construction file (TCF) to confirm that the documentation detailed in terms of the guidelines in tables 1 and 2 complies with the format required in SANS 17025.

The Chief Inspector of Mines of the Department of Mineral Resources has accepted responsibility for the accuracy and updating of the recommended practice and is responsible for incorporating amendments.

1. SCOPE

This recommended practice covers the constructional requirements, testing and approval of blasting and related systems, used in the controlled initiation of explosive blasts.

2. NORMATIVE REFERENCE

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from the SABS Standards Division.

IEC 61508-3, Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 3: Software requirements.

IEC 61508-7, Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 7: Overview of techniques and measures.

SANS 10108, The classification of hazardous locations and the selection of apparatus for use in such locations.

ISO/IEC 17025, General requirements for the competence of testing and calibration laboratories.

EN 13763-part 1 - 27, Explosives for civil uses – Detonators and Relays.

EN 61000, Electromagnetic Compatibility (EMC).

IEC 60079-0, Explosive atmospheres – Part 0: Equipment – General requirements.

IEC 60079-11, Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i".

European Directive 2014/28/EU - "the harmonisation of the laws of the Member States relating to the making available on the market and supervision of explosives for civil uses".

3. TERMS AND DEFINITIONS

For the purposes of this document, the following terms and definitions apply.

3.1 **Accredited test laboratory** (ATL)

Test laboratory that is accredited by the government endorsed national accreditation body to carry out or verify tests specified in the appropriate standards.

NOTE: An ATL also issues the inspection authority (IA) certificates.

3.2 **Controlled blasting system** (CB system)

System which enables the initiation of a blast from a control point via a communication medium relevant to the particular system.

3.3 Employer

Person who employs or provides work for any person to conduct blasting operations and is the responsible party for the safe use of the blast system.

3.4 Hazard

Source of exposure to danger and risk.

3.5 Inherently safe test equipment

Test equipment to test a specific initiator installation, and which is unable to fire the initiator under test.

NOTE: Such test equipment will be unable to transfer sufficient energy to the initiator to cause it to initiate. Passive safety measures incorporated in the design of the system should be able to withstand at least two independent failures in the initiator and test equipment combination. Risk assessment to confirm sufficient level of protection (e.g. SIL3)

3.6 Initiator

Electric detonator, electronic delay detonator (EDD), electro-explosive device (EED) or any initiating device with the capability of initiating a blast or explosives when activated from a CB system.

NOTE: Spark starters for shock tube are also known as initiators and form part of this definition for the purposes of the standard.

3.7 Inspecting authority certificate (IA certificate)

National certificate issued by an ATL endorsing conformance with the relevant national or international standards as recommended by the inspection authority (IA).

3.8 Manufacturer/supplier

Person (legal entity) who designs, manufactures, repairs, imports or supplies any article for the purpose of blasting.

NOTE: See foreword for relevant national legislation.

3.9 Panel of experts

Panel of experts appointed by the ATL who are knowledgeable in the field, and are competent to evaluate the product which passed the relevant tests as verified or conducted by an approved test laboratory.

NOTE: The panel includes representatives from the relevant national regulators (see foreword) and the manufacturer or supplier.

3.10 Risk

Likelihood that injury or harm to persons or property exists.

3.11 Risk assessment

Identification of hazards in a process or project, that could cause harm to persons or equipment or the environment, followed by the estimation of the risk, severity and probability, of the event happening.

3.12 Safety interlocked blast equipment

Blast equipment designed to initiate a blast in a controlled manner, incorporating at least two independent safety interlocks.

NOTE 1: These interlocks should be of such nature that a change of state in one interlock may not automatically dictate a change in another interlock without a deliberate command or action to affect such secondary change.

NOTE 2: Should it be required to connect the blast equipment to initiators before the blast site is cleared of people, the equipment should also comply with the requirements for inherent safety while the interlocks are engaged.

3.13 Subject matter expert (SME)

Subject matter expert is an expert or a member of a Technology Advisory Board (TAB) contracted or assigned by an organization or an inspection body to consult on a specific project.

NOTE: SME's know what is critical to the performance of the task and should have additional information. SME's typically have participated with standards bodies and have development and operations experience (or both) that dates back to the inception of their area of expertise that provides them with uncommon wisdom and patience.

4. APPROVAL PROCESS

4.1. General

4.1.1. Any manufacturer or supplier who requires approval for the use of a controlled blasting system, shall obtain an IA certificate of compliance from an ATL.

4.1.2. Once the results of the technical construction file and safety tests required are available, a relevant national regulatory body (see foreword) may be called during the trial stage to assist the ATL to perform the following:

a) Review of documentation that describes the design philosophies and operating procedures regarding the safe operation of the system;

NOTE: A non-disclosure agreement should be entered into between the relevant parties to protect the intellectual property disclosed.

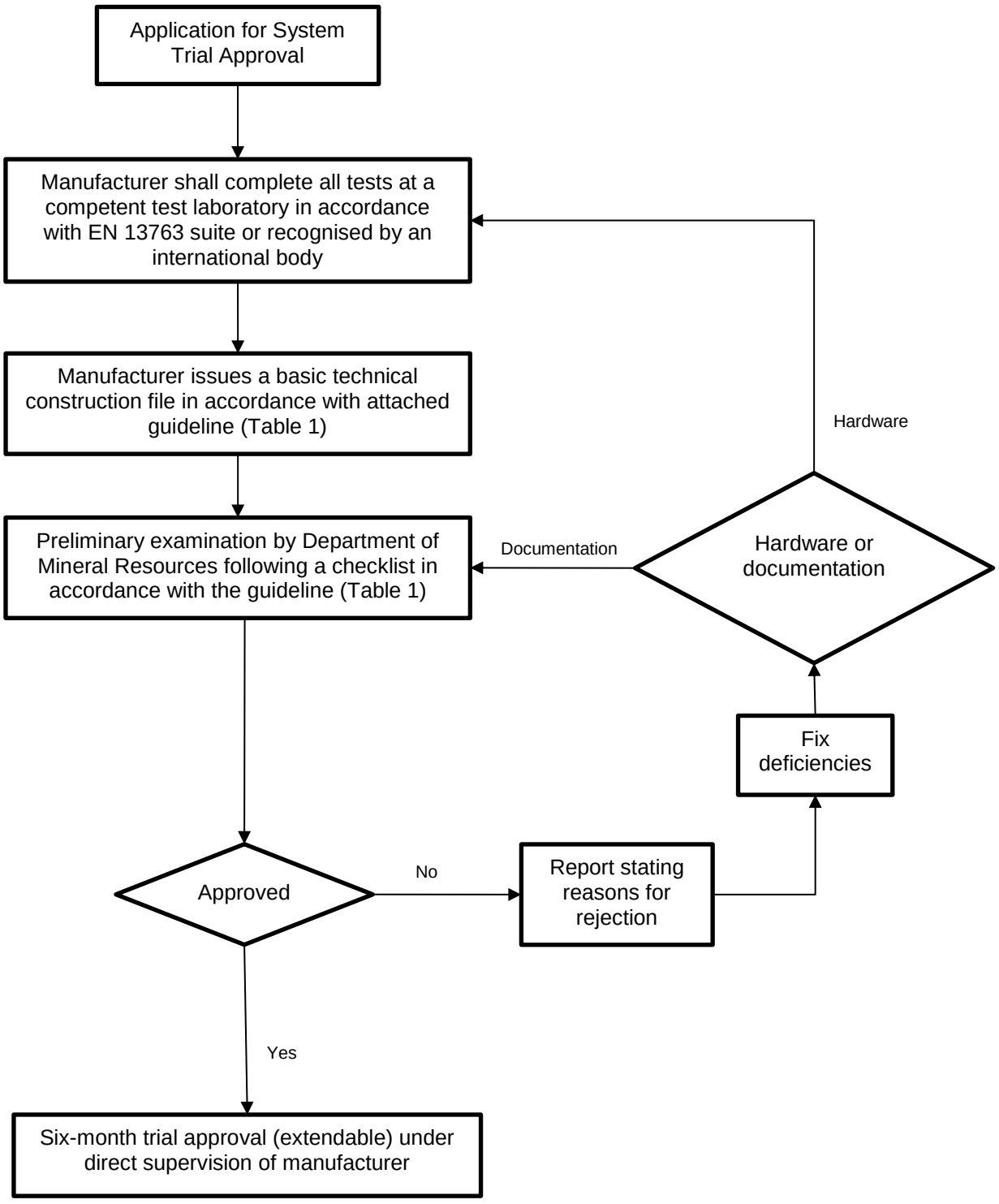
b) View a practical demonstration of the system, if necessary on site, in a surface or underground application; and

NOTE: If the system is still in the trial stage, application for exemption from this requirement should be made to the ATL in conjunction with the regulatory authority.

c) If found that the system complies with the requirements of EN 13763 suite, it should be recommended that the system be certified for use in terms of the relevant national regulatory body (see foreword).

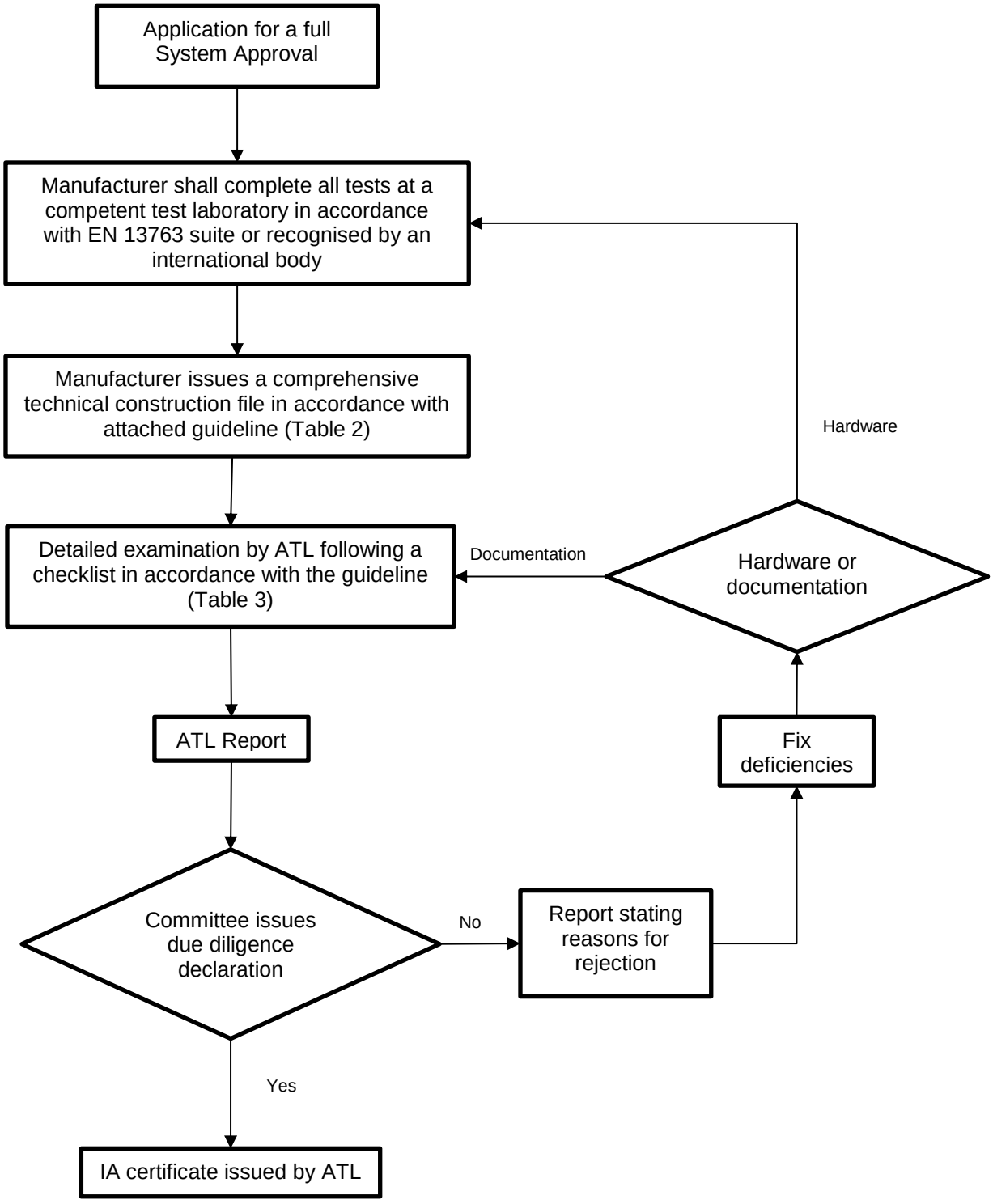
4.1.3. Any application for certification by an ATL, shall be accompanied by the documentation given in tables 1 and 2.

4.1.4. Figures 1 and 2 demonstrate the process diagram for the application for a trial approval and a full system approval respectively.



NOTE: The Department of Mineral Resources may convene a committee with the CIE, manufacturer or supplier's representative with appropriate SME's and the Department of Labour if required.

FIGURE 1: Process diagram for the application of trial approval



NOTE: The committee may be convened by the ATL and may consist of the Department of Mineral Resources, CIE, manufacturer or supplier's representative and appropriate SME's and the Department of Labour if required.

FIGURE 2: Process diagram for the application of full system approval

4.2. Technical construction file (as supplied by the manufacturer)

4.2.1. Public domain documentation

4.2.1.1. The technical construction file provided by the manufacturer or supplier (or both) shall contain sufficient information so as to allow the user to apply the system correctly, safely and effectively.

NOTE: See foreword for the relevant national legislation.

4.2.1.2. Appropriate reference shall be made to EN -13763 suite.

4.2.1.3. The manual(s) shall include all the information required by the user to compile training manuals for the initiation system. The contents of the manual will assist the user in developing the site-specific application risk assessment for the initiation of the specific type of detonators that are required to be initiated.

4.3. Risk assessment

4.3.1. Comprehensive risk assessment of the product used in the complete blasting system

A comprehensive risk assessment of the product used shall be compiled.

NOTE: See foreword for the relevant national legislation.

4.3.2. Comprehensive risk assessment during the application of the blasting system

A risk assessment for the environment and application where the controlled blasting system will be used shall be prepared. This risk assessment shall refer specifically to the application by the end user of the CB initiation system and not to the design and manufacturing process of the system.

NOTE: See foreword for the relevant national legislation (MHSA section 11).

4.3.3. Control measures

The control measures identified to minimize the hazards of a controlled blasting system shall be identified in generic terms in order to create a guideline that the employer or owner (or both) shall use, to formulate a code of practice or a mine procedure. The risk assessment shall be prepared in order to meet the requirements of the relevant national legislation (see foreword).

4.4. Proprietary documentation

4.4.1. **Preamble**

4.4.1.1. Because this documentation reveals the details of design which constitute the intellectual property of the manufacturer or the supplier, the submission of this documentation could be subject to the signing of legally binding confidentiality agreements between the ATL, the relevant national regulatory authority, and the manufacturer or the supplier (or both).

4.4.1.2. The ATL and the relevant national regulatory authority shall not refuse to put such agreements in place, which actions could unduly delay the granting of approval.

4.4.1.3. The confidentiality agreements in 4.4.1.2 will be binding on both the legal entity that entered into the agreements and the individuals employed by them who can have insight into the information contained in the documentation.

4.4.1.4. The purpose of this documentation is to enable the ATL and the relevant national regulatory authority to determine whether the manufacturer or the supplier (or both) has applied sound principles in the design of the system and has due diligence in evaluating the safety related properties of the system.

4.4.2. Contents of the proprietary documentation

4.4.2.1. All relevant information in tables 1 and 2 is applicable. The documentation shall refer to, and describe in sufficient detail, the operation and safety features of the CB initiation system, for the relevant national regulatory authority to perform the assessment to make an appropriate evaluation.

4.4.2.2. All relevant documentation applicable to the certificate issued shall be retained by the ATL in a traceable and secure format.

4.4.2.3. IA certificates issued by ATL's shall confirm compliance with the mandatory safety tests detailed in the relevant standard.

4.5. Product inspection

4.5.1. Construction of blast initiation and testing equipment to be used in South Africa

4.5.1.1. If blast initiation and testing equipment is to be used in a hazardous location, as defined in the relevant national legislation (see foreword), it shall be submitted to the ATL for inspection in order to ensure that blast initiation and tester enclosures are not manufactured of a light metal and that such equipment is explosion protected. See IEC 60079-0 and IEC 60079-11.

4.5.1.2. If it is required that the controlled blasting initiation system is to be used in hazardous locations, it shall comply with the requirements of SANS 10108.

4.5.1.3. If blast initiation and testing equipment is to be used anywhere else, the equipment shall be approved as defined in this document.

4.5.2. Functional demonstration

The controlled blasting initiation system shall be demonstrated on request to the ATL, showing that the system complies with the claimed performance requirements. The demonstration is to be arranged by the original equipment manufacturer (OEM) or supplier.

4.6. Certificate of approval

Provided that the controlled blasting initiation system has been found to comply with all the conditions set out in EN 13763 suite, an IA certificate will be issued by the ATL within a period of one month.

All changes that are made must be risk assessed and the ATL notified of such changes. The ATL will determine if it shall be necessary to re-apply for assessment and approval of the changes, whereupon an amended or new certificate of approval shall be issued.

5. MARKING OF APPROVED CONTROLLED BLASTING SYSTEM COMPONENTS

Controlled blasting system components (excluding detonators) shall be legibly and durably marked or otherwise identified by the following where applicable:

a) The name or trademark of the original equipment manufacturer (OEM)

b) The identification number of the test laboratory;

c) The serial number of the electronic system.

6. TRACEABILITY OF APPROVED CONTROLLED BLASTING SYSTEM COMPONENTS

Unique identification of explosives is essential if accurate and complete records of explosives are to be kept at all stages of the supply chain. This should allow the identification and the traceability of an explosive from its production site and its placing on the market until its final user and its use with a view to preventing misuse and theft and to assisting law enforcement authorities in the tracing of the origin of lost or stolen explosives. An efficient traceability system also facilitates market surveillance authorities' task of tracing economic operators who made non-compliant explosives available on the market. When keeping the information required for the identification of economic operators, economic operators should not be required to update such information in respect of other economic operators who have either supplied them with an explosive or to whom they have supplied an explosive.

7. GUIDELINE FOR THE PREPARATION OF A TECHNICAL CONSTRUCTION FILE

In support of an application for the issuing of an IA certificate for a controlled blasting system and subsequent approval procedure to be followed.

7.1. Introduction

This procedure describes the process that the manufacturer or supplier and the test laboratory shall follow to obtain an IA certificate for a controlled blasting system.

It is the responsibility of the manufacturer or supplier, to present evidence that the system under examination, complies fully with all the information supplied in respect of product specifications, declarations of performance and safety of operation.

The manufacturer or supplier may only make application to one authorized test laboratory (for which a formal declaration will be needed).

7.2. Purpose

The procedure sets out the approach that the manufacturer or supplier shall follow to demonstrate that the initiation apparatus and blasting system has been tested in compliance with the requirements of the relevant standards.

7.3. Regulations

7.3.1. This procedure applies to the relevant national legislation (see foreword) to ensure that

the initiation and blasting systems are safe to operate in all mines.

7.3.2. This procedure also applies to the relevant national legislation (see foreword).

7.4. Roles and responsibilities

7.4.1. Manufacturer or supplier

a) To supply a system that if used according to the user and training manual will not pose a hazard or risk to persons at a mine.

b) To supply documentation as detailed in tables 1 or 2 where appropriate.

7.4.2. Accredited test laboratory

The duty of an ATL will be:

a) To examine whether the technical construction file supplied by the manufacturer against the requirements of the relevant standard specified in table 3;

b) To ensure that the test reports are in accordance with the SANS 17025 format or similar accepted formats;

c) To appoint the observers of witnessing tests that are not carried out on their property;

d) To compile a report on the findings of the assessment;

e) To convene a committee for approval or rejection;

f) To issue an IA certificate where full compliance with the standards is shown; or

g) To supply full report on where the system fails to comply with the relevant standards.

7.4.3. Subject matter expert

An SME is called in to verify that the system or part of the system that is being evaluated complies with the relevant standard (see 3.1).

7.5. Information of the product and relevant system documentation requirements

The committee may be convened by the ATL and will consist of the Department of Mineral Resources, the CIE, the Department of Labour, manufacturer or supplier representative and appropriate SMEs. Tables 1 and 2 are guidelines for documentation that is required for assessment of the system.

Table 3 is a guideline for the ATL assessment application.

TABLE 1: Guideline: Manufacturer technical construction file for trial approval

1	2	3
Section	**Description**	**Relevant information required**
1	Introduction and development of the product	• Introduction to the design philosophy of the product • Overview of the operating principles of the system • General description of the major components and their functions (in block diagram format) • System safety philosophy description • Formal safety test reports which confirm compliance with the requirements of section 3 above. (Reports to comply with the format specified in ISO/IEC 17025)
2	Normative and referenced standards, test reports and motivation for excluded tests	• EN 13763 • EN 61000 • EN 61508 • EN 55011 / SANS 211 / CISPR 11 • IEC 60529 • IEC 60079 • ISO / IEC 17025 • SANS 10108
3	System hardware components	• Where considered appropriate – engineering drawings (electrical and mechanical) • Material safety data sheets (where applicable)
4	System software development	• Software development and design process • Software risk assessment • Software testing and verification reports
5	Risk assessments	• Comprehensive product risk assessment of the complete system – individually for each of the major components identified in the block diagram and in a connected state • Comprehensive product application risk assessment • Risk review to confirm that testers are inherently safe
6	Safety test reports	• Formal safety test reports which confirm compliance with the requirements of section 3 above. (Reports to comply with the format specified in ISO/IEC-17025)
7	Product system user training manuals	• Operating instruction manual • Subject matter expert certificate

TABLE 2: Guideline: Manufacturer Technical construction file – list of contents full approval

1	2	3
Section	**Description**	**Relevant information required**
1	Introduction and development of the product	• Introduction to the design philosophy of the product overview of the operating principles of the system
2	Sales and service history of the product and system	• History of sales information (products in the field) • History list of the product and system (product changes) • Any 'incidents' of unplanned initiations experienced, and details of the inquiry findings
3	Normative and referenced standards	• EN 13763 • EN 61000 • EN 61508 • EN 55011 / SANS 211 / CISPR 11 • IEC 60529 • IEC 60079 • ISO / IEC 17025 • SANS 10108
4	System overview	• General description of the major components and their functions (required in block diagram format) • Detailed system specification including all components (in accordance with the above block diagram)
5	System hardware components	• Where considered appropriate engineering-drawings (Electrical and mechanical: Engineering control equipment) • Bill of materials: Mechanical and electrical Material safety data sheets
6	System software components	• Software development and design process • Software specification and risk assessment • Software testing and verification
7	Risk assessments	• Comprehensive 'product' risk assessment of the complete system – individually for each of the major components identified in the 'block diagram' and in a 'connected state' • Comprehensive 'product application' risk assessment Risk review to confirm that the product is 'inherently safe'
8	Safety test reports	• Formal safety test reports which confirm compliance with the requirements of section 3 above. (Reports to comply with the format specified in ISO/IEC-17025)

1	2	3
Section	**Description**	**Relevant information required**
9	Product system user training manuals	• This section will require a series of fully detailed training manuals (modules) that can be referenced by the user to compile lesson plans and codes of practice • Product system training manuals shall include a competency knowledge test
10	Field trials and reports (new or modified systems)	• System field trials to demonstrate compliance with designed performance criteria • Formal report on results and technical reviews
11	Quality Management	• Auditable quality management system such as ISO 9001 or an ATL mark holder

TABLE 3: Guideline: Check sheet for the ATL assessment

1				2	3	4	5	6	7	8	9	10	11
Required from manufacturer										**For ATL use**			
Detonator/Initiator required tests				**Test report**			**Test method**			**Compliance**			
EN 13763	**E**	**PE**	**ST**	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
EN 13763-1 Requirements	**X**	**X**	**X**										
EN 13763-2 Determination of thermal stability.	**X**	**X**	**X**										
EN 13763-3 Determination of sensitiveness to impact.	**X**	**X**	**X**										
EN 13763-4 Determination of resistance to abrasion of leading wires and shock tubes.	**X**	**X**	**X**										
EN 13763-5 Determination of resistance to cutting damage of leading wires and shock tubes	**X**	**X**	**X**										
EN 13763-6 Determination of resistance to cracking in low temperatures of leading wires	**X**	**X**											
EN 13763-7 Determination of the mechanical strength of leading wires, shock tubes, connections, crimps and closures.	**X**	**X**	**X**										
EN 13763-8 Determination of resistance to vibration of plain detonators.	**X**	**X**	**X**										
EN 13763-9 Determination of resistance to bending of detonators.	**X**	**X**	**X**										

E = Electric detonators; PE = Electronic or programmable electronic detonators; ST = Shock tube detonators

TABLE 3: Guideline: Check sheet for the ATL assessment *(continued)*

1				2	3	4	5	6	7	8	9	10	11
Required from manufacturer										**For ATL use**			
Detonator/Initiator required tests				**Test report**			**Test method**			**Compliance**			
EN 13763	**E**	**PE**	**ST**	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
EN 13763-11 Determination of resistance to damage by dropping of detonators and relays.	**X**	**X**	**X**										
EN 13763-12 Determination of resistance to hydrostatic pressure.	**X**	**X**	**X**										
EN 13763-13 Determination of resistance of electric detonators to electrostatic discharge.	**X**	**X**	**X**										
EN 13763-15 Determination of equivalent initiating capability.	**X**	**X**	**X**										
EN 13763-16 Determination of delay accuracy.	**X**	**X**	**X**										
EN 13763-17 Determination of no-fire current of electric detonators.	**X**	**X**											
EN 13763-18 Determination of series firing current of electric detonators.	**X**	**X**											
EN 13763-19 Determination of firing impulse of electric detonators.	**X**	**X**											
EN 13763-20 Determination of total electrical resistance of electric detonators.	**X**	**X**											

E = Electric detonators; PE = Electronic or programmable electronic detonators; ST = Shock tube detonators

TABLE 3: Guideline: Check sheet for the ATL assessment *(continued)*

1				2	3	4	5	6	7	8	9	10	11
Required from manufacturer										**For ATL use**			
Detonator/Initiator required tests				**Test report**			**Test method**			**Compliance**			
EN 13763	**E**	**PE**	**ST**	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
EN 13763-21 Determination of flash-over voltage of electric detonators.	**X**	**X**											
EN 13763-22 Determination of capacitance, insulation resistance, and insulation breakdown of leading wires.	**X**	**X**											
EN 13763-23 Determination of the shock-wave velocity of shock tubes.			**X**										
EN 13763-24 Determination of the electrical non-conductivity of shock tubes.			**X**										
EN 13763-25 Determination of transfer capacity of relays and coupling accessories.			**X**										
EN 13763-26 Definitions, methods and requirements for devices and accessories for reliable and safe function of detonators and relays.	**X**	**X**											
EN 13763-27 Definitions, methods and requirements for electronic initiation systems.	**X**	**X**											

E = Electric detonators; PE = Electronic or programmable electronic detonators; ST = Shock tube detonators

TABLE 3: Guideline: Check sheet for the ATL assessment *(continued)*

1				2	3	4	5	6	7	8	9	10	11
Required from manufacturer: tests from EN 13763-26 Annex A and CEN/TS 13763-27 Clause 4.5.6.4										**For ATL use**			
Tester, blast controller or other system components connected to detonators or dummy detonators				**Test report**			**Test method**			**Compliance**			
CE tests	**EN 61000**	**Test Level**	**Pass Criteria (Class)**	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
EN 13763-26 Annex A 4.5 Electrostatic discharge immunity test	4.2 Electrostatic Discharge	15 kV air	A or B										
EN 13763-26 Annex A 4.5 Electrostatic discharge immunity test	4.2 Electrostatic Discharge	8 kV air	A or B										
CEN/TS 13763-27 4.5.6.4.4.2 to 4.5.6.4.5.2 Functioning during stress (EN 61000-4-3)	4.3 Radiated Immunity functional tests 10 frequencies	10V/m 80 MHz - 1 GHz	Full function										
CEN/TS 13763-27 4.5.6.4.4.2 to 4.5.6.4.5.2 Functioning during stress (EN 61000-4-3)	4.3 Radiated Immunity functional tests 10 frequencies	3 V/m 1 GHz to 2 GHz	Full function										
CEN/TS 13763-27 4.5.6.4.4.1 Safety against unintended initiation (EN 61000-4-3: 30V/m 80 MHz to 1 GHz)	4.3 Radiated Immunity safety test - sweep	30V/m 80 MHz - 1 GHz	No detonation										
CEN/TS 13763-27 4.5.6.4.4.1 Safety against unintended initiation (EN 61000-4-3: 30V/m 1 to 2 GHz)	4.3 Radiated Immunity safety test - sweep	10V/m 1 GHz - 2 GHz	No detonation										
EN 13763-26 Annex A 4.3 Electrical fast transient/burst immunity test	4.4 Fast transients	4 kV power lines, 2kV signal lines	A,B										
EN 13763-26 Annex A 4.2 Surge Immunity Test	4.5 Surge immunity power lines	4 kV line to line, 2 kV line to earth	A,B										

TABLE 3: Guideline: Check sheet for the ATL assessment *(continued)*

1				2	3	4	5	6	7	8	9	10	11
Required from manufacturer: tests from EN 13763-26 Annex A and CEN/TS 13763-27 Clause 4.5.6.4										**For ATL use**			
Tester, blast controller or other system components connected to detonators or dummy detonators				**Test report**			**Test method**			**Compliance**			
CE tests	**EN 61000**	**Test Level**	**Pass criteria (Class)**	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
CEN/TS 13763-27 4.5.6.4.4.2 to 4.5.6.4.5.2 Functioning during stress EN 61000-4-6)	4.6 Conducted susceptibility functional test 30 frequencies	10 V 150 kHz - 80 MHz	Full function										
CEN/TS 13763-27 4.5.6.4.4.1 Safety against unintended initiation (EN 61000-4-6: 30V)	4.6 Conducted susceptibility safety test - sweep	30 V 150 kHz - 80 MHz	No detonation										
EN 13763-26 Annex A 4.3 Electrical fast transient/burst immunity test	4. 11 Power dips and interruptions and variations	30% reduction 10 ms, 60% reduction for 100 ms, >90% reduction for 5s	A,B										
Communication covered by EMC Directive 2014/30/EU	ICASA Compliance for any R.F. communication systems used	Above ground	ICASA approval certificate										
EN 13763-26 Annex A 4.8 Radio frequency emissions to 1 GHz to pass Class A (industrial level)	SANS 211/CISPR 11/EN 55011 Emissions	Test 30 MHz to > 2,5 GHz	Class A underground (ICASA - class B above ground)										
CEN/TS 13763-27 4.5.6.5 Detonator function test			Function to specification										
CEN/TS 13763-27 4.5.6.6 System function test			Function to specification										
Effective radiated power test for R.F. communication - < 500 mW underground observing ICASA limits that may be lower for the specified band & ICASA level limits for the band above ground													
Note: For tests EN 61000-4-2/4/5 and 11 Criterion C may be considered for blasting systems that are NOT remote controlled where an operator reset is possible.													

TABLE 3: Guideline: Check sheet for the ATL assessment *(continued)*

1	2	3	4	5	6	7	8	9	10	11
Required from manufacturer							**For ATL use**			
Environmental required tests	**Test report**			**Test method**			**Compliance**			
EN 13763	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
EN 13763-26 Appendix B 3.2 High temperature testing										
EN 13763-26 Appendix B 3.3 Temperature change testing										
EN 13763-26 Appendix B 3.4 & B 3.6 Damp heat testing										
EN 13763-26 Appendix B 3.5 Low temperature testing										
EN 13763-26 Appendix B 3.7 Bump testing										
EN 13763-26 Appendix B 3.8 Vibration testing										
EN 13763-26 Appendix B 3.9 Drop testing										
EN 13763-26 Appendix B 3.10 Damp heat – steady state										
EN 13763-26 clause 5.6 Battery low indications										
EN 13763-26 clause 7.4 Short circuit current limitations										
EN 13763-27 Clause 4.5.6.4 Electromagnetic Compatibility										
IEC 60529 Waterproof Test (IP rating test)										

TABLE 3: Guideline: Check sheet for the ATL assessment *(continued)*

1	2	3	4	5	6	7	8	9	10	11
Required from manufacturer: tests from IEC 60079							**For ATL use**			
Equipment that will be deployed in 'declared hazardous areas'	**Test report**			**Test method**			**Compliance**			
IEC 60079	**Document issuer**	**Document reference numbers**	**ATL and independent SME's**	**Modified**	**Motivation**	**Due diligence done**	**N/A**	**Yes**	**No**	**Comments**
5.3.3.2.2 a) Thermal Endurance Subject the component to thermal endurance in accordance with 26.8 of IEC 60079-0:2011. The duration of the test shall be four weeks at a relative humidity of 90 % ± 5 % at a temperature of 80 ºC										
5.3.3.2.2 b) Thermal endurance The component shall be subjected to thermal endurance in accordance with 26.9 of IEC 60079-0:2011. The duration of the test shall be 24 h at a temperature of -20 ºC										
5.3.3.2.2 c) Resistance Impact Test The component shall be subjected to a resistance impact test in accordance with 26.4.2 of IEC 60079-0:2011. An impact energy of 7 J shall be applied										
5.3.3.2.2 d) Drop Test The component shall be subjected to a drop test in accordance with 26.4.3 of IEC 60079-0:2011										
5.3.3.2.2 e) Ingress Protection The system electrical or electronic circuitry (or both) shall be protected against the ingress of dust and water to at least IP54 in accordance with IEC 60529										
IEC 60079-11 Intrinsic Safety the construction and testing of intrinsically safe apparatus intended for use in an explosive atmosphere and for associated apparatus, which is intended for connection to intrinsically safe circuits which enter such atmospheres.										
Alternately the manufacturer shall select tests from IEC 60079-0 and IEC 60529 appropriate to the system under test.										
The manufacturer of the equipment shall select and motivate tests from IEC 60079-0; appropriate to the system under test. Variation in test parameters shall be motivated by the manufacturer.										

TABLE 4: Typical list of test contractors

1	2	3
Typical list of test contractors		
Name of	**Observer**	**Test facility**
ISSA	Mr X Consultancy Y	Department of Communications: Institute for Satellite and Software Applications (Formerly Houwteq)
ITC	Accredited test house, observer not required	Interference Testing and Consultancy Services (Pty) Ltd
XPL	Mr Y Consultancy M	Explolabs (Pty) Ltd
NSM	Mr X Consultancy Y	Naschem division of Denel
AEL	Mr Y Consultancy M	Pinelands test site

TABLE 5: Due diligence

1	2
Due diligence done	**Due diligence**
DD1	Checked test equipment
DD2	Demonstrated test methods
DD3	Reviewed test officer confidence
DD4	Witnessed all tests
DD5	Witnessed test selectively
DD6	Reviewed test report of breakdown
DD7	ISO/SANS 17025 accredited laboratory
DD8	Examined technical documents
NOTE 1: Explanations to be given for tests not applicable or deviation from standards or test methodology. **NOTE 2:** *Example:* Equipment complies with standard requirements. **NOTE 3:** *Example:* The requirement of the test was found to be insufficient as specified in the specifications and a more stringent test was required. The test levels were adjusted to the required level.	

8. GUIDELINE FOR THE PREPARATION OF SOFTWARE RISK ASSESSMENT

The preferred method for performing the overall system risk assessment for systems containing software is in accordance with EN-13763-27, 4.5.3.2 or in accordance with IEC 61508-3 *software requirements.*

Information on the coding of software is given in IEC 61508-3, 7.4.6 and tables A.5, B.2, B.3 and B.6.

For techniques and measures, see IEC 61508-7 clauses B and C.

ANNEX A: Issuing, upgrading, and maintenance of IA certificates for mines
(normative)

A.1 In South Africa, all electrical or electronic detonators (or both), detonating initiators and blasting systems used in mines shall be covered by an IA certificate. The requirements in A.2 to A.13 cover the validity of IA certificates.

A.2 All IA certificates issued shall have a validity period of ten years. Where a product is in service and its certificate has expired, it will not be affected. This will also be applicable to overseas certificates which have been examined and converted to South African IA requirements in accordance with A.9.

A.3 If, during a validity period or if the product is in service after its certificate has expired, the product is modified or changed to an extent that it requires re-evaluation, this shall be done by an ATL and re-certified. This re-evaluation or re-certification (or both) shall take into account the current edition of the national standard used for certification and the complete product shall meet the requirements of that standard.

A.4 During the validity period of IA certificates the product can be manufactured or supplied either under the batch test method or under an approved product certification scheme irrespective of changes to the national standard, provided that the product does not change from the original certified design and that no unsafe condition that affects the products is identified in the original edition of the standard used for certification.

A.5 Repairs and overhauls carried out by the certificate holder shall not invalidate the IA certificate.

A.6 Should a product be modified or changed in such a way that it no longer complies with the certified design, the upgraded TCF shall be re-submitted to an ATL for re-evaluation. This re-evaluation shall take into account the current national standard and the product shall comply with that standard. This applies to newly manufactured as well as in-service products.

A.7 Current IA certificates and Government Mining Engineer (GME) certificates (previously known as S or SE numbers) issued before 2007 shall have a validity of 10 years. All new products shall have a validity of 10 years from the date of certification. The date of issue and the date of expiry shall be stated on newly issued IA certificates.

A.8 A product still in production shall be submitted for re-certification to an ATL before the IA certificate expires so as to achieve re-certification before the expiry date. The product will be re- assessed or tested (or both) and will be re-certified to the current edition of the national standard. Where the current edition of the national standard dictates that a product shall be upgraded or changed, the onus is on the manufacturer or supplier of the product to institute such upgrades or changes as to ensure that the product complies with the current national standard, as required for re-certification.

A.9 If a certificate is issued for a product by an accredited International Body, the ATL shall examine the supporting documentation to confirm transferability and

compliance with South African standards to identify any additional testing or documentation that may be required. It is imperative that requirements for “inherent safety” (3.5) and safety interlocked blasting (3.12) are met.

A.10 Where a product with a valid IA certificate is found to be unsafe for use, the manufacturer or supplier shall take appropriate steps to rectify the design of such a product and re-certify such rectified products. Unsafe products already supplied shall be recalled and both the relevant national regulatory body (see foreword) and the ATL (and approved certification body for mark holders) that issued the certificate shall be notified.

A.11 Where a standard is superseded during the validity period of a certificate, then such standard shall still be deemed to apply to the product for the validity period of the certificate. In terms of batch-tested products, ATL’s shall still be able to test to such standards while the certificates remain valid.

A.12 Certification that covers variations in product design, or covers a range of similar products, shall show, in the test report or IA certificate, that each variation or design has been considered and tested where necessary, and each variation deemed or designed shall be clearly stated in the test report and IA certificate.

A.13 All records related to manufacture shall be kept for a minimum period of 10 years by the product certificate holder and manufacturer.

BIBLIOGRAPHY

Standards

BS EN 62305-4, Protection against lightning – Part 4: Electrical and electronic systems within structures.

ISO 683-17, Heat-treated steels, alloy steels and free-cutting steels – Part 17: Ball and roller bearing steels.

ISO 3696, Water for analytical laboratory use – Specification and test methods.

ISO 4957, Tool steels.

SANS 762, Assessment of inadvertent initiation of bridge wire electro-explosive devices by radio- frequency radiation: gGuide.

SANS 10228, The identification and classification of dangerous goods for transport.

SANS 10325-1, The safe application of detonator systems for use in mining and civil blasting applications – Part 1: Electronic detonator systems.

SANS 10347 (SABS 0347), Avoidance of hazards underground in collieries due to lightning.

USA Department of Defence Military Standard MIL–STD–331B, Environmental and performance test for fuze and fuze components.

OTHER PUBLICATIONS

Government Gazette No. 30753 of 7 February 2008 Notice 215 of 2008. *Notice of intention to make regulations in respect of technical standards for electronic communications equipment.* (This standard cross-reference adopted South African standards for electromagnetic compatibility with IEC specifications).

Government Gazette 30955 of 7 April 2008, Notice No. 432 of 2008. Regulations in terms of licence exemptions in terms of section 6 of the Electronic Communications Act read with section 31(6) in respect of radio frequency spectrum, electronic communications services and/or electronic communication network services.

Government Gazette 31264 of 22 July 2008, Notice No. 890 of 2008. The Independent Communications Authority of South Africa hereby gives notice of its intention to review the radio frequency band plan covering 9 kHz to 1000 GHz.

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