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REPORT

Ignition Hazard Analysis and ATEX Conformity Evaluation of Monti MBX Bristle Blaster tool

Technical evaluation of ignition hazard properties and ATEX conformity according to EN 13463-1

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Ignition Hazard Analysis and ATEX Conformity Evaluation of Monti MBX Bristle Blaster tool - Technical evaluation of ignition hazard properties and ATEX conformity according to EN 13463-1

Extract

An Ignition Hazard Analysis and ATEX conformity evaluation has been performed for the Monti MBX Bristle Blaster tool in order to provide a foundation on which ATEX approval of the equipment as category 2 in terms of the European directive 94/9/EC can be based. The current ignition hazard analysis and conformity evaluation should form a vital part of the documentation to be included in the technical file for the equipment that should be submitted to a Notified Body (for archive purposes) in order to achieve the ATEX approval required before the equipment can be used in zone 1 potentially explosive atmospheres.

Project Info

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1 Background and Introduction

1.1 Background

The EC directive 94/9/EC [1] sets a number of requirements for equipment, both electrical and non-electrical, intended for use in areas containing hazardous atmospheres of explosible gas, dust, oil-mist and vapours. The above-mentioned directive came into force 1. July 2003 and therefore Monti Werkzeuge GmbH must document that the equipment they manufacture is in accordance to the directive and relevant standards, in terms of the hazardous area classification (Ex-zones), when their tool is to be used in potentially explosive atmospheres.

The use of equipment, protective systems and components in potentially explosive atmospheres requires strict levels of safety to be attained and documented according to the ATEX directive 94/9/EC. The classification of the region or zone in which the equipment is to be used determines the level of safety to be attained and thus the category to which the equipment is to be referred. The certification and/or safety conformity requirements for the relevant equipment categories (1, 2 & 3) are as stated in the directive 94/9/EC (Annex 1), EN 13463-1 (section 4) [2], EN 13237 (Annex A) [3] and EN 1127-1 [4] (section 6.4). The type of ignition sources to be considered are as given in EN 1127-1 (section 5.3) [4]. The ignition hazard analysis is to be performed as described in EN 13463-1 [2] and EN 15198 [6].

Reference is made to communication with Martin Jennes, Monti Werkzeuge GmbH, regarding the performance of an ATEX conformity and ignition safety assessment, to be performed in cooperation with GexCon, for the evaluation of a new surface treatment tool, the MBX Bristle Blaster, to allow ATEX approval of the system as category 2 equipment for use in zone 1 for explosive atmospheres according to the ATEX 94/9/EC directive and the harmonized European Standard EN 13463-1 [2].

1.2 Scope of the current work

This report is a technical evaluation of the MBX Bristle Blaster in the form of an ignition hazard analysis according to the European Standard on mechanical equipment for use in potentially explosive atmospheres, EN 13463-1 [2]. The ignition hazard analysis uses ignition properties that are assumed to be typical for the solvents and vapours that are likely to be encountered during use of the tool as a starting point. It includes a discussion of the conformity of the equipment and the intended use of the tool in respect to the requirements set by the standard and the various documentation received and validation tests performed.

The purpose of the current conformity and ignition hazard assessment is to evaluate, with the ultimate intention of qualifying the Bristle Blaster tool/equipment for ignition source protection, according to standards in the EN 13463 series (parts 1-8) and thus allow use of the equipment in potentially explosive atmospheres according to the directive 94/9/EC (ATEX) as Group II, Category 2 equipment. This report covers the relevant conformity issues according to the EN 13463-1 standard [2].

The current work is intended to serve as an independent evaluation of the equipment in terms of the relevant requirements in the EN 13463-1 standard and thus is an appraisal of the tool in terms of the 94/9/EC directive. The responsibility for the final stages of ATEX approval (submission of technical file to a Notified Body and preparation of an adequate "declaration of conformity" etc) still lies with the manufacturer of the equipment. The current work is limited to the evaluation and documentation of the ignition hazard properties and ATEX conformity aspects of the MBX Bristle Blaster tool only.

1.3 Assumptions and limitations

It is assumed that all relevant requirements of the machine directive [5] and corresponding standards have been satisfied and that this is documented in the information to be found in the technical file for the equipment. Appraisal of the conformity with the machine directive is not included in the current evaluation.

The current equipment assessment has been performed, and is only valid under the assumption that the equipment under evaluation (EUE) is constructed and used according to the documentation described in section 1.4 and that the equipment has been produced and functions as described in section 2. The evaluation is only valid when the Bristle Blaster tool is used together with the pneumatic power tool described in section 2. The intended use and limits of application for the equipment, on which the conformity evaluation and ignition hazard analysis are based, are described in section 1.5. The ignition hazard analysis is valid for gases, vapours and solvents belonging to gas class IIA only, taking into account the respective ignition properties typical of such materials and fluids.

1.4 Basis for ignition hazard assessment and ATEX conformity evaluation

The current ignition hazard analysis is based on brochures, user manual and test data including:

- Description of the equipment.
- Definition of intended use, limits of application (quoted in section 1.5).
- Results of any design calculations made.
- Results of tests that have been carried out.
- Relevant assumptions that have been made (e.g. loads, strengths, safety factors).
- Instructions for installation, operation and maintenance.

1.5 Intended use and limits of application for the equipment

The current analysis assumes use within Ex-zone 1 of gases and vapours belonging to gas group IIA. The ignition properties typical for petrol, hexane and propane, as given in Table 1.1 below, have been used as a basis for the ignition hazard analysis performed.

If the intended use of the equipment is not adequately described by these fluids then the evaluation may well need adjustment.

Table 1.1 Summary of ignition and combustion properties for typical IIA gases and vapours thought to be typical for those which will be encountered during use of the Bristle Blaster tool

Property	Propane	Hexane	Petrol
Chemical formula (-)	C_3H_8	C_6H_{14}	C_8+
Relative density (air = 1.0)	1.53	0.65	2.29
Flashpoint (ºC)	-104	-22	Ca. -45
Boiling point (ºC)	-42	69	Ca. 116-120
Lower Explosion Limit, LEL (%vol)	2.1	1.2	Ca. 1.2-1.3
Upper Explosion Limit, UEL (%vol)	9.5	7.4	7.1
Minimum ignition temperature, MIT (ºC)	Ca. 450	225	380-415
Temperature class (-)	T1	T3	T2
Minimum ignition energy, MIE (mJ)	0.26	0.25	0.25
Maximum experimental safe gap MESG (mm)	Ca. 0.92	0.93	-
Gas group (-)	IIA	IIA	IIA
Explosion constant, K_G (bar.m/s)	100	100	Ca. 87
Laminar burning velocity (m/s)	0.46	0.46	Ca. 0.40

2 Description of the equipment – MBX Bristle Blaster

2.1 Client/manufacturer

The MBX Bristle Blaster equipment under evaluation (EUE) is manufactured by Monti Werkzeuge GmbH, Germany.

2.2 Equipment under evaluation (EUE)

The EUE is a mechanical surface treatment tool named the MBX Bristle Blaster. The tool consists of hardened wire bristle tips and is driven by a fully pneumatic power tool, without electrical components.

Different MBX Bristle Blaster belts have been tested. This includes the following belts:

- MBX Bristle Blaster belt 23 mm (golden coloured)
- MBX Bristle Blaster belt 23 mm (golden coloured) without hardened tips
- MBX Stainless Steel Bristle Blaster belt 23 mm (white steel coloured)
- MBX Bristle Blaster belt 11 mm (golden coloured)
- MBX Bristle Blaster belt 11 mm (golden coloured) without hardened tips

It is assumed that the machine has been produced by the manufacturer in accordance with the following directives and standards where relevant:

Machinery Directive – 2006/42/EC.

Harmonised European Standards – EN 292-1, EN 292-2, EN 418 and EN 294.

2.2.1 Construction principle and functional details

The tool consists of a rotating hub with hardened wire bristle tips that are bent forward. The bristle tips strike the surface with kinetic energy that is equivalent to standard processes that use grit blasting media. After impact, the bristle tips immediately retract from the surface. The hub is powered by a specially designed power tool. The power tool used in this evaluation utilizes compressed air.

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The casing of the power tool made of Polyamid/Fiberglass 35% PA6-GF35. This material is an isolator and has a surface resistivity of 10^{10} Ω.

2.2.2 Installation

The Bristle Blaster belt is placed inside the hub, which is than mounted onto the power tool using an Allen wrench. After the hub is mounted, the power tool is connected to the compressed air line.

2.2.3 Design and safety features

The tool utilizes compressed air and does not include any electrical components.

2.2.4 Maintenance

The machine is basically maintenance-free. However, the pneumatic tool must be oiled daily according to instructions in the user manual.

3 Ignition Hazard Analysis Procedure

The current ignition hazard analysis has been performed in accordance with the requirements described in EN 13463-1 [2] and EN 15198 [6] and the procedures described in chapter 5 and Annex B of the European Standard EN 13463-1 [2].

The analysis is performed as a 4-stage process and is presented in tabular form. The results of the ignition analysis are given in section 4. Firstly, all of the potential ignition sources, as defined in EN 1127-1 [4], are assessed in terms of their relevance for the equipment under evaluation (EUE) as indicated in Table 4.1 in section 4.1. Once these are identified the detailed analysis begins with an appraisal of each of the relevant ignition sources for the various parts or areas of the EUE (section 4.2). The initial evaluation determines the probability or likelihood of occurrence of the potential ignition source becoming effective in terms of during normal operation, due to expected malfunctions or rare failures (stages 1 & 2 in Table 4.2). This, in principle, determines the extent to which the equipment can be approved in terms of its equipment category. Comparing this to the target category for which one is aiming at equipment approval, the extent and type of safety measures that should be implemented and documented is indicated.

Once these measures are taken into account, the third stage of the ignition hazard analysis is performed in which the type and details of the implemented safety measures are assessed and a revised likelihood of occurrence is determined to find the final category rating for the equipment for each potential source identified (stages 3 & 4 in Table 4.2). Any further restrictions on the limits of application of the equipment are noted in column 4f of the ignition hazard analysis table in section 4.2 (Table 4.2).

Finally, the final category rating for the equipment is determined as the most restrictive of the values obtained during stage 4 (column 4e in Table 4.2).

4 Ignition Hazard Assessment

This section contains the results of the ignition hazard analysis in the form of tables. Table 4.1 in section 4.1 contains the initial assessment of the relevance of the various potential ignition sources. Table 4.2 in section 4.2 summarises the details of the ignition analysis for the different ignition sources that are deemed relevant for the various parts of the machine/equipment under appraisal. This section includes the safety measures that are either used or implemented, or that are recommended implemented, in order to reach the required level of safety for equipment in terms of intended use and target category.

4.1 Identification of relevant ignition hazards

Table 4.1 Overview of initial assessment of equipment related ignition sources that are relevant for the current Bristle Blaster unit

Ign ID No.	Guide words for ignition hazard tables – Potential ignition sources: Ref prEN 1127-1, clauses 5.3 & 6.4	Relevance of ignition source**	Reason
1	Hot surfaces	Relevant	Moving parts and collisions/friction will occur when operating the tool.
2	Flames and hot gases (including hot particles)	Not relevant	Not present
3	Mechanically generated sparks	Relevant	Moving parts and collisions/friction will occur when operating the tool.
4	Electrical apparatus*	Not relevant	The tool is powered by compressed air without electrical components.
5	Stray electric currents and cathodic corrosion protection	Not relevant	Not present
6	Static electricity	Relevant	Certain components and parts are made of insulating material
7	Lightning	Not relevant	Not present
8	Radio frequency (RF) electro-magnetic waves from 10^4 Hz to $3x10^{12}$ Hz	Not relevant	Not present
9	Electromagnetic waves from $3x10^{11}$ Hz to $3x10^{15}$ Hz	Not relevant	Not present
10	Ionising radiation	Not relevant	Not present
11	Ultrasonics	Not relevant	Not present
12	Adiabatic compression and shock waves	Not relevant	Not present
13	Exothermic reactions, including self-ignition of dusts	Not relevant	Not present

* Normally assumed to be adequately certified and thus safe for use as part of the mechanical equipment being assessed in which case it falls outside the scope of this ignition hazard assessment although a requisite degree of safety must be documented as part of the "technical file".
** Applicability to the Equipment Under Evaluation (EUE) usually denoted as either "Relevant" or "Not relevant". If necessary, the relevance of the ignition source on the inside and/or outside of EUE should be indicated.

1. Hot surfaces:
If an explosive atmosphere comes into contact with a heated surface ignition can occur. Not only can a hot surface itself act as an ignition source, but a dust layer or a combustible solid in contact with a hot surface and ignited by the hot surface can also act as an ignition source for an explosive atmosphere.

All moving parts can become sources of ignition if they are not sufficiently lubricated. Collisions and friction between the bristle wire tips and treated surfaces will generate hot surfaces.

2. Flames and hot gases (including hot particles):
Assumed not present, hence not relevant, since it is assumed that no hot materials are handled in or by the current equipment.

3. Mechanically generated sparks:
As a result of friction, impact or abrasion processes, particles can become separated from solid materials and become hot owing to the energy used in the separation process. If these particles consist of oxidisable substances, for example iron or steel, they can undergo an oxidation process, thus reaching even higher temperatures. These particles (sparks) can ignite dust/air-mixtures. In deposited dust, smouldering can be caused by the sparks, and this can be a source of ignition for an explosive atmosphere. Mechanical sparks can occur due to the collision between the bristle wire tips and treated surfaces. The combination of rust-contaminated bristle tips and light metals can produce incentive thermite sparks.

4. Electrical apparatus:
Not relevant, not present.

5. Stray electric currents and cathodic corrosion protection:
Not relevant, not present.

6. Static electricity:
Incendive discharges of static electricity can occur under certain conditions. The discharge of charged, insulated conductive parts can easily lead to incendive sparks. With charged parts made of non-conductive materials, and these include most plastics as well as some other materials, brush discharges and, in special cases, by combination of conductive and non-conductive materials, propagating brush discharges are also possible.

7. Lightning:
Not relevant, not present.

8. Radio frequency (RF) electro-magnetic waves from 10^4 Hz to $3x10^{12}$ Hz:
Not relevant, not present.

9. Electromagnetic waves from $3x10^{11}$ Hz to $3x10^{15}$ Hz:
Not relevant, not present.

10. Ionising radiation:
Not relevant, not present.

11. Ultrasonics:
Not relevant, not present.

12. Adiabatic compression and shock waves:
Not relevant, not present.

13. Exothermic reactions, including self-ignition of dusts:
Not relevant, not present.

4.2 Ignition hazard assessment tables

Table 4.2 Ignition hazard analysis results summary table for the EUE

Ignition Hazard Assessment Table for "Monti MBX Bristle Blaster tool"																		
	1		2					3			4							
	ignition hazard		assessment of the frequency of occurrence without application of an additional measure					safety measures applied to prevent the ignition source from becoming effective			frequency of occurrence after safety measures applied							
	a	b	a	b	c	d	e	a	b	c	a	b	c	d	e	f		
Id No.	potential ignition source	description/basic cause (what conditions cause which ignition hazard?)	normal operation	expected malfunction	rare malfunction	not relevant	reasons for assessment	description of the measure(s) applied	basis (citation of standards, technical rules or experimental results)	technical documentation (evidence including relevant features listed in column 1)	normal operation	expected malfunction	rare malfunction	not relevant	resulting category	necessary restrictions		
1	Hot surfaces	Rotating parts of the tool can generate hot surfaces when not lubricated.		X				According to user manual, the tool shall be lubricated in accordance with specifications.		EN13463-1, user Instructions.			X		2G	IIA		
2	Hot surfaces	Bearing failure for rotating hub.			X		Assume standard use and maintenance is sufficient in zone 1 for intended use.	Bearings lubricated for expected lifespan.		EN13463-5, constructional safety, "c".			X		2G			
3	Hot surfaces	Collisions and friction generated by the bristle blaster belt or wire tips can generate hot surfaces	X				.	The equipment was tested and found unable to ignite explosive atmospheres of petrol-air and hexane-air. No further measures applied.		GexCon report, ref [9]			X		2G	IIA, 135 ºC		
4	Mechanical sparks	Mechanical sparks generated when the bristle wire tips collide with a surface.	X					The equipment was tested and found unable to ignite explosive atmospheres of petrol-air and hexane-air. No further measures applied.		GexCon report, ref [9]			X		2G	IIA		
5	Hot surfaces and/or mechanical sparks	Hot surfaces and/or mechanical sparks generated due to damage of the tool after drop.		X				A drop test has been performed to confirm that the tool meets the requirements of EN 13463-1 after expected misuse.		GexCon report, ref [11]			X		2G			

Ignition Hazard Assessment Table for "Monti MBX Bristle Blaster tool"

Id No.	1		2					3			4					
	ignition hazard		assessment of the frequency of occurrence without application of an additional measure					safety measures applied to prevent the ignition source from becoming effective			frequency of occurrence after safety measures applied					
	a	b	a	b	c	d	e	a	b	c	a	b	c	d	e	f
	potential ignition source	description/basic cause (what conditions cause which ignition hazard?)	normal operation	expected malfunction	rare malfunction	not relevant	reasons for assessment	description of the measure(s) applied	basis (citation of standards, technical rules or experimental results)	technical documentation (evidence including relevant features listed in column 1)	normal operation	expected malfunction	rare malfunction	not relevant	resulting category	necessary restrictions
6	Static electricity	The casing of the power tool is made of plastic, which can be charged and generate electrostatic discharges.	X				The plastic material of the tool has a surface resistivity of 10^{10} Ω.	A static electricity test has been performed to determine charge accumulation and discharge properties of the casing.		GexCon report, ref [10]			X		2G	IIA, IIB
7	Static electricity	The rotating hub is made of cast aluminium and isolated from earth due to the power tool's plastic casing. This may produce electrostatic sparks.	X					A static electricity test has been performed to determine charge accumulation and discharge properties of the casing.		GexCon report, ref [10]			X		2G	IIA, IIB
Resulting equipment category including all existing ignition hazards:															**2G**	**IIA, 135 °C**

5 Conformity to Requirements in relevant Standards

In order to complete the ATEX evaluation of the EUE, a comprehensive conformity evaluation of the equipment has to be performed to ensure that the equipment satisfies the relevant demands and requirements of the 94/9/EC directive and the relevant standards for the intended use and target category for the equipment. The performance of an adequate ignition hazard analysis, like that described in the previous sections, is only one of the main points of conformity to be considered.

Conformity to the following European Standards has been assessed in order to reach the target equipment category for ATEX approval of the Bristle Blaster tool:

- EN 13463-1: 2009
- EN 13463-5: 2003

The remaining conformity evaluation is given in tabular form in the following sections.

5.1 Conformity to EN 13463-1 : 2009

The draft European standard EN 13463-1 [2] describes the basic requirements of equipment and components intended for use in potentially explosive atmospheres. Below, a comparison and assessment is made between the specific requirements set in the draft standard and the information received including the data from the tests that have been performed. For normative references and definitions one should refer the draft EN 13463-1 standard [2].

The primary conformity issues according to the EN 13463-1 standard for the Bristle Blaster tool covered by the present technical evaluation is summarised in Table 5.1.

Table 5.1 Conformity table for "MBX Bristle Blaster" tool according to relevant parts of prEN 13463-1 standard

EN 13463-1:2009			
Clause	Requirement - test	Result/comments	Verdict
1	Scope	The EUE is covered by this standard.	**P**
2	Normative references	This clause contains no requirements.	**P**
3	Terms and definitions	This clause contains no requirements.	**P**
4	**Equipment categories and explosion groups**	**Requirements in sub-clauses only**	**-**
4.1	Equipment category	Equipment is group II with target category 2 for use in Ex-zone 1.	**P**
4.2	Explosion groups (subdivisions)	Equipment is intended for use with typical flammable gases and vapours for IIA.	**P**
4.3	Specific explosive atmospheres	Not intended for use with specific gas groups beyond IIA.	**P**
5	**Ignition Hazard Assessment**	**Covered in section 4 of this report.**	**-**
5.1	General requirements	The user instruction covers rough handling and humidity effects.	**P**
5.2	Procedure of ignition hazard assessment	See section 3 of this report	**P**
5.2.1	Formal analysis	See section 3 and 4 of this report	**P**
5.2.2	Assessment for equipment-group I	Requirements in sub-clauses only	**-**
5.2.2.1	Group 1, category M1	Not relevant for EUE.	**n/a**
5.2.2.2	Group 1, category M2	Not relevant for EUE.	**n/a**
5.2.3	Assessment for equipment-group II	Requirements in sub-clauses only	**-**
5.2.3.1	For category 1 equipment	Not relevant. Beyond target category	**n/a**
5.2.3.2	For category 2 equipment	Relevant for target category.	**P**
5.2.3.3	For category 3 equipment	Covered by target category.	**P**
5.2.4	Assessment with faults	EUE tested with air cooling removed and higher load and higher supply pressure than intended for normal use.	**P**
5.2.5	Basic information necessary for the ignition hazard assessments	Basic information about EUE supplied.	**P**
5.2.6	Ignition hazard assessment report	Covered in this report.	**P**
6	**Assessment of possible ignition sources**	**Requirements in sub-clauses only**	**-**
6.1	General	Covered in section 4.1 of this report.	**P**
6.2	Hot surfaces	Requirements in sub-clauses only	**-**
6.2.1	General	Maximum surface temperature was obtained by testing	**P**
6.2.2	Design temperatures	Use of equipment outside temperature range -20 to +60 ˚C assumed irrelevant.	**P**
6.2.3	Establishing the maximum surface temperature	Maximum surface temperature was tested at an ambient temperature of 20 ˚C with high load, high supply pressure but with air-cooling intact.	**P**
6.2.4	Group I equipment	Not relevant	**n/a**
6.2.5	Group IIG equipment	Maximum surface temperature was measured to be below 135 ˚C, resulting in the equipment to be of the temperature class T4.	**P**

EN 13463-1:2009			
Clause	Requirement - test	Result/comments	Verdict
6.2.6	Special cases for Group IIG equipment	Requirements in sub-clauses only	**-**
6.2.6.1	Small parts	EUE satisfies the requirements for temperature class T4	**P**
6.2.6.2	Enclosed volumes	Assumed that no volumes exist in the equipment that can contain explosive atmospheres and that can become hot.	**P**
6.2.7	Group IID equipment	Assumed that equipment will not be used as Group IID for dusts.	**n/a**
6.3	Flames and hot gases	Not relevant.	**n/a**
6.4	Mechanically generated sparks	Requirements in sub-clauses only.	**-**
6.4.1	General	Mechanical sparks can occur during normal operation. Ignition caused by these mechanical sparks was tested and found to be unlikely. Limitations on use of the tool required in the user instructions to prevent the tool being used in combination with light metals. The combination of rust-contaminated bristle tips and light metals can produce incendive thermite sparks.	**P**
6.4.2	Assessment of sparks generated by single impacts	Requirements in sub-clauses only.	**-**
6.4.2.1	Assessment of single impact sparks as Potential Ignition Sources	Not relevant to EUE. See also 6.4.2.2	**n/a**
6.4.2.2	Assessment of single impact sparks as effective ignition sources	Requirements in sub-clauses only.	**-**
6.4.2.2.1	General	Equipment tested for mechanical spark generation. Single impact sparks not deemed relevant.	**P**
6.4.2.2.2	Category 1G equipment	Not relevant – equipment not intended for 1G.	**n/a**
6.4.2.2.3	Category 2G equipment	Single impact sparks not deemed relevant.	**n/a**
6.4.2.2.4	Category 3G equipment	Covered by 6.4.2.2.3	**n/a**
6.4.2.2.5	Equipment of category 1D, 2D or 3D	Not relevant – equipment not intended for dust atmospheres.	**n/a**
6.4.3	Assessment of sparks and hot surfaces generated by friction	Equipment tested for mechanical spark generation.	**P**
6.4.4	External equipment containing light metals	Requirements in sub-clauses only.	**-**
6.4.4.1	Equipment-group I	Not relevant.	**n/a**
6.4.4.2	Equipment-group II	Materials in EUE do not contain more than 7.5% magnesium. Limitations on use of the tool required in the user instructions to prevent the tool being used in combination with light metals. The combination of rust-contaminated bristle tips and light metals can produce incendive thermite sparks.	**P**
6.5	Electrical ignition sources	Beyond scope of standard, also not relevant.	**n/a**
6.6	Stray electric currents, cathodic corrosion protection	Requirements in sub-clauses only.	**-**
6.6.1	Internal sources	Not relevant for EUE	**n/a**

EN 13463-1:2009			
Clause	Requirement - test	Result/comments	Verdict
6.6.2	Other sources	Not relevant for equipment manufacturer – should be considered by the user.	**n/a**
6.7	Static electricity	Requirements in sub-clauses only	**-**
6.7.1	General	Assumed likely and is considered during the current ignition hazard assessment.	**-**
6.7.2	Connection facilities for earthing conducting parts	The rotating hub is made of cast aluminium and is isolated from earth. However was tested for charge accumulation and discharge properties.	**P**
6.7.3	Prevention of highly efficient charge generating mechanisms….	Not relevant.	**n/a**
6.7.4	Equipment-group I	Not relevant.	**n/a**
6.7.5	Equipment-group II	The plastic material has a surface resistance which exceeds 1 GΩ. The tool exceeds the size limitation of 100 cm^2. The material was tested according to 13463-1 Annex D and did not produce sparks powerful enough to ignite gasses in group IIA.	**P**
6.8	Lightning	Not relevant.	**n/a**
6.9	Radio frequency (RF) electro-magnetic waves from 10^4 Hz to $3x10^{12}$ Hz	Not relevant.	**n/a**
6.10	Electromagnetic waves from $3x10^{11}$ Hz to $3x10^{15}$ Hz	Not relevant.	**n/a**
6.11	Ionising radiation	Not relevant.	**n/a**
6.12	Ultrasonics	Not relevant.	**n/a**
6.13	Adiabatic compression and shock waves	Not relevant.	**n/a**
6.14	Exothermic reactions, including self-ignition of dusts	Not relevant.	**n/a**
7	Additional considerations	Requirements in sub-clauses only	**-**
7.1	Dust deposits and other material in the gap of moving parts	Use of equipment assumed to be as IIG equipment within “dust-free” environment. Equipment not to be used with explosive dust atmospheres.	**n/a**
7.2	Opening times of enclosures	Not relevant.	**n/a**
7.3	Non metallic parts of the equipment	Requirements in sub-clauses only	**-**
7.3.1	General	-	**-**
7.3.2	Specification of the materials	Properties of the construction materials used shall be included in the technical file.	**P**
7.3.3	Thermal endurance	Not thought to be a problem but temperature index not known.	**P**
7.4	Removable parts	A tool is required to remove parts from the tool.	**P**
7.5	Materials used for cementing	No cemented parts are used.	**P**
7.6	Light transmitting parts	Not relevant.	**n/a**

EN 13463-1:2009			
Clause	Requirement - test	Result/comments	Verdict
8	**Verification and tests**	**Requirements in sub-clauses only**	**-**
8.1	General	Tests were performed to determine surface temperature and whether sparks can be effective ignition sources during expected malfunctions.	**P**
8.2	Determination of the maximum surface temperature	Requirements in sub-clauses only	**--**
8.2.1	General	The maximum surface temperature has been measured under expected malfunctions.	**P**
8.2.2	Maximum surface temperature in special cases	Not deemed relevant for EUE.	**n/a**
8.3	Flammability test	Testing of flammability not deemed necessary since no overheating of non-metallic parts has been identified during intended use.	**P**
8.4	Mechanical tests	Requirements in sub-clauses only.	**-**
8.4.1	Test for resistance to impact	Potential damage deemed to be a possible, but unlikely, cause of an effective ignition source in the IHA. Considered irrelevant to EUE.	**P**
8.4.2	Drop test	A drop test was performed and showed no reduced explosion safety when accidentally dropped.	**P**
8.4.3	Required results	A drop test was performed and showed no reduced explosion safety when accidentally dropped.	**P**
8.4.4	Tests for surface protective coating for group I category M2 equipment	Requirements in sub-clauses only	**-**
8.4.4.1	General	Not relevant.	**n/a**
8.4.4.2	Impact ignition tests in explosive mixture	Requirements in sub-clauses only	**-**
8.4.4.2.1	Verification of ignition of the raw light alloy material	Not relevant.	**n/a**
8.4.4.2.2	Estimation of protective coating efficiency	Not relevant.	**n/a**
8.4.4.2.3	Interpretation	Not relevant.	**n/a**
8.4.4.3	Adhesion test of the protective coating	Not relevant.	**n/a**
8.5	Additional tests of non-metallic parts of the equipment relevant for explosion protection	Requirements in sub-clauses only	**-**
8.5.1	Ambient temperature during tests	Not deemed relevant or necessary as there are no non-conducting parts that are deemed critical for explosion protection.	**n/a**
8.5.2	Tests for equipment-group I	Not relevant.	**n/a**
8.5.3	Tests for equipment-group II	Not relevant.	**n/a**
8.5.4	Thermal endurance to heat	Not relevant.	**n/a**
8.5.5	Thermal endurance to cold	Not relevant.	**n/a**
8.5.6	Resistance to chemical substances for Group 1 equipment	Not relevant.	**n/a**
8.5.7	Mechanical resistance tests	See 8.4.1	**P**

EN 13463-1:2009			
Clause	Requirement - test	Result/comments	Verdict
8.5.8	Surface resistivity test of non-conductive parts of the equipment relevant for explosion prevention and protection.	Surface resistivity of the plastic material was found in literature.	**P**
8.5.9	Thermal shock test	Not relevant.	**n/a**
9	**Documentation and information for use**	**Requirements in sub-clauses only**	**-**
9.1	Technical documentation of the manufacturer	Technical file needs to be updated to include explosion safety aspects.	**P**
9.2	Information for use	User instructions might need to be updated to include explosion hazards and protective measures.	**P**
9.3	Marking	Requirements in sub-clauses only	**-**
9.3.1	General	It is assumed that equipment will be visibly marked with a suitably durable “nameplate”. -	**P**
9.3.2	Marking according to this standard	Equipment is assumed to be marked with: - Name & address of manufacturer - Machine type/number - Year of production - ATEX code: IIA 2G c T4 - Ambient temp range -20 - +40 ˚C - Serial number - “CE” symbol	**P**
9.3.3	Marking on very small equipment	Not deemed necessary.	**n/a**
9.4	Examples of marking (informative)	This clause is informative only not normative and it contains no specific requirements.	**-**
Annex A, Methodology for confirming the category (normative)			**-**
A.1	Methodology for confirming the category of Equipment-group I	Requirements in sub-clauses only	**-**
A.1.1	Category M1 Equipment	Not relevant.	**n/a**
A.1.2	Category M1 Equipment	Not relevant.	**n/a**
A.2	Methodology for confirming the category of Equipment-group II	Requirements in sub-clauses only	**-**
A.2.1	Category 1 Equipment	Not relevant.	**n/a**
A.2.2	Category 2 Equipment	Intended use implies use in zone 1, thus yielding category 2.	**P**
A.2.3	Category 3 Equipment	Covered by requirements for Category 2	**P**
Annex B, Explanation of the ignition hazard assessment procedure (informative).			**-**
Annex C, Examples of ignition hazard assessment (informative).			**-**
Annex D Charging tests with non conductive materials (informative).			**-**
Annex E, Example of rig for resistance to impact test (informative).			**-**
Annex F, Rig for impact ignition test (normative).			**-**
Annex G, Consideration of misuse which can reasonably be anticipated during ignition hazard assessment procedure (informative).			**-**
Annex H, Significant changes between this European Standard and the Essential Requirements of EU Directive 94/9/EC (informative)			**-**
Annex ZA, Relationship between European Standard and Essential Requirements of EU Directive 94/9/EC (informative).			**-**

Assuming the requirements of the EN 13463-1 standard not specifically dealt with during this technical evaluation, in terms of technical file content and other information submitted to Notified Body, are satisfied it is concluded and proposed that the current MBX Bristle Blaster tool described and evaluated here be approved as ATEX category 2 equipment within the limitations of application and use described in section 4.

5.2 Conformity to EN 13463-5 : 2003

Since some of the safety measures, mentioned in the ignition hazard analysis in order to prove safe operation as category 3 and/or category 2 equipment for safe use in zone 2 and/or zone 1, rely on the principle of "constructional safety" then basic conformity to the EN 13463-5 standard is also required. Evaluation summary of conformity to this standard is given in Table 5.2.

Table 5.2 Conformity table for "MBX Bristle Blaster" according to relevant parts of EN 13463-5:2003 standard

EN 13463-5:2003			
Clause	Requirement - test	Result/comments	Verdict
1	**Scope**	**-**	**P**
2	**Normative references**	**This clause contains no requirements.**	**P**
3	**Terms and definitions**	**This clause contains no requirements.**	**P**
4	**General**	**Requirements in sub-clauses only**	**-**
4.1	Determination of suitability	IHA has indicated that certain parts of the EUE require ignition protection type "c" using this standard in order to meet the requirements for category 3G (zone 2) and 2G (zone 1).The latter by a combination of specific user instructions and this standard for constructional safety.	**P**
4.2	Parts of equipment	It is assumed that the machines, parts, components and interconnecting parts of the EUE have been designed and produced such that they are capable of functioning in conformity with the operational parameters given by the manufacturer for their expected lifetime for the intended use.	**P**
4.3	Ingress Protection	Requirements in sub-clauses only	-
4.3.1	General	Sub-clauses 4.3.2-4.3.5 specify minimum IP-rating required for the EUE for intended use.	**P**
4.3.2		Not deemed relevant.	**n/a**
4.3.3		IP grade assumed sufficient for intended use.	**P**
4.3.4		Not deemed relevant for EUE as not intended for use in dust atmospheres.	**n/a**
4.3.5		Not deemed relevant for EUE as not intended for use in dust atmospheres.	**n/a**
4.4	Seals for moving parts	Requirements in sub-clauses only	**-**

EN 13463-5:2003			
Clause	Requirement - test	Result/comments	Verdict
4.4.1	Unlubricated gaskets, seals, sleeves, bellows and diaphragms	If and where used, these are assumed to contain no light metals and be resistant to distortion and degradation without loss of explosion protection	**P**
4.4.2	Stuffing box seals	Not deemed relevant for EUE.	**n/a**
4.4.3	Lubricated seals	No lubricated seals used – Not relevant for EUE	**n/a**
4.5	Equipment lubricants/ Coolants/ Fluids	Requirements in sub-clauses only	**-**
4.5.1		Suitable lubricants are assumed used.	**P**
4.5.2		Suitable fluids are assumed used.	**P**
5	**Requirements for moving parts**	**Requirements in sub-clauses only**	**-**
5.1	General	During normal operation, bearing and axle rotational speeds of the EUE are > 1 m/s. Adequate “lifetime” lubrication and user instructions, including suitable maintenance routines and replacement intervals must be provided according to Ex-zone (equipment category).	**P**
5.2	Vibration	Vibrations can be expected during normal operation. Adequate “lifetime” lubrication and user instructions, including suitable maintenance routines and replacement intervals must be provided according to Ex-zone (equipment category).	**P**
5.3	Clearance	Not deemed relevant.	**n/a**
5.4	Lubrication	Lubrication of components beyond that of bearings is assumed unnecessary for EUE.	**P**
6	**Requirements for bearings**	**Requirements in sub-clauses only**	**-**
6.1	General	It is assumed that bearings suitable for intended use and loading have been used and conformity to ISO 281 is assumed and that life expectancy takes into account intended use with class IIA gasses which is expected to reduce lifetime expectancy from normal manufacturing estimates.	**P**
6.2	Lubrication	The majority of the bearings used are sealed and lubricated for life. Life expectancy to account for intended use in gas atmosphere given.	**P**
6.3	Chemical compatibility	Assumed not relevant beyond the consideration of use of EUE as in 6.1 & 6.2.	**P**
7	**Requirements for power transmission systems**	**Requirements in sub-clauses only**	**-**
7.1	Gear drives	Requirements in sub-clauses only	**-**
7.1.1		Not relevant.	**n/a**
7.1.2		Not relevant.	**n/a**
7.2	Belt drives	Requirements in sub-clauses only	**-**
7.2.1		Not relevant for EUE as no belt drives used.	**n/a**
7.2.2		Not relevant for EUE as no belt drives used.	**n/a**
7.2.3		Not relevant for EUE as no belt drives used.	**n/a**
7.2.4		Not relevant for EUE as no belt drives used.	**n/a**
7.2.5		Not relevant for EUE as no belt drives used.	**n/a**

EN 13463-5:2003			
Clause	Requirement - test	Result/comments	Verdict
7.2.6		Not relevant for EUE as no belt drives used.	**n/a**
7.3	Chain drives	Not relevant for EUE as no chain drives used.	**n/a**
7.4	Other drives	Not relevant for EUE as no other drives types used.	**n/a**
7.5	Hydrostatic/ Hydrokinetic/ Pneumatic - equipment	Requirements in sub-clauses only	**-**
7.5.1		Assumed that the pneumatic system will not produce hot surfaces exceeding the maximum surface temperature, even when operated continuously at maximum normal rating.	**P**
7.5.2		Not relevant for EUE.	**n/a**
7.5.3		Assumed that the pneumatic equipment complies with the requirements of EN 983.	**P**
7.5.4		Assumed not relevant for EUE.	**n/a**
7.5.5		Assumed not relevant for EUE.	**n/a**
7.5.6		Requirements for the air compressors used to power the tool are handled in the instructions manual.	**P**
8	**Requirements for clutches and couplings**	**Requirements in sub-clauses only**	**-**
8.1		Assumed not relevant for EUE as no clutches.	**n/a**
8.2		Assumed not relevant for EUE as no clutches.	**n/a**
8.3		Assumed not relevant for EUE as no clutches.	**n/a**
9	**Requirements for brakes and braking systems**	**Requirements in sub-clauses only**	**-**
9.1	Brakes used only for stopping in emergency	Not relevant for EUE.	**n/a**
9.2	Service brakes (including friction brakes and fluid based retarders)	Not relevant for EUE.	**n/a**
9.3	Parking brakes	Not relevant for EUE.	**n/a**
10	**Requirements for springs and absorbing elements**	**Not relevant for EUE**	**n/a**
11	**Requirements for conveyor belts**	**Requirements in sub-clauses only**	**-**
11.1		Not relevant for EUE.	**n/a**
11.2		Not relevant for EUE.	**n/a**
11.3		Not relevant for EUE.	**n/a**
11.4		Not relevant for EUE.	**n/a**
11.5		Not relevant for EUE.	**n/a**
12	**Marking**	**Requirements in sub-clauses only**	**-**
12.1		The letter “c” is to be included, in addition to the marking requirements of EN 13463-1, to indicate that principles in this standard have been used to ensure ignition sources are avoided for EUE.	**P**
12.2		ATEX code: II 2G c T3 for zone 1 equipment	**P**
12.3		Not relevant for EUE	**n/a**
Annex A, Examples of some of the thought processes and principles used in the construction of items of equipment protected by ‘Constructional Safety’ protection (informative)			**-**

EN 13463-5:2003			
Clause	Requirement - test	Result/comments	Verdict
Annex B, Test requirements (normative)			**-**
B.1	**"Dry run" test for lubricated sealing arrangements**	**Assumed not relevant for EUE.**	**n/a**
B.2	**Type test for determining the maximum engaging time of clutch assembly**	**Requirements in sub-clauses only**	**-**
B.2.1	Apparatus	Requirements in sub-clauses only	**-**
B.2.1.1		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.1.2		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.1.3		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.1.4		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.1.5		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.1.6		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.2	Procedure	Requirements in sub-clauses only	-
B.2.2.1		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.2.2		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.2.3		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.2.4		Assumed not relevant for EUE as no clutches.	**n/a**
B.2.3	Results	Assumed not relevant for EUE as no clutches.	**n/a**
B.2.4	Reporting	Assumed not relevant for EUE as no clutches.	**n/a**
Annex ZA, Clauses of this European Standard addressing essential requirements or other provisions of EU Directives (informative).			**-**

6 Conclusion

An ATEX conformity and ignition safety assessment has been performed, in cooperation with Monti Werkzeuge GmbH, for the evaluation of a new surface treatment tool, the MBX Bristle Blaster, to allow ATEX approval of the system as category 2 equipment for use in zone 1 for explosive atmospheres according to the ATEX 94/9/EC directive and the harmonized European Standard EN 13463-1.

The stainless steel brushes may after a while corrode or may become contaminated after use on rusty steel surfaces. These should therefore in no circumstances be used on light metals as this combination can produce incendive thermite sparks. These sparks contain a larger amount of energy than “standard steel sparks” and they can ignite class IIA gasses.

The assessment shows that the tool can be ATEX approved as category 2 equipment for gas group IIA gases.

7 References

[1] Directive 94/9/EC of the European Parliament and Council of 23 March 1994: On the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.

[2] European Standard EN 13463-1, Non-electrical equipment for use in potentially explosive atmospheres – Part 1: Basic method and requirements, January 2009.

[3] European Standard EN 13237, Potentially explosive atmospheres – Terms and definitions for equipment and protective systems intended for use in potentially explosive atmospheres, June 2003.

[4] European Standard EN 1127-1, Explosive atmospheres – Explosion prevention and protection - Part 1: Basic concepts and methodology, November 2007.

[5] Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery.

[6] European Standard EN 15198, Methodology for the ignition hazard assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres, March 2005.

[7] European Standard: EN 13463-5, Non-electrical equipment for use in potentially explosive atmospheres – Part 5: Protection by constructional safety “c”, December 2003.

[8] European Standard: EN 13463-6, Non-electrical equipment for use in potentially explosive atmospheres – Part 6: Protection by control of ignition source “b”, April 2005.

[9] GexCon report: GexCon09-44124-RA-1, Testing of Monti MBX Bristle Blaster in explosive atmospheres.

[10] GexCon report: GexCon09-44124-RA-3, Testing of static electric discharge characteristics of material used in the MBX Bristle Blaster according to EN 13463-1:2009, Annex D.

[11] GexCon report: GexCon09-44124-RA-4, Testing of the physical resistance of the MBX Bristle Blaster when dropped from a height of 1 meter according to EN 13463-1:2009.