CROATIAN MINE ACTION CENTRE

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Pursuant to Article 69, Paragraph 2 of the Law on Humanitarian Demining (*Official Gazette*, no. 153/05), the Director of the Croatian Mine Action Centre, having previously procured the opinion of the Director of the State Office for Metrology, passed the following document on 16th May 2007:

BOOK OF RULES AND REGULATIONS

ON TECHNICAL REQUIREMENTS AND ASSESSMENT OF CONFORMITY OF MACHINES USED IN HUMANITARIAN DEMINING OPERATIONS

1. GENERAL PROVISIONS

Article 1

This Book of Rules and Regulations stipulates the contents of the associated documentation, technical requirements that a demining machine system is to meet, examination and/or testing procedure and methods for assessing conformity of machines with the prescribed requirements.

Article 2

This Book of Rules and Regulations prescribes the following elements:
– Basic and operative technical requirements machines used in humanitarian demining operations need to meet;
– Rights and responsibilities of legal entities and natural persons that place the machines on the market and/or to use;
– Procedures for the assessment of conformity with the prescribed requirements;
– Documents that are to be made available to CROMAC before putting the machines into service (usability assessment issuance; accreditation procedure);
– Methods of marking the machines used in humanitarian demining operations.

Article 3

Machines used in humanitarian demining operations can be placed on the market, namely can be put into service only if they conform to prescribed technical requirements and are marked in accordance with the regulations.

Article 4

Based on technical requirements and conformity assessment it shall be determined whether:
– Machines perform the intended role;
– Machines are effective,
– Machines can survive the detonation of anti-personnel and anti-tank mines;
– Machines are safe for machine operators,
– Machines are acceptable for particular conditions and environment.
The establishment of conformity with the prescribed requirements for machines used in humanitarian demining operations in terms of this Book of Rules and Regulations shall mean the confirmation of meeting the requirements prescribed for demining machines.

Article 5

Terms and definitions used in this Book of Rules and Regulations are in accordance with HR and ISO norms, IMAS, CEN and shall mean the following:
– *Norm*: Document passed by consensus and approved by a recognized body, which provides rules, instructions or characteristics, for general or recurring use, for activities or their results with the aim of achieving the highest level of organization in a given context.
– *Normative document*: document providing rules, instructions or characteristics for a variety of activities.
– *CEN*: The European Committee for Standardization.
– *CWA*: Cen Workshop Agreements.
– *IMAS*: International Mine Action Standards.
– *STANAG*: NATO Standardization Agreement.
– *Technical specification*: Document stipulating technical requirements to be met by product. Note: If necessary, the technical specification must provide procedures used to verify whether the prescribed requirements have been met. Technical specification may be the norm, a part of the norm or a separate document independent of the norm.
– *Instructions for use*: Document that recommends methods and procedures of design, production, installation, maintenance or use of equipment, constructions or products. Note: Instructions for use may be the norm, a part of the norm or independent of the norm.
– *Regulation*: Document containing mandatory legal provisions, passed by an administrative body.
– *Technical regulation*: Document providing binding technical requirements, either directly or by referencing or incorporating the norm, technical specification or instructions for use. Note: Technical regulation may be supplemented by technical instructions, i.e. sufficient provisions describing the ways the requirements are to be met.
– *Accreditation*: Procedure by which a competent government or institutional recognizes that a particular body or person is qualified to perform particular tasks.
– *Conformity assessment of demining machines*: Every activity relating to direct or indirect assessment of whether technical requirements prescribed for machines used in humanitarian demining operations have been met.
– *Placing a demining machine on the market*: Point when a demining machine is for the first time transferred from the stage of manufacture or import with the intention of distribution or use. This definition does not refer to machines manufactured or imported for the purpose of sale on the foreign market.
– *Placing the machine into service*: Time of the first use of a demining machine in the Republic of Croatia by the end user.
– *Demining machine operator*: Deminer or assistant worker operating a demining machine.
– *Machine model*: Sample, machine prototype based on which machines are made.
– *Machine type*: Basic characteristics shared by a group of machines that distinguish them from other demining machines (sample, model). A machine distinguished for essential characteristics within a group of the same objects.
– *Machine features*: Distinctive characteristics of a machine.
– *Machine performances*: Totality of required features, requirements to be met or taken into consideration while assessing the conformity of a demining machine.
– *Machine survivability*: The effect of anti-personel and anti-tank mine on a machine.
– *Survivability for the safety of machine operator*: Level of protection of a machine operator against the explosion.
– *Machine acceptance*: Capacity of a machine to work in the environment where it is intended to be used and to achieve the designed depth of soil treatment.
– *Soil treatment*: Depending on the characteristics and condition of the soil, soil treatment may involve cutting and grinding (coherent soil) or breaking (incoherent soil) up to the designed depth of soil treatment.
– *Soil treatment density*: Adaptation of the speed of a demining machine to the rotor provided with a particular arrangement of working tools, in order to provide density of soil treatment necessary for a safe destruction of anti-personnel mines of the smallest dimensions and placed in very unfavourable

positions.
– *Flails*: Rotor-powered chains with hammers for soil treatment and mine neutralization (by breaking or detonating)
– *Tillers*: Rotor-powered teeth or knives that grind soil and break or detonate a mine.
– *Mine breaking*: Procedure by which the casing of a mine, detonator (and/or additional detonator), explosive charge and other parts of a mine are deformed, broken, crushed, scattered by a working tool of a machine in such a manner so as not to initiate the firing chain, i.e. a mine does not detonate.
– *Mine detonation*: Procedure by which a demining tool of a machine initiates the firing chain, i.e. a mine detonates.
– *Demining safety assessment*: Assessment of the effect of the explosion on the safety of a machine operator, working tools and the machine. The capability to neutralise the effect of the explosion on the machine.
– *Testing*: Determining one or more characteristics of demining machines in accordance with the procedure.
– *Examination*: A series of tests conducted in a systematic manner, the results of which lead to overall assessment of a component, equipment or system.

2. TECHNICAL REQUIREMENTS FOR MACHINES USED IN HUMANITARIAN DEMINING OPERATIONS

a) General requirements

Article 6

Demining machine consists of a base (chassis) and working tools (flail, tiller). The base is a track or wheel vehicle. The superstructure consists of a driving unit, steering unit, executive unit, and the attachment consists of a front segment with or without working unit drive, or trailer with or without working unit drive.

Article 7

General technical requirements a demining machine is to satisfy:
– Mine clearance (anti-personnel mines, anti-tank mines, mixed mine fields) under different field conditions;
– A machine must be able to neutralise mines (destroy mines by breaking or detonation). Working tools need to be resistant to mine blasts, roots and stones, and the teeth of a working tool, i.e. of a flail need to be easily replacable;
– Machine speed, adapted to soil treatment, needs to be adjusted to the required depth;
– Clearance quality needs to satisfy the requirements prescribed by the Standard Operating Procedures;
– Machine operator safety: operation by remote control or directly from the cab. Machine crew must be protected from anti-personel and anti-tank mine fragments, impulse noise and vibrations;
– Armour protected on all sides, especially from sudden explosion from underneath and the front;
– Machine survivability and maintenance.

b) Operating requirements

Article 8

Operating requirements regard particular performances of different kinds and types of machines, their survivability and acceptance.
In the accopmpanying documentation, machine manufacturer and/or machine user conductiong humanitarian demining operations shall provide data mentioned in Section 8 of CWA 15044: 2004., referring to technical features of every single machine according to type and kind.

Article 9

Machine classification is made according to purpose, working tools and mode of operation. If both direct and remote operation is possible, a machine shall only be accredited for the classification in which it was tested.

Article 10

According to machine weight, demining machines are classified into four categories: light machines, medium machines, heavy machines and demining excavators.

Article 11

Classification according to purpose:
– Demining machines;
– Vegetation cutters and waste removers;
– Support vehicles.

Article 12

Classification based on tool:
– Machine with flails;
– Machine with a mill;
– Machine with a vegetation cutter;
– Combination of tools;
– Others.

Article 13

Classification according to mode of operation:
– Direct operation from the cabin of the machine;
– Operation with remote controls;
– Direct operation from the cabin of the machine and with remote controls;
– Operation with remote controls and video monitoring.

Article 14

Demining excavators are usually construction machines adapted to the needs and conditions of humanitarian demining operations. Excavators with working tools - light flail are classified as demining machines.

Article 15

Technical requirements shall be defined separately for every classification, and the conformity assessment shall be conducted in accordance with CEN Agreement CWA 15044:2004.

3. DEMINING MACHINES

Article 16

Demining machines are machines that mechanically treat mined or mine suspected areas, remove vegetation (cutting and/or shredding), excavate mines and neutralize them by detonating and/or breaking them up to the depth specified by a demining or mine search project.

CLASSIFICATION OF DEMINING MACHINES ACCORDING TO WEIGHT AND BASED ON TOOL

a) Light machines

Article 17

Light machines weigh up to 5 tons. Working tool is a light flail. The flail consists of chains and hammers for soil treatment by digging or crushing, in the process of which anti-personnel mines on the surface or in the ground are broken or detonated.
Vital parts of the machine must be armoured for balistic protection against fragments of fragmentation mines.

b) Medium machines

Article 18

Medium-sized machines weigh from 5 to 20 tons. Working tool is a heavy flail, tiller or a combination of tools. The flail consists of chains and hammers for soil treatment by digging or crushing in the process or which anti-personnel and/or anti-tank mines on the surface or in the ground are detonated. The flails must be able to endure blasts of anti-personnel mines in which process one to three chains are usually damaged.
Tillers are rotor-powered teeth or knives (rotating cutting tools) that grind soil, namely break and crush a mine and/or cause detonation

The machine must be armoured to protect the machine operator and vital parts of the machine against fragments of blast mines.

c) Heavy machines

Article 19

These machines weigh more than 20 tons. The working tool is a single or a multiple flail or tiller, or their combination. The flail consists of chains and hammers for soil digging, breaking or detonating anti-personnel/anti-tank mines on the surface or in the ground. Heavy flail is also used for breaking mine fields. They must be able to endure anti-tank mine blast in which process one to three chains are damaged.
Tillers are rotor-powered teeth or knives (rotating cutting tools) that grind soil, namely break and crush a mine and/or cause partial or complete detonation.

The machine must be armoured to protect the machine operator and vital parts of the machine against fragments of blast mines.

d) Demining excavators

Article 20

Demining excavators weigh more than 15 tons. Demining excavator is a machine with tools for demining and vegetation cutting. The working tool is a light flail.
The flail consists of chains and hammers or just hammers (strike and dig the soil) for striking, breaking or detonating anti-personnel mines on the surface or in the ground.
The excavator cab and particular other parts must be armoured to protect the machine operator and vital parts of the machine against blast fragments.

CLASSIFICATION REQUIREMENTS ACCORDING TO WEIGHT AND BASED ON TOOL

a) Machine capacity to neutralise a mine

Article 21

Demining machine, namely working tools must be able to safely neutralise mines by breaking or detonating them in the following manner:
– Light machines: capacity to neutralise all kinds of anti-personnel mines on the surface or in the ground up to the depth specified by the annual assessment of machine features;
– Medium machines: capacity to neutralise all kinds of anti-personnel and/or anti-tank mines on the surface or in the ground up to the depth specified by the annual assessment of machine features;
– Heavy machines: capacity to neutralise all kinds of anti-personnel and/or anti-tank mines on the surface or in the ground up to the depth specified by the annual assessment of machine features;
– Demining excavators with a flail: capacity to neutralise all kinds of anti-personnel mines on the surface or in the ground up to the depth specified by the annual assessment of machine features;

b) Vegetation clearance capacity

Article 22

Demining machines, namely tools are to clear and /or cut vegetation in the following way:
– Light machines: capacity to clear and/or cut low and medium vegetation in accordance with Section 4 of CWA15044;
– Medium machines: capacity to clear and/or cut low, medium and high vegetation in accordance with Section 4 of CWA15044;
– Heavy machines: capacity to clear and/or cut low, medium and high vegetation in accordance with Section 4 of CWA15044;
– Demining excavators with a flail: capacity to clear and/or cut low and medium vegetation in accordance

with Section 4 of CWA15044 on slopes, channels, dykes and embankments.

c) Machine survivability

Article 23

Machine survivability is determined by the resistance to mine threats and the specific level of protection (CWA 15044, equivalent STANAG 4569).
Survivability is measured by the level of mine and balistic protection as based on the worst case scenario of the mine blast available.

Article 24

Light machines: level I of mine protection and level Iof balistic protection (STANAG 4569 Annex A and Annex B). Machine survivability against all kinds of anti-personnel mines, without significant damage caused to the machine armour and tools. The detonation of anti-personnel mine under the tools can cause serious damage. The machine can be destroyed but without injuries of the machine operator.

Article 25

Medium machines: level II of mine protection and level IIof balistic protection (STANAG 4569 Annex A and Annex B). Machine survivability against all kinds of anti-personnel and/or anti-tank mines. The detonation of anti-personnel mine does not cause significant damage to the machine armour or tools. The machine can continue to operate without major repairs. The detonation of an anti-tank mine (6 kg TNT) under the tools can cause serious damage to the tools. The machine can be seriously damaged but without injuries of the machine operator.

Article 26

Heavy machines: level II of mine protection and level II of balistic protection (STANAG 4569 Annex A and Annex B). Machine survivability against all kinds of anti-personnel and/or anti-tank mines. The detonation of anti-personnel mine does not cause significant damage to the machine armour or tools. The machine can continue to operate without repairs. The detonation of an anti-tank mine (6 kg TNT) under the tools can cause serious damage to the tools. The machine can be seriously damaged but without injuries of the machine operator.

Article 27

Demining excavators with flails: level II of mine protection and level II of balistic protection (STANAG 4569 Annex A and Annex B). Machine survivability against all kinds of anti-personnel mines. Possible damage caused to the excavator arm and hydraulic tubing. The excavator is not intended for destroying anti-tank mines.

d) Adapting machine speed to tool rotation speed

Article 28

For the purpose of quality machine demining, machine speed needs to be adapted to tool rotation speed as a guarantee of mine neutralisation (by breaking or detonating).
The documentation submitted by the testing applicant must contain a soil treatment quality diagram, i.e. soil treatment density diagram.

e) Arrangement of digging tools and depth of soil treatment

Article 29

The arrangement of digging tools (digging tools: flails, tiller teeth) must be such so as not to leave undamaged an anti-personnel mine of the smallest dimensions placed in an unfavourable position (30 mm).

Article 30

The requirements for soil treatment quality with regard to clearance depth are specified by a project of mine search and/or demining of a mine suspected area.
If not otherwise specified by the project, average clearance depth of soil treatment in Class I soil shall be 20 cm, and in Class II and III soil 10 cm (soil classes as specified by Section 6.1.1 of CWA 15044).

f) Machine operator safety

Article 31

Light machines are operated exclusively by remote control.

Article 32

Directly operated heavy machines, medium machines and demining excavators must have a cab with level II of balistic protection that guarantees protection against fragments of anti-personnel and/or anti-tank mines, noise, vibrations (explosion wave).
The noise inside the cab at the time of mine explosion must not exceed 125 dB.
The total level of shock acceleration measured on the seat of machine operator, made as a result of the detonation of TMA-3 mine must be lower than 10 g, and the permitted maximum speed change <3 m/s.

Article 33

For level II of balistic protection Armox steel plate must be 100kg/m2. Windscreen, windows and other transparent surfaces shall be made of armored glass consisting of several layers of glass with protective membranes between the layers to prevent fragments from entering the cab.

The cab must have an entrance/exit door and a roof door for emergency exit.

g) Machine reliability and maintenance

Article 34

Testing demining machine reliability (the user submits documentation with data on reliability, Section 8, specification no. 17, CWA 15044) and maintenance possibilities shall be documented, including the influence of soil and vegetation conditions (soil density, soil looseness, soil cohesion, erosiveness, configuration, dust, water, heat), i.e. environment on the machine (testing performances Section 6, CWA 15044).

h) Obligatory equipment of demining machine

Article 35

Demining machine directly operated from the cab must have a 6kg powder fire extinguisher (ABC). The fire extinguisher (S6 with powder) must be regularly maintained in accordance with the regulations on maintenance and choice of fire extinguishers.
Every machine must have a manufacturer's plate stating the name of the manufacturer, machine type (machine model) and registration number.

4 VEGETATION CUTTERS AND WASTE REMOVERS

a) Vegetation cutters

Article 36

Machines with working tools such as roto shredders or various cutting tools with knives (special excavators) can be used for vegetation clearance of mine suspected areas.
Working unit consists of a rotating drum which can be attached to the front section of a high clearance machine. Free rotating hammers shred higher vegetation. The length of shredding hammer is 10 cm. Cuttters can have rotating knives with multiple cutting edges.
The capacity of removing all types of vegetation by cutting and shredding is required.

Article 37

The arrangement of cutting tools and/or rotating knives must be such so as not to leave the vegetation uncut or only partially removed.
The possibility of cutting down individual trees of diameter up to 10 cm.
Machine can be operated directly from the cabin and/or by remote control.
If the machine is operated directly from the cabin, safety of machine operator must be ensured in accordance with Articles 32 and 33 of this Book of Rules and Regulations.

b) Machines for waste removal on mine suspected areas

Article 38

All construction machines equipped with appropriate tools and balistic protection of the machine operator in the cabin can be used to remove waste and building material from a mine suspected area.

The machine can be directly operated from the cabin and/or by remote control.
If the machine is operated directly from the cabin, the safety of machine operator must be ensured in accordance with Articles 32 and 33 of this Book of Rules and Regulations.

5 SUPPORTING VEHICLES

Article 39

Supporting vehicles are used to protect a machine operator operating a demining machine and staff conducting humanitarian demining operations.

Article 40

The requirements for supporting vehicles used in humanitarian demining operations are the following:
– High clearance, min. 300 mm,
– Quick entrance and exit of the crew,
– armoured protection consisting of a monoblock body and a multilayer protective glass (armox 400-500, 480-540 HB, thickness 4-6-8 mm; titan/hardox/kevlar/ multilayer glass),
– Mine threat level: MTL-01, MTL-02 i MTL-03 A/B,
– Mine threat level equivalent:
a) Anti-mine protection: level I: anti-tank protection and devices; level II: 6 kg of TNT; level III: 8 kg of TNT;
b) Balistic protection 360°: level I (standard) and level II (option),
– Crew protection:
a) Level II, anti-tank mine explosion, 6 kg TNT under the wheel,
b) Protection from impulse noise (max 140 dB),
c) Acceleration on the seat (not less than 10 g on the seat), speed change (not less than 3 m/s),
– Equipment: communication equipment, GPS, NBC protection (option),

6 PROCEDURES OF CONFORMITY ASSESSMENT OF MACHINES USED IN HUMANITARIAN DEMINING OPERATIONS

Article 41

All machines used in humanitarian demining operation are subject to conformity assessment and testing of machine features.
The assessment is based on testings conducted on test polygons or sites.

Article 42

An authorised legal entity that designed manufactured or purchased a demining machine (hereinafter: testing applicant) shall submit a request for conformity assessment and provide information on the machine as stated in Section 8 of CEN CWA 15044.

Article 43

The testing applicant shall submit a request for conformity assessment with the following documentation enclosed:
– Technical data on the material of cab armour and glass and on the protection of vital parts of the machine (material certificates);
– Certificate on the measuring of noise inside the cab (issued by an accredited laboratory/center);
– Certificate or report on the overall level of impact acceleration on the machine operator's seat caused by detonation o fan anti-tank mine (issued by an accredited laboratory/center);
– Documents on developmental and test site testing (if existing);

– Documents on the use of the machine outside Croatia (if existing),
– Appointment of the testing applicant representative who will be present at the testing.
Conformity assessment request shall be submitted with all the certificates on the quality control of the machine, issued by authorised institutions.

Article 44

Conformity assessment request together with the rest of the required documentation shall be submitted in Croatian to an accredited laboratory/center authorised to issue a conformity assessment.

Article 45

In order to obtain and renew a certification and/or certificate on conformity of a demining machine, requirements prescribed by this Book of Rules and Regulations are to be satisfied
If an institution performing demining machine testing considers that not all the reqirements necessary for conformity assessment have been met, it shall inform the testing applicant about it as soon as possible. It shall identify problems and define corrective measures to be taken by the testing applicant.
The testing applicant shall show and document what modifications it has made to fully meet the requirements.

Article 46

The testing applicant shall report and document all changes and modifications on the machine that can have an impact on the safety of a machine operator and demining operations quality.
If the modifications carried out are significant and have an impact on the safety of a machine operator and/or demining operations quality with respect to project requirements, a new conformity assessment shall be made.

Article 47

The final assessment on conditions and possibilities of use of a machine in demining operations (usability assessment-accreditation) shall be issued by the Director of CROMAC based on the certificate on conformity.

a) Testing performances

Article 48

The purpose of testing is to test and evaluate, under controlled conditions, the capability of the machine to neutralise mines at different depths in different types of soil.

Testing and evaluation is performed in accordance with CEN Agreement CWA 15044:2004.

Article 49

Different types of the same kind of machine, designed and/or manufactured in Croatia shall be subject to testing.
The testing shall be performed on one of the machines belonging to the same type. The other machines of the same type as well as tested machines shall not subject to a complete testing, but only to an annual assessment of machine features based on which the annual conformity assessment is issued.

Article 50

The testing shall also comprise an assessment of machine features (regular - annual and/or additional), by means of which the condition of the machine with respect to the condition determined by conformity assessment procedure shall be identified.
The testing shall be performed once a year on polygon for demining machines testing or site of the mine search and/or demining project.
Testing on the site may involve only heavy machine and demining excavator testing.

Article 51

The annual features assessment comprises the assessment of soil treatment depth, machine speed, soil treatment density and machine performance on one test lane with the local compressed soil.
The calibration, performed by an authorised institution, of the equipment used to measure the depth of soil treatment, soil treatment density and machine performance is not required.

Article 52

Additional assessment of machine features is performed upon request by CROMAC.

Polygon testing of demining capabilities

Article 53

Testing of the capability of a machine to neutralize mines at different depths in different types of soil.
Testing shall be performed on a prepared polygon with three test lanes, each with a different homogenuous soil type (gravel, sand, topsoil) and under controlled conditions as stipulated by CWA 15044.

Article 54

Testing, target selection and arrangement as well as defining and interpretation of clearance results shall be in accordance with CWA 15044.
In case standardised targes as specified by Annexes 1, 2 and 3 of CEN Agreement CWA 15044 can not be procured, demining capability can be tested as a part of survivability and acceptance testing using anti-personnel and anti-tank mines on a prepared polygon with the local homogenous soil.

Testing soil treatment depth and quality

Article 55

The testing of the optimal performance of the machine, soil treatment density and soil treatment depth shall be performed in the same test lanes as in Article 54.

Article 56

The assessment of the optimal performance of the demining excavator with flails, soil treatment density and soil treatment depth shall be performed on specially prepared test lanes with local soil.
The lanes shall be in the form of a symmetrical arc defined by the size of the excavator arm and width of the tool.

Article 57

The penetration profile of the tool imprinted on fibreboard panels placed across the clearance path of the machine shall be evaluated and measured (Section 2.6 - Tool penetration profile, CWA 15044).
The depth of the impact (imprint) of the flail hammer or tiller tooth shall be measured on the fibreboards along the entire working length of the tool.
A mean value shall be calculated based on 20 individual measurements (the measurements are taken evenly along the entire length of the imprint, starting with the initial damage on whichever side of the fibreboard) taken for every test obstacle.

Article 58

If there is one or more "blank spaces" on the fibreboard (a space without an imprint - undamage obstacle) along the length larger than the diameter of the smallest anti-personnel mine, the soil treatment density is not satisfactory.
If the mean value of soil treatment depth on test lanes, Class I soil, is greater than 17 cm, and lower than 19.5cm, provided that none of the individual measurements taken on the test lane are lower than 12cm, the demining machine shall be assessed as performing treatment of Class I soil up to the depth of 20 cm successfully.

Testing vegetation clearance capability

Article 59

The assessment of vegetation clearance capability shall be performed on the polygon or the appropriate site with low, medium and high vegetation as classified in Section 4 and based on the procedure specified in the same section of CWA 15044 (Section 4 Ground preparation and vegetation clearance).

b) Survivability testing

Article 60

Survivability testing shall be performed in accordance with CEN Agreement CWA 15044.

Before survivability testing, an authorised institution (laboratory/center) performing the testing, shall evaluate, based on the submitted documentation and the examination of the machine, minimun protection specifications, including the following:
– Materials used (types, thickness, certificate, etc.);
– Design principles (anti-mine, balistic protection, etc.);
– Construction quality (access of fittings and controls, welds, etc.);

– Safety principles (such as exits, fure suppression, etc.).

Machine survivability

Article 61

Test conditions, execution, placement of mines or charges, data collection and information management shall be in accordance with CWA 15044.
In case standardised targes as specified by Annexes 1, 2 and 3 of CEN Agreement CWA 15044 can not be procured, machine survivability shall be tested as a part of acceptance testing using anti-personnel and/or anti-tank mines.

Operator survivability

Article 62

Machines operated directly from the cab shall be tested for balistic protection and machine operator safety after remote detonation of anti-tank mine TMA-3 or anti-tank mine of similar characteristics but with not a smaller charge.

Article 63

The following effects will be measured (in accordance with CWA 15044):
– Overpressure in internal organs (ear) / impulse noise;
– Acceleration of the seat and floor (feet and spinal);
– Displacement of operator.
For the purpose of conformity assessment requirements stated in Articles 31, 32 and 33 of this Book of Rules and Regulations must be met.
Test conditions, execution, placement of mines or charges, data collection and information management shall be in accordance with CWA 15044.

c) Acceptance testing

Article 64

Before acceptance testing, authorised institutions (laboratories, centers) performing the testing, shall evaluate the results of performances and survivability testings, and verify that the machine is safe for acceptance testing.
An authorised institution/center shall prescribe testing arrangements and detailed acceptance testing procedure (preparations, safety measures, placement of mines and mine search after acceptance testing).
In the course of machine testing the presence of test leader or his deputy, appointed by an authorised laboratory/center, and testing applicant representative is obligatory.

Article 65

The purpose of the testing is to verify that a demining machine and operational procedure proposed by the testing applicant in its assessment request are safe and effective.
Testing procedure is carried out in accordance with Section 7 of CWA 15044 and the testing plan.
The testing plan shall be drawn up by a laboratory/centre authorised for demining machine testing.

Number and type of anti-pesonnel and anti-tank mines to be used in testing

Article 66

Light demining machines and demining excavators shall be tested only against the following anti-personnel mines:
– 5 pieces PMA-1A,
– 5 pieces PMA-2,
– 5 pieces PMA-3,
– 2 pieces PMR-2A,
– 2 pieces PROM-1.

Article 67

Medium-size demining machines are tested against both anti-personnel and anti-tank mines. Mines used to test medium-size demining machines operated directly from the cab and/or by remote control shall be the following:
– 5 pieces PMA-1A,
– 5 pieces PMA-2,
– 5 pieces PMA-3,
– 2 pieces PMR-2A,
– 2 pieces PROM-1,
– 1 piece TMM-1,
– 2 pieces TMRP-6.
The testing applicant may specify, under the conditions preceding the testing, that a medium-size demining machine remotely operated is to be tested only against anti-personnel mines. This shall be specifically stated in the certificate issued.
Medium-size demining machines with flails and/or tillers, operated directly from the cab, shall not be tested against anti-tank mines: TMM-1 and TMRP-6, but against targets as stipulated by CWA 15044.
In case suitable targets can not be procured, testing as stipulated by Article 63 shall be acceptable.

Article 68

Mines used to test heavy demining machines operated directly from the cab and/or remotely operated shall be the following:
– 5 pieces PMA-1A,
– 5 pieces PMA-2,
– 5 pieces PMA-3,
– 2 pieces PMR-2A,
– 2 pieces PROM-1,
– 1 piece TMM-1,
– 1 piece TMA-3,
– 1 piece TMA-4,
– 2 pieces TMRP-6.

Upon the exhaustion of the mine supply, the number and type of mines or targets shall be in accordance with specifications specified in CWA 15044.

Deployment of mines

Article 69

Anti-personnel pressure-activated mines (PMA) shall be placed in accordance with Section 7.4.1 of CWA 15044. They shall be supplied with appropriate fuses and placed in a line, with the distance between them of about 4m and at the depth 5, 10, 15 and 20 cm as specified by figure shown in Section 7.4.1 of CWA 15044.

Article 70

Anti-personnel fragmentation mines (PMR) are placed in accordance with Section 7.4.2 of CWA15044. They shall be placed in front of the machine and working tool at the distance of 15 to 20 m with a tripwire streched towards the machine (as specified by figure shown in Section 7.4.2 of CWA 15044).

Article 71

Bounding fragmentation anti-personnel mines (PROM) shall be placed in front of the machine and working tool, one at the distance of about 5m and preparation for pressure activation , and the other at the distance of about 15m with a tripwire stretched towards the machine (tripwire activation).

Article 72

Anti-tank mines shall be placed in accordance with Section 7.4.3 of CWA 15044. They are supplied with appropriate fuses and placed one by one:
– TMM-1, TMA-3 i TMA-4 shall be placed 5m in front of the working tool at the depth of about 10-20cm;
– TMRP-6: one pressure-activated mine shall be placed at the depth of about 10-20cm and 5m in front of the machine and the working tool, the other for activation through the disturbance ot a tilt rod.

Evaluation of test results and reporting

Article 73

The evaluation of test results shall be performed in accordance with CEN Agreement CWA 15044. The final results shall be specified as number of mines:
– Triggered (detonated),
– Mechanically Neutralised (untriggered, damaged, non functional),
– Live Damaged (untriggered, damaged, still functional),
– Live (untriggered, undamaged).

Article 74

If a mine is left undamaged the procedure shall be repeated with the same type of mine (with the total number of mines specified).

If after the repeated acceptance testing of a demining machine using anti-personnel and/or anti-tank mines, there are still one or more mines left unneutralised (by detonation or breaking), the working tool does not meet the requirements. The testing is aborted.

Article 75

If in the course of conformity assessment procedure deviations from specified technical requirements are determined, particular results of the previous performance, survivability or acceptance tests may be accepted in the repeated testings, if they meet these technical regulations.

d) Testing in a mine suspected area

Article 76

All demining machines shall be tested for the capablity of vegetation clearance.
The capability of vegetation clearance in three different environments shall be tested in accordance with Section 4 of CWA 15044 (class and vegetation description).
The machine shall be tested in low, medium and high vegetation environment, working through 10 meters of vegetation as based on the worst case scenario available for the project in question.

Article 77

For machines tested for soil treatment density and soil treatment depth 3mm fibreboards shall be placed across the test lane in accordance with CWA 15044.
Machines constructed not to engage the ground shall not be subject to the fibreboard test.
The penetration profile shall be evaluated in accordance with Article 57 of this Book of Rules and Regulations. All machines not meeting the requirements regarding soil treatment density and soil treatment depth may be used for ground preparation and vegetation clearance.

Article 78

If requested by the testing applicant and upon the completion of polygon test, the testing of the machine may be done in realistic conditions, in a mine suspected area.
Such testing can be performed as a part of demining and/or mine search project, and shall be performed by an institution or center accredited for demining machines testing in cooperation with CROMAC.
The size of the test area depends on machine classification and is specified by Section 8 of CWA 15044.
Minimum data to be recorded during the test on the site are specified in Section 8.1 of CWA 15044.

7 CONFORMITY ASSESSMENT PROCEDURES FOR VEGETATION CUTTERS AND WASTE REMOVERS

Article 79

The testing of vegetation cutters shall be performed on the appropriate polygon or site in realistic conditions without placing fibreboards into the ground across the test lane.
The assessment of machine operator safety, if a machine is operated directly from the cab, shall be issued based on the submitted documentation showing that all the requirements as specified in Articles 32 and 33 of this Book of Rules and Regulations have been met.

Article 80

Waste removers shall not be subject to test. The validity of a waste remover and working tools shall be verified by visual examination and test trial. The assessment of machine operator safety, if the machine is directly operated from the cab, shall be issued based on the submitted documentation showing that all the requirements as specified in Articles 32 and 33 of this Book of Rules and Regulations have been met.

8 CONFORMITY ASSESSMENT PROCEDURES FOR SUPPORT VEHICLES USED TO PROTECT A MACHINE

Article 81

The assessment of machine operator safety, when the machine is operated from a supporting vehicle, shall be issued based on the submitted documentation of the support vehicle procured, showing that all the requirements as specified in Article 40 of this Book of Rules and Regulations have been met.
The validity of a support vehicle and the condition of materials used for anti-mine and balistic protection of the machine operator or crew shall be verified by visual examination and test ride on site.

10 OTHER PROVISIONS

Article 82

The expenses of demining machine testing shall be covered by the testing applicant.
If a machine is damaged in the course of examination/testing, the repair expenses shall be covered by the testing applicant.
The cost of examination and/or testing shall be specified by an institution (laboratory/center) accredited for demining machine testing.

Article 83

Based on the issued certificate of conformity CROMAC shall issue the assessment on conditions and possibilities of demining machine usage in humanitarian demining operations (usability assessment).

Article 84

This Book of Rules and Regulations shall enter into force on the eighth day after the date of publication in the *Official Gazette*.

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Sisak, 16th May 2007

Director
Oto Jungwirth, v. r.