

Future Counter Mobility System (FCMS)

ANNEX A to FCMS URD¹ Performance Definitions and Criteria

Prepared for:

Ministry of Defence (MoD)
Defence Procurement Agency (DPA)
Bristol, England BS34 8JH
United Kingdom

In Response to:

CONTRACT MOB/00048/2

27 January 20XX

Prepared by:

G P COLLETT
Mob RM1
Mob IPT

¹ Section 4.6.1 of FCMS partial URD (QAL/P1168/2/6/4/6), issue 1, 26th January 20XX.

TABLE OF CONTENTS

PERFORMANCE DEFINITIONS AND CRITERIA	1
1.0 INTRODUCTION.....	1
2.0 FCMS PERFORMANCE (SSKP)	1
2.1 <i>Definition.</i>	1
2.2 <i>The Target Set.</i>	1
2.3 <i>Demonstration of Compliance.</i>	1
2.4 <i>SSKP Variables.</i>	2
2.5 <i>Minimum Requirements.</i>	2
2.6 <i>FCMS Countermeasures.</i>	3
3.0 FCMS PERFORMANCE (OBSTACLE EFFECTS)	4

LIST OF TABLES

Table 1: Target Set.....	1
Table 2: Engagement Geometries.....	2
Table 3: Minimum Acceptable Environment and Terrain Criteria for FCMS	3
Table 4: FCMS Countermeasures.....	4
Table 5: FCMS Performance and Evaluation Parameters	4

ANNEX A PERFORMANCE DEFINITIONS AND CRITERIA

1.0 INTRODUCTION

1.1 This Annex defines the performance requirement of the FCMS system. The requirement has been developed to meet the overall counter-mobility capability defined by the Users of the system.

1.2 The following paragraphs provide performance definitions and criteria for elements of the FCMS system. Single Shot Kill Probability (SSKP) shall be used to prove performance (dependent upon the solution(s) for FCMS elaborated in Milestone Report 5²). If this is not possible, owing to the deployed characteristics of the proposed solution, then the Attrition and/or Delay characteristics of the FCMS obstacle shall be investigated.

2.0 FCMS PERFORMANCE (SSKP)

2.1 Definition.

For a deployed FCMS the SSKP is defined as being the likelihood that any valid single target entering the [zone of authority] of the system will be subjected to a mobility kill or total kill. This definition specifically excludes firepower kill.

2.2 The Target Set.

Primary valid targets shall be main battle tanks, and other heavy/light armoured tracked/wheeled vehicles. This is in accordance with the Armour, Anti-Armour Balance Paper³. Specific targets shall be those identified in Table 1:

Timeframe	MAIN TANK THREAT		MAIN LAFV THREAT		OTHERS
	Recommended	Worst Case	Recommended	Worst Case	Recommended
2008	T-80U PIP1, T-72, T-90 S-DAS 2	T-90 PIP 1, S-DAS 2, H-DAS 2	BMP-2, S-DAS 1	BMP-3, BMP-2 PIP 1, S-DAS 1	BTR-60, 70, 80, MAZ-537, MAZ-543, ZIL-131
2015	T-80 PIP 2, T-90 PIP 1, S-DAS 2, H-DAS 2	RS-TK-02, S-DAS 3, H-DAS 3	BMP-3, BMP-2 PIP 1, S-DAS 1	BMP-3 PIP 1 (amphib & non-amphib), S-DAS 2	BTR-60, 70, 80, MAZ-537, MAZ-543, ZIL-131
2025	T-80U PIP 2, T-90 PIP 1, S-DAS 3, H-DAS 3	RS-TK-02, DAS-4	BMP-3, BMP-2 PIP 1, S-DAS 1	BMP-3 PIP 1 (amphib & non-amphib), S-DAS 2	BTR-60, 70, 80, MAZ-537, MAZ-543, ZIL-131

Table 1: Target Set

2.3 Demonstration of Compliance.

Acceptance of the system shall be by demonstration of compliance to the SSKP requirement for T72, BMP-1, and BMP-2 target vehicles. As a goal compliance shall also be demonstrated for the T80 target vehicle, although it is acknowledged that information on the T80 is less readily available. Targets shall be assessed over the engagement geometries shown in Table 2 as means of achieving SSKP:

² QinetiQ/FST/SSS/6/202/7 dated 01 Dec 03.

³ SNR (A) Armour, Anti-Armour Balance Paper, Chapter 2, Revised 18 Jun 97

COMMERCIAL

Engagement Geometry	Performance	Remarks
Top Attack	Penetration 45° angle of incidence ($\geq 70\text{mm}$) into semi-infinite RHA (contract compliance test). Perforation of RHA target representative of T-72B engine deck + BAD pack. Perforation of RHA target representative of BMP-2 roof + BAD pack.	To be clarified before issue of ITT
Side Attack	Penetration 45° angle of incidence ($\geq 70\text{mm}$) into semi-infinite RHA. Perforation of RHA target representative of T-72B side panel + BAD pack. Perforation of RHA target representative of BMP-2 side panel + BAD pack.	To be clarified before issue of ITT
Belly Attack	Perforation of RHA target representative of T-72 B belly armour.	To be clarified before issue of ITT. Full width attack to be assessed.

Table 2: Engagement Geometries

There is no favoured engagement geometry for any single element of the FCMS capability. The capability should be deployed in the configuration where it has the greatest chance of producing the desired mobility kill or total kill.

2.4 SSKP Variables.

The elements that comprise the SSKP of FCMS are defined in Milestone Report 1⁴. Clearly this measure is both weapon and target specific because a more heavily armoured vehicle is likely to be more difficult to kill than a lightly armoured one. It is also related to other variables such as target speed, environmental conditions and terrain. Given the range of possible values, returns to tender should quote SSKP in terms of one of the following:

- A single target vehicle type with fixed speed, environmental conditions, heading and magnetic latitude.
- A single target vehicle type averaged over a number of different speeds, environmental conditions, headings and magnetic latitudes.
- A set of target vehicle types with fixed speed, environmental conditions, headings and magnetic latitude.
- A set of target vehicle types averaged over a number of different speeds, environmental conditions, headings and magnetic latitudes.

2.5 Minimum Requirements.

The minimum average SSKP for an individual FCMS shall be [0.4] when employed under the environmental and terrain conditions stipulated in the appropriate FCMS DEF STAN (summarised in Table 3). Performance shall be computed over ranges to target at closest point of approach (CPA) between 0 and 100 metres and target speeds between 5 kph and 100 kph.

DefStan/Reference	Condition	Minimum Requirement	URD Ser
00-35 (Part 4)/3 Chapter 1-01.	Air Temperature	From +49°C to -51°C met and +71°C to - 51°C storage	181-191, 166-176
00-35 (Part 4)/3 Chapter 5-01	Wind Speed	20 ms ⁻¹	303
00-35 (Part 3)/3 Chapter 3-29	Snow Depth	0.6 m	304
00-35 (Part 3)/3 Chapter 3-29	Icing	2.54 mm	305
00-35 (Part 3)/3 Chapter 3-27	Rainfall Rate	100620 mm per hr for one hr	306

⁴ QinetiQ/FST/CR033638/3.0 dated Sep 03.

COMMERCIAL

DefStan/Reference	Condition	Minimum Requirement	URD Ser
Part 1 – URD	Terrain Slope	15°	302
Part 1 - URD	Terrain Type	Fields, dirt roads, desert, hard packed soil, frozen terrain, low dense grass, high grass, urban areas, wooded areas, mountainous.	76
00-35 (Part 4)/3 Chapter 3-01	Solar Radiation	970 w/m ²	To be included
00-35 (Part 3)/3 Chapter 3-29	Submersion	1 m for 20 days (in packaging). 0.15m for 20 days (system itself)	To be included
00-35 (Part 4)/3 Chapter 10-01	Altitude	1000 m	72
08-6 (Part 3 – 5)	Signature	See DefStan	240-245, 286-289

Table 3: Minimum Acceptable Environment and Terrain Criteria for FCMS

2.6 FCMS Countermeasures.

The FCMS is likely to encounter countermeasures. The countermeasure threat for mines-based and non mines-based solutions are identified across the 2008, 2015 and 2025 timescales in Table 4.

Countermeasure	2008	2015	2025
Mine/DF:			
Single Coil MSP ⁵	YES	YES	YES
Multiple Coil Single Axis MSP	YES	YES	YES
Multiple Coil Multiple Axis MSP	Possible	YES	YES
Depermed Target	Possible	YES	YES
Degaussed Target	NO	Possible	Possible
High Field Target	NO	Possible	Possible
Track Width Mine Plough	YES	YES	YES
Full Width Mine Plough	YES	YES	YES
Roller	YES	YES	YES
Chain and Dog Bones	YES	YES	YES
Explosive Hose	YES	YES	YES
EMP	YES	YES	YES
Jamming	YES	YES	YES
Fragment, bullet, shaped charge/EFP attack	YES	YES	YES
Overpressure	YES	YES	YES
Battlefield Obscuration	YES	YES	YES
DAS	YES	YES	YES
Air:			
EMP	YES	YES	YES
Jamming	YES	YES	YES
Fragment, bullet, shaped charge/EFP attack	YES	YES	YES
Overpressure	YES	YES	YES
Battlefield Obscuration	YES	YES	YES
IF:			
Jamming	YES	YES	YES
Fragment, bullet, shaped charge/EFP attack	YES	YES	YES
Overpressure	YES	YES	YES

⁵ Magnetic Signature Projector

COMMERCIAL

Countermeasure	2008	2015	2025
DAS	YES	YES	YES
Battlefield Obscuration	YES	YES	YES

Table 4: FCMS Countermeasures

3.0 FCMS PERFORMANCE (OBSTACLE EFFECTS)

3.1 To achieve mission success the User requires that the minimum overall effect of the deployed FCMS shall be assessed across the parameters defined in Table 5. This table highlights the required levels of attrition or delay that the obstacle must achieve (Milestone Report 1⁶) against the Red formations described in Milestone Report 4⁷. Any returns to tender shall include a description of how these effects are to be demonstrated.

FCMS Purpose	Red Attrition Level	Red Delay (hrs)	Warning of Need	Frontage (km)	Distance from Own Troop (m)	Transits of Obstacle at Speeds of:
Fix	≥50%	6+	Immediate	10	0-500 500-10000 10000+	Medium-speed transit (25 kph)
Disrupt	≥25%	3+	Immediate < 1 hr	4 x 1 deep	0-500 500-10000	High-speed transit (40 kph)
Block	≥60%	6+	Immediate < 6 hrs	10	2000 10000	Slow-speed transit (12 kph)

Table 5: FCMS Performance and Evaluation Parameters

⁶ QinetiQ.FST/CR033638/2.0 dated Sep 03.

⁷ QinetiQ/KI/Consult/CR032580 dated Oct 03.