

# SYSTEM REQUIREMENTS SPECIFICATION

## F-16 Self-protection Suite for Terma A/S

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**Confidential**

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### Acceptance

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Company A

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## 1. Scope

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### 1.1. Identification

The system covers a Self-protection Suite [SpS] for the F-16 combat aircraft. It includes an Intelligent Cockpit Control Unit [ICCU] for controlling the Electronic Warfare Suite [EWS] and a Pod consisting of a Missile Warning System [MWS] and a Dispensing System for release of Payloads (chaffs and flares).

### 1.2. System Overview

The goal of the system is to provide a Self-protection Site for the F-16 combat aircraft from enemy missile threats. Incoming missiles are detected and audio/visual warnings are transmitted to the pilot. The SpS will have three modes – fully automatic, semi-automatic, and manual.

### 1.3. Document Overview

This document specifies system requirements, based on user requirements and preconditions delivered to Company A [The Company] by Terma A/S [The Customer]. This document is confidential and cannot be shared with entities other than The Customer and The Company, unless agreed otherwise by said parties.

## 2. Referenced Documents

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This section provides an overview of referenced documents throughout the System Requirements Specification document.

Reference ID	Document Name
REF1	Jacobsen, R.H. (2014). <i>Systems Engineering Exercises and Teaching Materials</i> . Aarhus University – School of Engineering. TISYE1-10-003. V1.4.
REF2	<i>MIL-STD-1553-B Specification Document</i> .

## 3. Requirements

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This section provides an overview of the system requirements sorted by category. Note that adjusted user requirements have been marked in *italics*.

### 3.1. Required States and Modes

Sys. Req.	User Req.	Description
SR-1	UR-12	The system shall comprise of at least three modes; manual, semi-automatic and automatic.
SR-2	UR-13	Manual mode shall dispense the program selected by the pilot.
SR-3	UR-14	Semi-automatic mode shall initiate a threat response upon consent from the pilot.
SR-4	UR-15	Automatic mode shall initiate a threat response without pilot interaction.

### 3.2. System Capability Requirements

Sys. Req.	User Req.	Description
SR-5	UR-2	The pod shall be able to dispense payloads forwards, downwards and sideways.
SR-6	UR-6	The system shall provide aircraft mission computer with status information.
SR-7	UR-11	The cockpit unit shall be able to control power of dispensing system.
SR-8	UR-11	The cockpit unit shall be able to control power of MWS.
SR-9	UR-21	The system shall be able to dispense a pattern of payloads programmable by end user.

### 3.3. System External Interface Requirements

Sys. Req.	User Req.	Description
SR-10	PRECON	The cockpit unit shall run on 28 VDC power.
SR-11	PRECON	The pod shall run on 115 V AC, 400 Hz power.
SR-12	UR-9	<i>The system shall be able to receive a discrete signal from aircraft to erase sensitive data.</i>
SR-13	UR-7	The system shall interface with the aircraft intercom system to provide audio cues and warnings.
SR-14	UR-5	Threats shall be transmitted to the aircraft mission computer in body frame format relative to the aircraft.
SR-15	UR-41	The cockpit unit shall communicate with the mission computer via a MIL-STD-1553-B data bus (REF1).

### 3.4. System Internal Interface Requirements

Sys. Req.	User Req.	Description
SR-16	UR-40	The cockpit unit shall communicate with the MWS via a MIL-STD-1533-B data bus (REF2).

### 3.5. System Internal Data Requirements

Sys. Req.	User Req.	Description
SR-17	UR-10	The system status on individual LRU level shall be provided by cockpit unit.

### 3.6. Adaptation Requirements

Not applicable.

### 3.7. Safety Requirements

Sys. Req.	User Req.	Description
SR-18	UR-8	The system shall include a hardware implemented safety interlock.

### 3.8. Security and Privacy Requirements

Sys. Req.	User Req.	Description
SR-19	UR-9	<i>The system shall be able to receive a discrete signal from aircraft to erase sensitive data.</i>

### 3.9. System Environment Requirements

Sys. Req.	User Req.	Description
SR-20	UR-30	<i>The pod structure shall remain intact when exposed to steady state acceleration levels from -5g to 5g fore.</i>
SR-21	UR-30	<i>The pod structure shall remain intact when exposed to steady state acceleration levels of -2.5g to 2.5g aft.</i>
SR-22	UR-30	<i>The pod structure shall remain intact when exposed to steady state acceleration levels of -25g to 25g up.</i>
SR-23	UR-30	<i>The pod structure shall remain intact when exposed to steady state acceleration levels of -11g to 11g down.</i>
SR-24	UR-32	<i>The pod shall be operational at temperatures of -40 degrees to 95 degrees Celsius on outer skin for up to 25 minutes.</i>
SR-25	UR-32	<i>The pod shall be operational at temperatures of -40 degrees to 102 degrees Celsius on leading edge for up to 25 minutes.</i>
SR-26	UR-33	<i>The pod shall be operational at temperatures of -40 degrees to 134 degrees Celsius on outer skin for up to 3 minutes.</i>
SR-27	UR-33	<i>The pod shall be operational at temperatures of -40 degrees to 151 degrees Celsius on leading edge for 3 minutes.</i>

### 3.10. Computer Resource Requirements

Sys. Req.	User Req.	Description
SR-28	UR-16	The system shall provide a method of loading software to MWS.

### 3.11. System Quality Factors

Sys. Req.	User Req.	Description
SR-29	UR-6	The system shall provide aircraft mission computer with built-in test results.
SR-30	UR-1	The pod shall include a minimum of eight standard magazines.
SR-31	UR-3	Introduction of the system may not compromise the operation of the current weapon system.
SR-32	UR-20	<i>The system shall be able to dispense a minimum of 2 payloads within 500ms.</i>

### 3.12. Design and Construction Constraints

Sys. Req.	User Req.	Description
SR-33	UR-42	The pod shall be mounted on the aircraft wing with 4 standard T-hooks spaced by 13 inches.
SR-34	UR-31	The maximum total weight of the pod shall be 270 kg.
SR-35	UR-43	The maximum power consumption of the pod shall be 700 W.

### 3.13. Personnel-related Requirements

Not applicable.

### 3.14. Training-related Requirements

Sys. Req.	User Req.	Description
SR-36	UR-21	Terma A/S shall receive a user manual explaining how to program a dispense pattern of payloads.

### 3.15. Logistics-related Requirements

Not applicable.

### 3.16. Packaging Requirements

Not applicable.

### 3.17. Other Requirements

Sys. Req.	User Req.	Description
SR-37	UR-4	The pod shall be mounted on the left-hand wing.

## 4. Quality Provisions

This section specifies the qualification methods of all system requirements. The two tables below show the types of qualification methods and the qualification methods for each system requirement, respectively

Qualification Method	Description
<b>Demonstration</b>	The requirement shall be qualified by a system demonstration.
<b>Test</b>	The requirement shall be qualified by a specific test is performed.
<b>Analysis</b>	The requirement shall be qualified by assessments and calculations.
<b>Inspection</b>	The requirement shall be qualified by an inspection.

System Requirement	Qualification Method	System Requirement	Qualification Method
SR-1	Inspection	SR-20	Test
SR-2	Demonstration	SR-21	Test
SR-3	Demonstration	SR-22	Test
SR-4	Demonstration	SR-23	Test
SR-5	Demonstration	SR-24	Test
SR-6	Demonstration	SR-25	Test
SR-7	Test	SR-26	Test
SR-8	Test	SR-27	Test
SR-9	Demonstration	SR-28	Demonstration
SR-10	Test	SR-29	Test
SR-11	Test	SR-30	Inspection
SR-12	Test	SR-31	Test; Analysis
SR-13	Test	SR-32	Test
SR-14	Test	SR-33	Inspection
SR-15	Test	SR-34	Test
SR-16	Test	SR-35	Test; Analysis
SR-17	Inspection	SR-36	Inspection
SR-18	Test	SR-37	Inspection
SR-19	Test		

## 5. Requirement Traceability

<b>Project Name:</b>	F16 Self-Protection Suite for Terma A/S	<b>Business Area:</b>	Defence Industry
<b>Project Manager:</b>	Boris Mihaylov	<b>Business Analysts Lead:</b>	Kim Henriksen
<b>QA Lead:</b>	Martin Valov	<b>Target Implementation Date:</b>	18/03/2015

Req. ID	Category or Functional Activity	Requirement Description	Use Case Reference	Design-document Reference	Code or Module Reference	Test Case Reference	User Acceptance Validation	Comments
SR-1	UR-12	The system shall comprise of at least three modes; manual, semi-automatic and automatic.						
SR-2	UR-13	Manual mode shall dispense the program selected by the pilot.						
SR-3	UR-14	Semi-automatic mode shall initiate a threat response upon consent from the pilot.						
SR-4	UR-15	Automatic mode shall initiate a threat response without pilot interaction.						
SR-5	UR-2	The pod shall be able to dispense payloads forwards, downwards and sideways.						
SR-6	UR-6	The system shall provide aircraft mission computer with status information.						
SR-7	UR-11	The cockpit unit shall be able to control power of dispensing system.						
SR-8	UR-11	The cockpit unit shall be able to control power of MWS.						

<b>SR-9</b>	UR-21	The system shall be able to dispense a pattern of payloads programmable by end user.						
<b>SR-10</b>	PRECON	The cockpit unit shall run on 28 VDC power.						
<b>SR-11</b>	PRECON	The pod shall run on 115 V AC, 400 Hz power.						
<b>SR-12</b>	UR-9	The system shall be able to receive a discrete signal from aircraft to erase sensitive data.						
<b>SR-13</b>	UR-7	The system shall interface with the aircraft intercom system to provide audio cues and warnings.						
<b>SR-14</b>	UR-5	Threats shall be transmitted to the aircraft mission computer in body frame format relative to the aircraft.						
<b>SR-15</b>	UR-41	The cockpit unit shall communicate with the mission computer via a MIL-STD-1553-B data bus (REF1).						
<b>SR-16</b>	UR-40	The cockpit unit shall communicate with the MWS via a MIL-STD-1533-B data bus (REF2).						
<b>SR-17</b>	UR-10	The system status on individual LRU level shall be provided by cockpit unit.						
<b>SR-18</b>	UR-8	The system shall include a hardware implemented safety interlock.						
<b>SR-19</b>	UR-9	The system shall be able to receive a discrete signal from aircraft to erase sensitive data.						
<b>SR-20</b>	UR-30	The pod structure shall remain intact when exposed to steady state acceleration levels from -5g to 5g fore.						



<b>SR-21</b>	UR-30	The pod structure shall remain intact when exposed to steady state acceleration levels of -2.5g to 2.5g aft.						
<b>SR-22</b>	UR-30	The pod structure shall remain intact when exposed to steady state acceleration levels of -25g to 25g up.						
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<b>SR-29</b>	UR-6	The system shall provide aircraft mission computer with built-in test results.						
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<b>SR-32</b>	UR-20	The system shall be able to dispense a minimum of 2 payloads within 500ms.						
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<b>SR-36</b>	UR-21	Terma A/S shall receive a user manual explaining how to program a dispense pattern of payloads.						
<b>SR-37</b>	UR-4	The pod shall be mounted on the left-hand wing.						

## 6. Other

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### 6.1. Glossary

<b>EWS</b>	Electronic Warfare Suite
<b>ICCU</b>	Intelligent Cockpit Control Unit
<b>LRU</b>	Line-replaceable Unit
<b>MWS</b>	Missile Warning System
<b>PRECON</b>	Precondition
<b>QA</b>	Quality Assurance
<b>REF</b>	Reference
<b>Req.</b>	Requirement
<b>SpS</b>	Self-protection Suite
<b>SR</b>	System Requirement
<b>Sys.</b>	System
<b>The Company</b>	Company A
<b>The Customer</b>	Terma A/S
<b>UR</b>	User Requirement