Annex A

Requirements Specification

Air Start Unit

TABLE OF CONTENTS

1 General

1.1 Background and scope

As the Royal Danish Airforce (RDAF) is obliged to give contribution to action in international operations all over the world there is a need to support RDAF's EH101 aircrafts. This acquisition of three (3) Air Start Units (ASU) is required to support RDAF's EH101 aircrafts in operation and during maintenance.

1.2 Concept

The ASU shall be capable of servicing RDAF's current aircrafts, mainly EH101 aircrafts. The ASU shall also be able to be used to support future acquired aircrafts. The ASU shall be easily transportable by plane, train and lorry in a standard 20 ft. container. The ASU shall have towing eye (towbar) and shall be towable with a towing vehicle. Due to the operations of the RDAF, the ASU should be able to operate in different climatic conditions as well as environments containing snow, hail, rain and sand with no or minimal modification of the ASU.

1.3 System description

A standalone gas turbine driven ASU able to run on diesel fuel meeting requirements according to EN 590 (or equivalent) and military aviation jet-fuel (JP-8/NATO F-34) (or equivalent) is required. The air from the ASU shall be delivered to the aircraft through a hose connected to the aircraft. The hose connection shall be able to connect to the aircraft in question. All parameters of the ASU, such as Bleed air output, Delivery pressure, Bleed air temperature, Mode of operation etc. shall be easily adjustable.

1.4 Use Cases

Future missions of the Danish Defence will put more effort than before on the mobility and flexibility of the units. Assignments shall be solved under all possible conditions and in a variety of different operation areas, ranging wide geographically, as well as in all kinds of terrain and weather conditions. This requires equipment that is up-to-date, thoroughly tested and usable in a wide range of applications.

ASUs to be procured shall be usable in a wide range of applications, to facilitate the mobility and flexibility of the Danish Defence. The ASUs shall be used for current RDAF aircrafts as well as aircrafts to be acquired in the future. The ASUs shall be able to meet logistics requirements necessary to ensure deployment of the RDAF.

The ASUs are going to be used in operation, for maintenance and other purposes under the areas of responsibility of the Aircraft Maintenance Squadron as an integral part of a supporting contribution. Three (3) operational ASUs are required to meet the usage needs during international operations as well as training exercises.

The personnel to operate the ASU can be assumed to be skilled workers with user knowledge of similar equipment.

1.5 Definitions and abbreviations

Each requirement is classified as "Mandatory Requirement" or "Evaluation Requirement" in the classification column. Mandatory Requirements are marked with "**M**". Evaluation Requirements are marked with "**E**".

Classification ID	Description
M	A mandatory requirement must be fulfilled by the tenderer. If a mandatory requirement is not fulfilled, the offer will be excluded from further evaluation.
E	Evaluation Requirement. These requirements will be evaluated by DALO.

For each requirement it is possible for DALO to make remarks as a guide to the requirement. *DALO remarks are made in Italics.*

For each requirement it is specified in the "Documentation" column how the tenderer should describe or document compliance with the requirement. Several categories for each requirement may be indicated. The following categories apply to the column "Documentation":

Documentation ID	Description
Y/N	Tenderer must answer with Y (yes) or N (no) if the requirement is fulfilled. If necessary with comments. Please observe that if it is a Mandatory Requirement answering 'No' results in an unconditional offer.
C	The offer must include a certificate as documentation.
D	The offer must include a description or attached valid documentation.

Consumable parts are defined as goods used in conjunction with the ASU, except fuel, oil and lubricants.

Abbreviations:

ASU - Air Start Unit

CEFR - Common European Framework of Reference for Languages

CMM - Component Maintenance Manual

DALO - Danish Defence Acquisition and Logistics Organisation

RDAF - Royal Danish Airforce

Standards that are referred to in this Annex A

- EN 590:2013+A1(May 2017): Automotive fuels - Diesel - Requirements and test methods
- ISO 2026 Aircraft - Connections for starting engines by air
- EN 60038 CENELEC standard voltages
- EN 1915-1 Aircraft ground support equipment – General requirements – Part 1: Basic safety requirements
- EN 1915-2 Aircraft ground support equipment – General requirements – Part 2: Stability and strength requirements, calculations and test methods
- EN 1915-3 Aircraft ground support equipment – General requirements – Part 3: Vibration measurement methods and reduction
- EN 1915-4 Aircraft ground support equipment – General requirements – Part 4: Noise measurement methods and reduction
- EN 12312-16 Aircraft ground support equipment - Specific requirements – Part 16: Air start equipment
- STANAG 4370 Edition 6 (December 2016): ENVIRONMENTAL TESTING
  - ◊ ALLIED ENVIRONMENTAL CONDITIONS AND TEST PUBLICATION (AECTP)-230, Edition 4 - Environmental Conditions
- STANAG 3346 Marking and Lighting of Airfield Obstructions
  - ◊ ICAO Annex 14 Volume 1 Chapter 6
- ISO 11446-1 Road Vehicles – Connectors for the electrical connection of towing and towed vehicles – 13-pole connectors for vehicles with 12 V nominal supply voltage
- STANAG 4007 ELECTRICAL CONNECTORS BETWEEN PRIME MOVERS, TRAILERS AND TOWED ARTILLERI Edition 2, 26 JANUARY 1993
- VG 96923-1 - Electrical connectors and plug-and-socket devices - Connectors, 12 poles, solder termination
- STANAG 4101 PPS (Edition 2): Towing attachments
- EN/ISO 11200 Acoustics - Noise emitted by machinery and equipment - Guidelines for the use of basic standards for the determination of emission sound pressure levels at a work station and at other specified positions
- DS/EN 9141 Aerospace series - Foreign Object Damage (FOD) Prevention Program - Requirements for Aviation, Space, and Defence Organizations.
- DS/EN/ISO 12100 Safety of machinery – General principles of design – Risk assessment and risk reduction

- DS/EN/IEC 60204-1 Safety of machinery- Electrical equipment of machines - General requirement
- DS/EN/ISO 13849-1 Safety of machinery- Safety related parts of control systems - General principles of design
- DS/EN/ISO 13850-1 Safety of machinery-Emergency stop function - Principles for design
- DS/EN 1037 Safety of machinery - Prevention of unexpected start-up
- STANAG 4062 SLINGING AND TIE-DOWN FACILITIES FOR LIFTING AND TYING DOWN MILITARY EQUIPMENT FOR MOVEMENT BY LAND AND SEA
  - ◊ (AEP 93) Allied Engineering Publication May 2016
- STANAG 7213(ATP-3.3.4.1) ALLIED TACTICAL PUBLICATION (TACTICS, TECHNIQUES AND PROCEDURES FOR NATO AIR MOVEMENTS) Edition A Version 1 JANUARY 2018

All references to standards (such as STANAGs, ISO, DS, etc.) are to the latest version.

2 Requirements Specification

2.1 Operational requirements

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
1.	**Air generator** The ASU shall use a turbine to generate the compressed air.	**M**	Y/N	
2.	**Air output** The minimum air output from the ASU shall be 1,50 kg air / sec.	**M**	Y/N	
3.	**Air Pressure** The pressure of the air from the ASU shall be between 3,5 bar to 5,4 bar absolute.	**M**	Y/N	
4.	**Connection helicopter** The connection of air to the aircraft / helicopter shall be with air start coupling with strainer. *Standard:* *ISO 2026 or equivalent*	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
5.	**Operation** It shall be possible for a single operator to operate the ASU.	**M**	Y/N	
6.	**Handling** It shall be possible for a single operator to connect and disconnect the ASU to a towing vehicle.	**M**	Y/N	
7.	**Brakes, Parking** The ASU shall have brake/brakes that can hold the ASU parked on a wet slope of ± 3°.	**M**	Y/N	
8.	**Display language** All user interfaces and the Man Machine Interface (MMI) / Operator Console shall be in Danish and/or English.	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
9.	**Power supply requirement** It shall be possible, if the ASU requires it, to operate the ASU and all accessories for the ASU with the electrical supply available in Denmark, either 1-phase and/or 3-phase, as follows: 3-phase 400 V AC ± 10% 50 Hz in accordance with DS/EN 60038 1-phase 230 V AC ± 10% 50 Hz in accordance with DS/EN 60038 *If the offered ASU does not require external electrical power supply, the Supplier shall also answer "Y".*	**M**	Y/N	
10.	**Towing speed** The ASU shall be able to be towed at 10 km/h on a plain surface which is in wet / dry conditions, but not with icy surface. *The surface will be compound of different texture and without slope.*	**M**	Y/N	
11.	**Towing speed, high** The ASU should be able to be towed at 30 km/h on a plain dry surface. *The surface will be compound of different texture and without slope.* *The tenderer shall state the maximum speed with which the ASU can be towed.*	**E**	D	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
12.	**Start up, time** The elapse time from start-up of the ASU to the ASU delivering air to the aircraft shall not exceed 300 seconds.	**M**	Y/N	

2.2 Technical requirements

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
13.	**ASU, Fuel** The ASU shall run on/use diesel fuel meeting requirements according to EN 590 (or equivalent) and military aviation jet-fuel (JP-8/NATO F-34) (or equivalent).	**M**	Y/N	
14.	**Weight, trailer** The ASU without fuel but with trailer shall weigh less than 3500 kg.	**M**	Y/N	
15.	**Weight, trailer** The ASU without fuel but with trailer should weigh less than 1200 kg. *The supplier shall state the weight for the ASU including trailer without fuel in kilogram (kg).*	**E**	D	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
16.	**Dimension, including trailer** The maximum dimension of the ASU's with trailer and with towbar in upright position (dismantled) shall be: Width: 2000 mm, Length: 3000 mm, Height: 2250 mm.	**M**	Y/N	
17.	**ASU design** The design of the ASU shall be in accordance with general applicable requirements in EN 1915 or equivalent and the specific applicable requirements in EN 12312-16 or equivalent.	**M**	Y/N	
18.	**ASU design climate** The design of the ASU shall be so that it can be stored and operated outside in climate categories A3, B1 and C1 without taking any precautionary measures. *Standards:* *STANAG 4370 (AECTP-230) or equivalent.*	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
19.	**Operation temperature, Hot** It shall be possible, with some reconfiguration if necessary, to operate the ASU in category A2 (HOT DRY). *Standards:* *STANAG 4370 (AECTP-230) or equivalent.*	**M**	Y/N	
20.	**Operation temperature, Hot** If it is necessary to configure the ASU to category A2, it shall be possible to change from normal operation of the ASU to category A2 operation in less than 360 minutes. *If the ASU does not need to be configured, the tenderer shall answer "Y".* *Standards:* *STANAG 4370 (AECTP-230) or equivalent.*	**M**	Y/N	
21.	**Operation temperature, Cold** It shall be possible, with some reconfiguration if necessary, to operate the ASU in category C2 (COLD). *Standards:* *STANAG 4370 (AECTP-230) or equivalent.*	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
22.	**Operation temperature, Cold** If it is necessary to configure the ASU to category C2, it shall be possible to change from normal operation of the ASU to category C2 operation in less than 360 minutes. *If the ASU does not need to be configured, the tenderer shall answer "Y".* *Standards:* *STANAG 4370 (AECTP-230) or equivalent.*	**M**	Y/N	
23.	**Operation temperature, extended** It should be possible to operate the ASU in the following climate category A1 (EXTREME HOT DRY), with less than 360 minutes of reconfiguration. *Standards:* *STANAG 4370 (AECTP-230) or equivalent.*	**E**	Y/N	
24.	**ASU, colour** The main colour of the ASU shall be Yellow RAL 1023 or equivalent. *Standard:* *STANAG 3346 or equivalent.* *ICAO Annex 14 Volume 1 Chapter 6 or equivalent.*	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
25.	**Light** The ASU shall be equipped with working light on all four sides.	**M**	Y/N	
26.	**Marking light** The ASU shall have the necessary marking light to be used on an airfield / apron / runway, in accordance with the standards mentioned below. *Standard:* *STANAG 3346 or equivalent.* *ICAO Annex 14 Volume 1 Chapter 6 or equivalent.*	**M**	Y/N	
27.	**Power outlet** The ASU should have a power outlet with standard of 12 V / 5 A, with 13 poles connector, in accordance with the standard mentioned below. *Standard:* *ISO 11446 or equivalent.*	**E**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
28.	**Power outlet NATO** The ASU should have a power outlet in accordance with NATO standard of 24 V/ 5 A with a connector, in accordance with the standards mentioned below. *Standards:* *STANAG 4007 or equivalent.* *VG 96923 L002 or equivalent.*	**E**	Y/N	
29.	**Towing eye for towing** The ASU towbar shall have a towing eye according to STANAG 4101 or equivalent, with dimension/tolerance that will avoid jolt from the join between the ASU and towing vehicle, in accordance with the standard mentioned below *Standards:* *STANAG 4101 or equivalent.*	**M**	Y/N	
30.	**Towing eye / towbar** It shall be possible to dismantle the towing eye/towbar of the ASU by 2 personnel in less than 10 minutes with use of standard workbench tools.	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
31.	**Noise** The ASU should, in operation and at maximal airflow, not emit an amount of Sound/noise exceeding 75 dB (A) at a distance of 6m. *The Supplier shall describe and document the sound/noise level in units of dB (A) for the ASU. The measurement shall be in operation and at maximal airflow. Measurements shall be carried out at a distance of 1 m from the contour of the machinery and at a height of 1,60 m above ground level. The position where the maximum sound pressure level is measured shall be recorded and declared.* *Reference standards:* *EN 1915-4 or equivalent* *ISO 11200 group or equivalent*	**E**	D	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
32.	**Emergency stop for equipment** The ASU and all associated components/equipment shall be equipped with emergency stop(s) in accordance with the standard mentioned below. *Reference standard:* *EN/ISO 13850-1 or equivalent* *DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC* *Executive Order No. 693 on the design etc. of machinery.*	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
33.	**Machinery Directive** The ASU, including all components/equipment/accessories and software, shall comply with the requirement in Directive 2006/42/EC on machinery and the relevant harmonised standards. *Reference standards e.g.:* *ISO 12100 or equivalent* *IEC 62061 or equivalent* *IEC 60204-1 or equivalent* *ISO 13849-1 or equivalent* *ISO 13850 or equivalent* *DS/EN 1037 or equivalent* *DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC* *Executive Order No. 693 on the design etc. of machinery.*	**M**	Y/N	
34.	**Debris** The design and the manufacturing of the ASU and its parts and accessories used shall be made in a way that prevents risk against Foreign Object debris (FOd).	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
35.	**CE (Comformité Européenne)** The ASU, including all equipment shall be CE-marked/conform with the requirements that apply to CE marking.	**M**	Y/N	

2.3 Maintenance

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
36.	**Communication** The ASU and equipment shall have no possibility to be accessed by an unauthorised person through the internet, mobile phone or any wireless equipment. *This might be implemented by a mechanical switch. The switch would in this case be able to completely switch on and off the power to the communication module. If the communications module can be made powerless by other means this will also be acceptable.*	**M**	Y/N	

2.4 Transportation

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
37.	**Transportation General** It shall be possible to transport the ASU with aircraft, train, truck and ship, in accordance with the standards mentioned below. *Standards:* *STANAG 4062 or equivalent* *STANAG 7213 or equivalent* *IATA, General Guidelines or equivalent* *ADR 2017 or equivalent* *IMDG – code or equivalent*	**M**	Y/N	
38.	**Transportation lifting fork lift** The ASU shall be equipped with a lifting point for fork lift truck.	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
39.	**Transportation fastening** The ASU shall be equipped with fastening points for transport. *It shall be possible to tie down the ASU.* *Standards:* *STANAG 7213 or equivalent* *STANAG 4062 or equivalent*	**M**	Y/N	
40.	**Transportation** It shall be possible to transport the ASU in a standard 20 feet container (*ISO 668 Type 1CC)*.	**M**	Y/N	
41.	**Transportation air** Transportation by air shall be possible without dismantling the ASU.	**M**	Y/N	
42.	**Transportation air, Fuel** It shall be possible to empty the ASU fuel tank without using any special tools or equipment.	**M**	Y/N	

2.5 Documentation

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
43.	**Manual: User** The Supplier shall as part of the delivery, deliver user manuals written in Danish and English. The manual shall provide all information required to operate the ASU.	**M**	Y/N	
44.	**Manual: Maintaining/service** The Supplier shall as part of the delivery, deliver service component maintenance manuals (CMM). The CMM shall be delivered written in either Danish and/or English. The manual shall provide all information required to carry out any service, maintenance and repair of the ASU.	**M**	Y/N	
45.	**Disposal** The CMM shall include a description of the disposal (or recycling) of all parts of the ASU, incl. sub systems.	**M**	Y/N	
46.	**Disposal, Law** The disposal (or recycling) shall comply with applicable law, including EU law applicable in Denmark.	**M**	Y/N	

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
47.	**Hazardous materials** The CMM shall include a catalogue/list of all the hazardous materials and consumables that are used for the ASU.	**M**	Y/N	
48.	**Hazardous materials data sheet** For each hazardous material and consumable in the Catalogue/list, the CMM shall include a Safety data sheet.	**M**	Y/N	
49.	**Parts list: Spare parts** The CMM shall include a complete Parts list of all parts of the ASU, incl. sub systems. *The parts list must state producer and the supplier´s stock number, as well as the Original Equipment Manufacturers (OEM) name and stock number.* *If the supplier is aware that a given component has a NATO Stock Number (NSN), such a number must be added to the parts list.*	**M**	Y/N	
50.	**Spare Parts: Prices** DALO shall be able to buy spare parts at a price as most favoured customer.	**M**	Y/N	

2.6 Training

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
51.	**Education: User** The Supplier shall as part of the delivery provide one User Course that enables the User to use the equipment in a safe way and also carry out daily maintenance such as, service and checking of the equipment. See Annex E. The User Course sessions shall be carried out on the supplied Equipment.	**M**	Y/N	
52.	**Education: Engineer/Technician** The Supplier shall as part of the delivery provide one Technical course that enables the Danish Defence workshop (FH) engineers and technicians to make and carry out all maintenances, services, checks and repairs of the delivered equipment in its entire lifetime. See Annex E. The Technical Course sessions shall be carried out on the supplied Equipment.	**M**	Y/N	
53.	**Education: Teachers** The teachers for the educational courses shall be able to hold security clearances in order to gain access to the Danish Defence's facilities.	**M**	Y/N	

2.7 Point of contact

Id. No.	Requirement description	Classification	Documen-tation	Tenderer's remarks to the requirement
54.	**Technical assistance** The Supplier shall provide a point of contact (POC) for technical issues, free of charge at the Suppliers office time (e.g. between 8 am and 4 pm at the suppliers' Local time) on all working-days, and the POC shall be for a period of 4 years from Delivery of ASU. *The purpose of the POC is to receive/answer/resolve technical issues, that DALO/FLV engineers cannot resolve themselves. This technical issue may arise in connection with the day-to-day operation of the Air Start Unit.*	**M**	Y/N	
55.	**Technical assistance/English or Danish** The Technical assistance shall be in English or Danish. The language requirement for English/Danish is level B2 pursuant to CEFR or the equivalent. *Reference standard:* *Common European Framework of Reference for Languages abbreviated (CEFR) or the equivalent.*	**M**	Y/N	