

## REQUEST FOR PROPOSAL DEMANDE DE PROPOSITION

### RETURN BIDS TO:

### RETOURNER LES SOUMISSIONS À :

Ministère de la Défense nationale / Department  
of National Defence  
MGen Pearkes Building, DGAEPM DAP 7  
101 Colonel By Drive  
Ottawa  
Ontario  
K1A 0K2

Attention : Alexandre Hein DOA 7-3-2 / DAP 7-  
3-2

### SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

#### Proposal To: National Defence Canada

We hereby offer to sell to Her Majesty the Queen in  
right of Canada, in accordance with the terms and  
conditions set out herein, referred to herein or attached  
hereto, the goods and services listed herein and on any  
attached sheets at the price(s) set out therefore.

#### Proposition à : Défense nationale Canada

Nous offrons par la présente de vendre à Sa  
Majesté la Reine du chef du Canada, aux  
conditions énoncées ou incluses par référence  
dans la présente et aux annexes ci-jointes, les  
biens et services énumérés ici et sur toute feuille  
ci-annexée, au(x) prix indique(s).

#### Solicitation Closes – L'invitation prend fin

At – à : 14:00PM Eastern Daylight Time (EDT)-  
Heure avancée de l'Est (HAE)

On - le : 28 May/mai, 2024

<b>Title/Titre</b> Radome Installation/ Installation, Radôme		<b>Solicitation No – N° de l'invitation</b> W8485-248125/A/RCS
<b>Amendment Date – Date de modif.</b> May 2 <sup>nd</sup> 2024		<b>Amendment No. – N° de modification</b> 001
<b>Address Enquiries to – Adresser toutes questions à</b>  <b>National Defence Headquarters</b> 101 Colonel By Drive, Ottawa, ON K1A 0K2  <b>DAP 7-3-2 attn.: Alexandre Hein</b> <a href="mailto:alexandre.hein@forces.gc.ca">alexandre.hein@forces.gc.ca</a>		
<b>Telephone No. – N° de téléphone</b>		<b>FAX No – N° de fax</b>
<b>Destination</b> Cold Lake, AB		

#### Instructions:

**Municipal taxes are not applicable. Unless otherwise specified herein all prices quoted must include all applicable Canadian customs duties, GST/HST, excise taxes and are to be delivered Delivery Duty Paid including all delivery charges to destination(s) as indicated. The amount of the Goods and Services Tax/Harmonized Sales Tax is to be shown as a separate item.**

**Instructions: Les taxes municipales ne s'appliquent pas. Sauf indication contraire, les prix indiqués doivent comprendre les droits de douane canadiens, la TPS/TVH et la taxe d'accise. Les biens doivent être livrés « rendu droits acquittés », tous frais de livraison compris, à la ou aux destinations indiquées. Le montant de la taxe sur les produits et services/taxe de vente harmonisée doit être indiqué séparément.**

<b>Delivery required - Livraison exigée</b>	<b>Delivery offered - Livraison proposée</b>
September / septembre 2024	
<b>Vendor Name and Address - Raison sociale et adresse du fournisseur</b>	
<b>Name and title of person authorized to sign on behalf of vendor (type or print) - Nom et titre de la personne autorisée à signer au nom du fournisseur (caractère d'imprimerie)</b>	
<b>Name/Nom</b> _____	<b>Title/Titre</b>
_____	
<b>Signature</b>	<b>Date</b>

## **AMENDMENT 001**

The purpose of Amendment 001 is raised to:

1. Amend Annex A – STATEMENT OF WORK
2. Add ANNEX G – Radome Specifications

### **1. Amend ANNEX A – STATEMENT OF WORK**

#### **Delete:**

- 3.5 The contractor supplied radome must meet the requirements stated in the Product Line Radome Performance Specifications for the TPS-77 Radar System (Document No. 77A591034 – dated 16 Nov 2011).

#### **Insert:**

- 3.5 The contractor supplied radome must meet the requirements stated in Annex G Radome Specifications.

### **2. Add ANNEX G – Radome Specifications**

**ANNEX G**

**SPECIFICATION FOR STANDALONE TPS-77 RADOME**

**AT**

**42 RADAR SQUADRON  
CFB COLD LAKE, AB, CANADA**

## ACRONYMS AND ABBREVIATIONS

Amp	Ampere
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
AWG (awg)	American Wire Gauge
btu/hr	British thermal unit per hour
C	Celsius
cm	Centimeter
dB	Decibel
DND	Department of National Defense
F	Fahrenheit
FAA	Federal Aviation Administration
ft	Feet
gr/m <sup>3</sup>	Grams per meter cubed
hr.	Hour
Hz	Hertz
in	Inches
in/hr	Inches per hour
kg	Kilograms
kg/m <sup>2</sup>	Kilograms per square meter
km/hr	Kilometers per hour
kW	Kilowatts
lbs	Pounds
LMC	Lockheed Martin Corporation
m	Meter
m <sup>2</sup>	Square meter
Mhz	Megahertz
mm	Millimeter
mi	Miles
mph	Miles per hour
Mrad (mrad)	Milliradian
MSSR	Monopulse Secondary Surveillance Radar
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
PPA	Platform Pallet Assembly
psi	Pounds Per Square Inch
psf	Pounds per square foot
sq ft	Square foot
V	Volts
VAC	Volts Alternating Current
VTM	Verification Trace Matrix
W/	With
µm	Micrometer

## 1. Scope

This document establishes the performance and design requirements for a radome, including related ancillary equipment as applicable to enclose a TPS-77 surveillance radar system in both its stowed and deployed (operational) state.

## 2. Applicable Documents

The following documents form part of this specification. In the event of a conflict between these documents and this specification, the contents of this specification take precedence.

**Product Line Radome Performance Specification for the TPS-77 Radar System**  
(Document No. 77A591034) – Dated 16 November 2011 – Prepared by LOCKHEED  
MARTIN CORPORATION, MS2 Electronics Parkway, P.O. BOX 4840 Syracuse, NY  
13221-4840 USA

**Canadian Standards 621** Tables 13-3 13-4 and Figure 13-2 (Obstruction Lights)

**CFTO C-55-040-001/TS-002** RF Radiation Hazards;

**FAA L-810(L) AC150/5345-43** (Obstruction Lights)

**ICAO Annex 14 Vol 1** para 6-3 (Obstruction Lights)

## 3. Requirements

### 3.1 Purpose

The radome must provide a protective enclosure for the safe operation of the radar antenna as well as provide a protective environment for technicians to maintain the radar antenna system. It must be capable of providing the physical characteristics, electromagnetic performance, and withstand environmental conditions as specified within this document.

### 3.2 Radome Mechanical Interface

The radome is to be mechanically interfaced to a cement pad. The radome manufacturer must provide mounting specifications (base ring/mounting template)

### 3.3 Radome Electrical Interface

All radome electrical equipment will operate at 60Hz.

### 3.4 Characteristics

#### 3.4.1 Life Expectancy

The radome will be designed for a useful life of 15 years minimum and will be capable of being dismantled and re-erected. Lifetime means the period, during which the radome conserves its electromagnetic and mechanical characteristics, provided that recommended maintenance is carried out.

#### 3.4.2 Electromagnetic Performance

The radome will meet the electromagnetic requirements specified in the Table 1 for all probable combinations of the specified environmental conditions. The radome structure will not cause a change in the electrical performances of the radar system exceeding the requirements specified in this document. Resulting radiation characteristics will be maintained in all azimuths and over all useful vertical angles of the radar.

Table 1 - Electromagnetic Requirements

A. Nominal Attenuation for Primary and Secondary Radars = 1200 - 1400 MHz; SSR: 1030 - 1090 MHz)			
	Dry Weather	Rain Fall 20 mm/hr	Rain Fall 40 mm/hr
Total one-way transmission loss for primary radar caused by the radome	≤ 0.15 dB (except ≤0.25 dB max in the direction of the door)	≤ 1.0 dB	≤ 1.0 dB
Total one-way transmission loss for the secondary radar caused by the radome	≤ 0.2 dB	≤ 1.0 dB	≤ 1.0 dB Contractor
First sidelobe perturbation in all planes and all lobes; both in azimuth and in elevation - primary radar	≤ 1.0 dB	≤ 1.0 dB	≤ 1.0dB
First sidelobe perturbation in all planes and all lobes; both in azimuth and in elevation - secondary radar	≤ 1.5 dB	≤ 1.5 dB	≤ 1.5dB
VSWR Degradation	≤ 5%	≤ 5%	≤ 5%
Recovery time	NA	5 min	5 min
Cross polarization degradation (linear polarization) or polarization rotation		< 20 dB less than 5°	

### 3.4.3 Physical Characteristics

The radome will be constructed of a panel system capable of meeting all the requirements found within this document.

#### 3.4.3.1 Radome Size Parameters

The radome design will be sized to accommodate the radar system as described in the following paragraphs.

##### 3.4.3.1.1 Radar Size

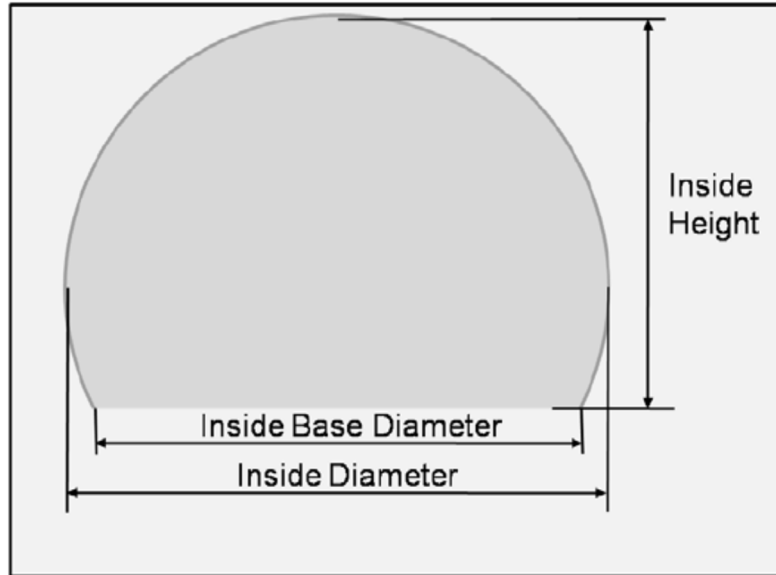
There are two primary radar physical states; deployed and stowed.

*Deployed:* The radar is determined to be in the deployed state when the array is fully erected from a Platform Pallet Assembly (PPA).

*Stowed:* The radar is determined to be in the stowed state when the array is laying flat on top of the Platform Pallet Assembly (PPA).

The following sub sections will describe the minimal size constraints placed on the radome due to the various radar configurations.

### 3.4.3.1.2 Key Radome Dimensions



*Figure 1 - Key Radome Dimensions*

### 3.4.3.1.3 Radar Ground Deployment

All measurements on the figures below are in **inches** and show the exact dimensions of the radar.

#### 3.4.3.1.3.1 Radome Inside Base Diameter Required

The following two Figures provide measurements of the radar when in stowed and deployed states. Figure 2 shows a top view of the radar when in the stowed state. Figure 3 shows a top view of the radar when in the deployed state.

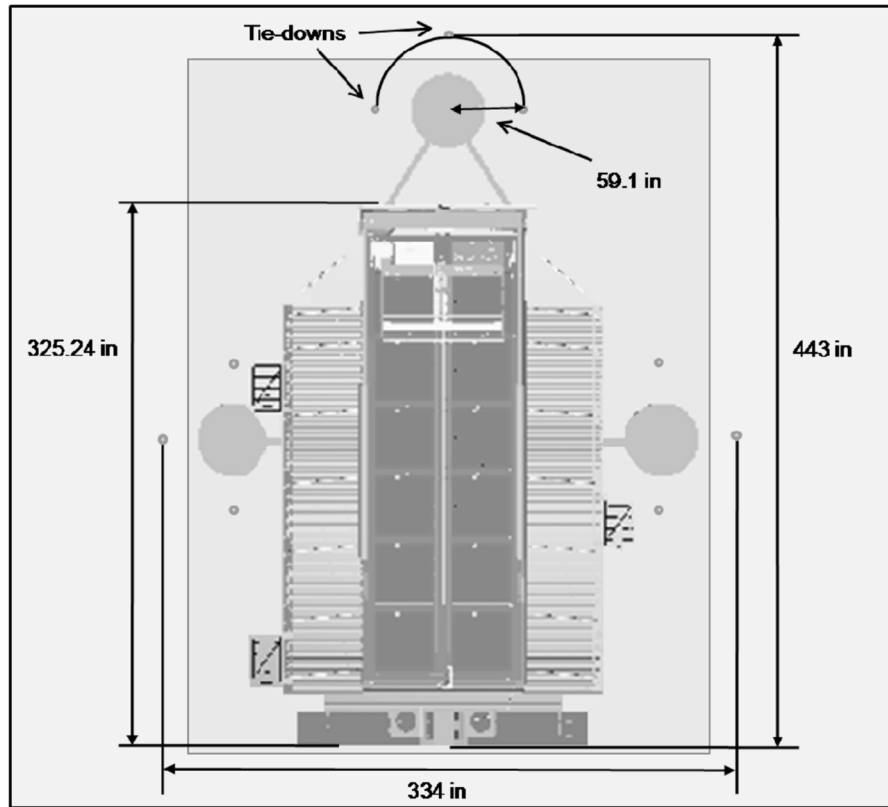


Figure 2 - Top View Stowed State

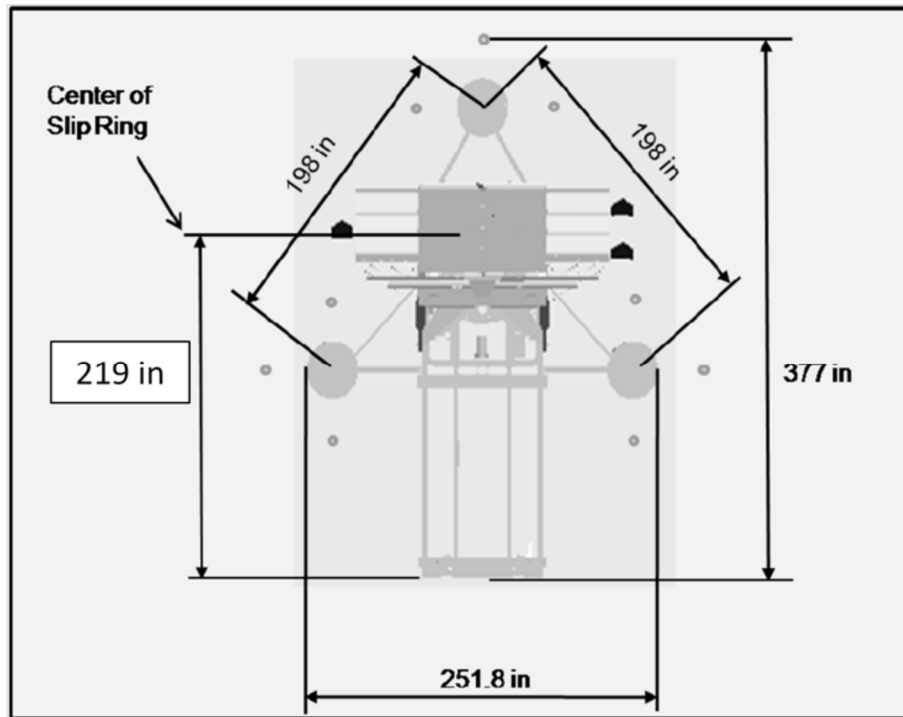


Figure 3 - Top View Deployed State



### 3.4.3.1.3.2 Radome Inside Diameter Required

The following two figures provide measurements of the radar when in stowed and deployed states. Figure 4 shows a side perspective of the radar in the stowed state. Figure 5 shows a side perspective of the radar in the deployed state.

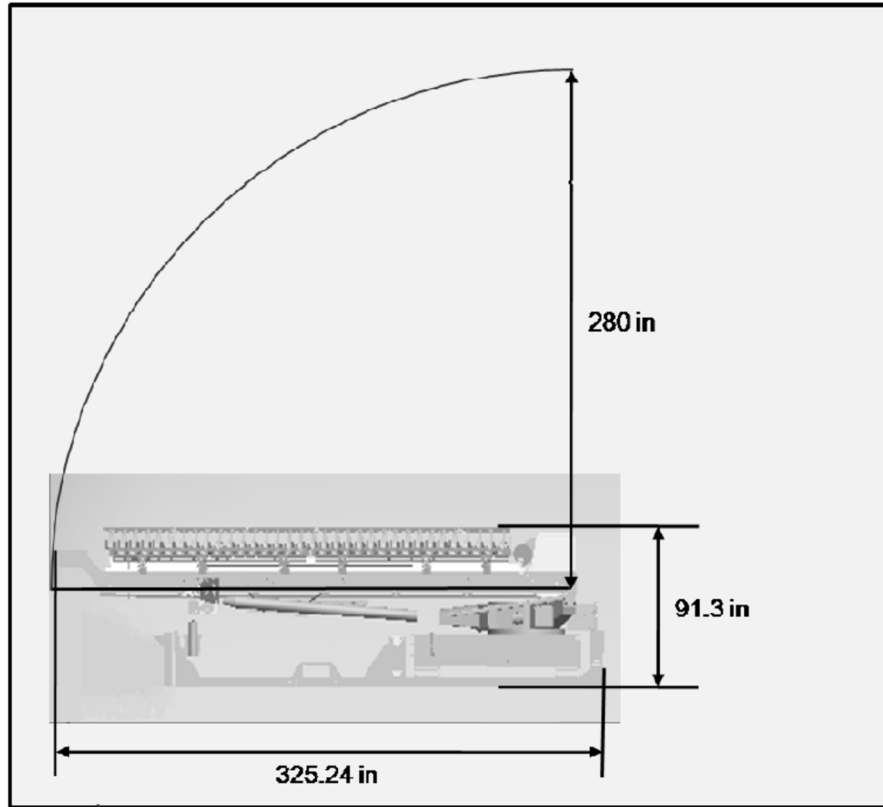


Figure 4 - Side View Radar in Stowed State

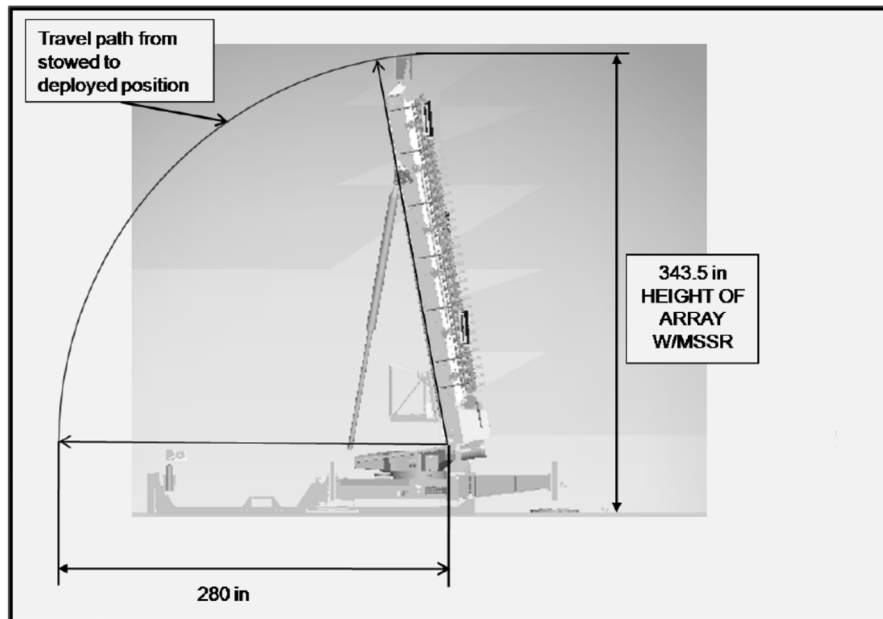


Figure 5 - Side View Radar in Deployed State

Note: The array will only travel from the deployed state to the stowed state along the curved line shown in Figure 5.

### 3.4.3.1.3.3 Radome Inside Height Required

The following figure provides the measurements of the radar when in stowed and deployed states. The maximum height of the radar when in the stowed state is shown in Figure 4 and only requires 91.3 inches. Figure 6 shows a front perspective of the radar in the deployed state.

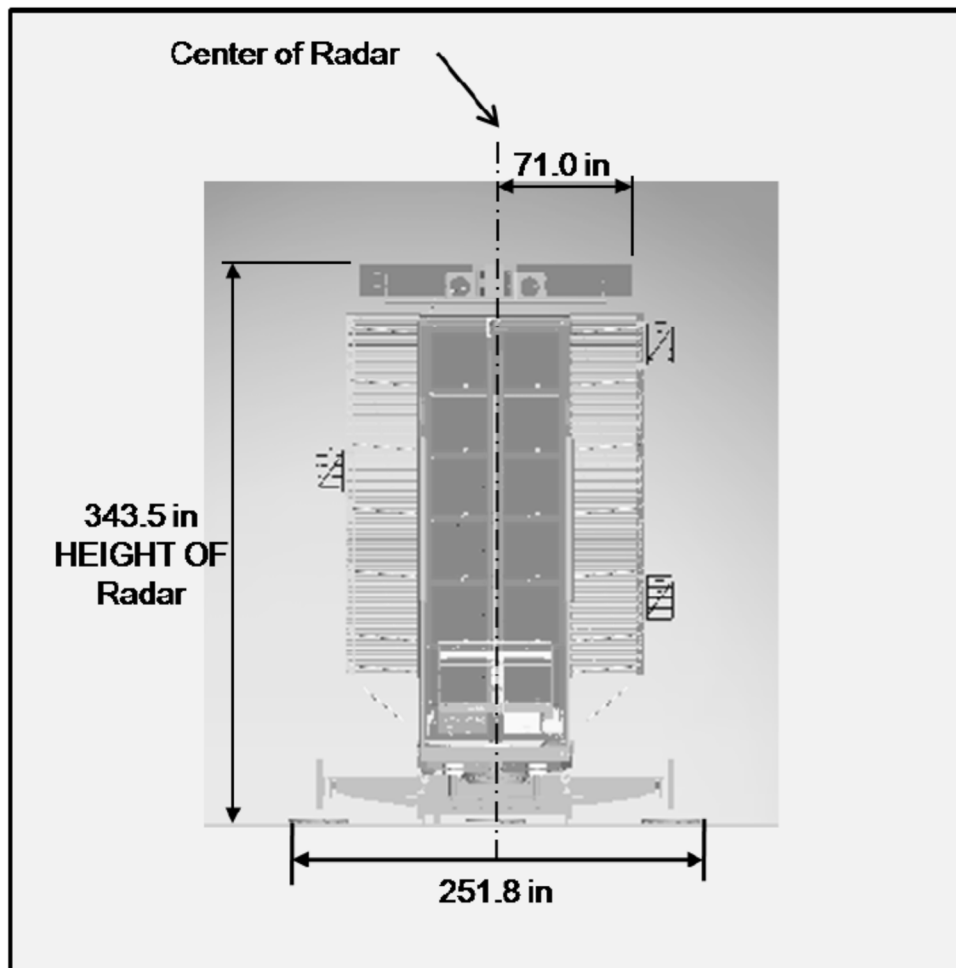


Figure 6 - Front View Radar in Deployed State

### 3.4.3.2 Mounting Base

The radome mounting base mechanical interface and design loads will be identified to DND to enable the design of the radome foundation structure. The radome and mounting base mechanical interface will be designed to survive all the environmental requirements as specified within this document. The Contractor will provide analysis and or test results if requested by the DND, to verify the structural adequacy of the radome mounting hardware, and radome-to-structure load data provided for the specified design environment.

#### 3.4.3.2.1 Mounting Base Template

An OEM mounting base template will be provided to enable installation of mounting hardware into the radome mounting interface on the facility structure.

#### 3.4.3.2.2 Framed Drive-In Door

The radome will be provided with a quantity two (2), minimum 10.0 ft (3.0 m) wide by 12.0 ft (3.7 m) high drive through door. The door and frame will not degrade the electrical performance of the radome as specified in Table 1. The door will be lockable and will open from within the radome only. The door will be capable of withstanding the environmental conditions specified herein. The door will be hinged and be capable of opening and closing without the use of

special tools or equipment. The doors shall be 180 degrees apart to facilitate drive-in – drive-out capability when moving the radar array.

#### **3.4.3.2.3 Drive-in Door Mounting Interface**

The drive-in door mounting interface shall be provided.

#### **3.4.3.2.4 Personnel Door**

On each interface between the radome and the drive-in door, there will be a personnel door. This door will be a standard size 36" wide door. This door will be lockable from the outside via a deadbolt type lock.

#### **3.4.3.3 Internal and External Surfaces**

The radome will be watertight, including minimal water, water condensate or moisture penetration or absorption into the radome wall or interior of the radome. The outside surface of the radome will be water repellent and will inhibit the formation of water film and discourage the adhesion of ice.

#### **3.4.3.4 Equipment Finishes**

##### **3.4.3.4.1 Colour**

The outside radome surface finish including all panels, doors, vents, hoods and hatches will be white, RAL 9010. Inside finish will be off-white of OEM's choice.

##### **3.4.3.4.2 Corrosion Protection**

All metallic surfaces and hardware will be corrosion resistant steel, aluminum, or corrosion protected (zinc coated or galvanized).

##### **3.4.3.5 Interchangeability**

All replaceable parts will incorporate provisions to allow complete assembly from inside the radome structure.

##### **3.4.3.6 Fire Retardation**

The entire radome assembly will be fire retardant in accordance with ASTM D635-88 (or equivalent).

##### **3.4.3.7 Radome Panels**

The radome design will incorporate provisions to allow complete assembly from inside the radome structure. The assembly and disassembly of the radome and the removal and replacement of individual panels will be accomplished using simple means (bolts, nuts, lock washers or lock nuts, etc.). Panel connection hardware will be stainless steel per MIL-DTL-14072 (or equivalent). Five percent additional panel connection hardware will be provided for spare parts. The radome will include post-erection caulking of the outside seams if necessary to assure complete weather tightness (i.e., rain and dust).

#### **3.4.4 Environmental Conditions**

The radome and ancillary equipment will be capable of withstanding any individual extreme or combination of the following extremes without any physical, mechanical, or electrical damage or any operational degradation below that specified in this document.

##### **3.4.4.1 Ambient Temperature**

-50 °C (-58 °F) to +70 °C (+158 °F)

#### **3.4.4.2 Relative Humidity**

Up to 100% including condensation and suspended droplets.

#### **3.4.4.3 Wind**

Wind speed of 150 km/hr (93mph) with gusting to 180 km/hr (112 mph), with up to 25 kg/m<sup>2</sup> (5.12 psf) of snow and ice.

Wind speed of 216 km/hr (134 mph) with gusting wind up to 250 km.hr (155 mph) at 0°C with no ice/snow load.

#### **3.4.4.4 Salt Atmosphere**

Salt atmosphere as encountered in coastal regions and during ocean transport and tested in accordance with MIL-STD-810 (or equivalent).

#### **3.4.4.5 Ozone**

The maximum concentration of ozone to be considered is 1part per million.

#### **3.4.4.6 Precipitation**

350 kg/m<sup>2</sup> (72 psf) of loading of any probable combination of ice, snow and/or other precipitation.

Hailstones of up to a diameter of 30 mm (1.2 inch).

Rain rates up to 100 mm per hour (4 in/hr) without damage.

#### **3.4.4.7 Sand and Dust**

Up to 1 gr/m<sup>3</sup>, 75 - 1000 µm.

#### **3.4.4.8 Solar Radiation**

High temperature and 3875 btu/hr -m<sup>2</sup> (360 btu/hr - sq ft) for four hours.

#### **3.4.4.9 Fungus**

In accordance with MIL-HDBK-454 requirement 4 (or equivalent).

#### **3.4.4.10 Fluids**

By brief contact with fluids common to radar operation and maintenance, especially Invarol.

#### **3.4.4.11 Shock and Vibration**

The radome will (1) be designed to withstand any shock or vibration it generates.

### **3.4.5 General Requirements**

Materials and parts supplied as part of the radome and ancillary equipment will meet MIL-HDBK-454 requirements (or equivalent DIM Standard). Equipment finishes will meet MIL-DTL-14072. Power and grounding will meet safety standards and installation guidelines provided in the national electric code NFPA 70. All the wiring and connections will be protected from sharp edges, rough surfaces, opening and closing of doors, tension and strain, and heat sources.

### **3.4.6 Identification and Marking**

Radome parts will be marked in accordance with MIL-STD-130. Packages/crates will be marked for shipment in accordance with transportability requirements given in the SOW. All radome

panels will include an identification label permanently embedded into the panel clearly visible after assembly to facilitate part identification.

### **3.5 Radome Equipment**

#### **3.5.1 Standard Equipment**

The radome will include the following standard equipment:

- a. Radome
- b. Zenith Exterior Access Equipment
- c. Snow Rope
- d. Single Air Terminal Lightning Protection System
- e. Aircraft Warning Light
- f. Installation Material

##### **3.5.1.1 Radome**

The radome will meet the mechanical and environmental requirements found within this document. Panels will be water repellent, chemically inert and will have the protective surface integrally bonded.

##### **3.5.1.2 Zenith Exterior Access Equipment**

###### **3.5.1.2.1 Zenith Hatch**

A zenith hatch to facilitate personnel access to the radome exterior will be incorporated near the vertical centerline of the radome. The access hatch will allow visual inspection of the radome surface area around the hatch and the replacement of aircraft warning light bulbs and globes.

###### **3.5.1.2.2 Ladder**

The radome zenith hatch will be accessed from inside the radome via a ladder provided by the Seller. Replacement of warning light bulbs and globes may be accomplished by maintenance personnel standing on the ladder.

###### **3.5.1.2.3 Exterior Access Provisions**

To facilitate more extensive inspection or repair of the entire outside surface of the radome by a maintenance person, exterior access provisions will be included as part of the standard radome. Radome exterior access provisions will include two sets of zenith anchors to facilitate deployment of a work-line and a life-line on either side of the zenith hatch/vent. The anchors and their panel support will be designed in accordance with OSHA/ANSI requirements.

###### **3.5.1.3 Snow Rope**

A snow rope will be provided attached to the radome zenith. The rope will extend from its anchor to the radome exterior deck surface and will be rated at a minimum 310-pound static load.

###### **3.5.1.4 Lightning Protection System**

An air terminal will be provided at the radome zenith to give a 120 degree cone of protection for the radome and designed in accordance with MIL-STD-464 "Electromagnetic Environmental Effects Requirements for Systems". The air terminal will be in electrical contact with its mounting plate located on the exterior radome surface. Three 2/0 awg or metric equivalent copper cables will be secured to the lightning rod mounting plate and will extend via standoffs to the radome base. These ground cables will be separated approximately 120 degrees in azimuth. An

additional 20 feet of cable for connection to a facility or structure ground will be included. All connections will be in accordance with MIL-STD-464 (or equivalent).

#### **3.5.1.5 Aircraft Warning Light**

Aircraft warning lights will be LED steady burning lights with infrared red lens. A two-lamp aircraft warning light, in accordance with FED AC 150/5345 "Approved Airport Equipment" obstruction lighting requirements, will be supplied and mounted at the radome zenith. The lamps will be wired in parallel for 220 V, 1 phase, 50 Hz power. Both lamps will illuminate simultaneously, thus providing the ability to replace both lamps when one fails. The lights will be automatically energized via a photocell mounted on the outside radome surface near the base. The warning light assembly will include mounting brackets, cable standoffs, photocell, connecting cable and a power circuit breaker box at the radome base. Light assembly must have a thermostatic heater. Light assembly and thermostatic heater must be powered by 95 to 220 VAC.

#### **3.5.1.6 Installation Material**

Corrosion protected hardware (zinc coated or galvanized), leveling washers and base panel sealant materials will be provided for mounting base panels to the Buyer supplied foundation base ring. The material quantities will include a five percent overage as installation spares.

#### **3.5.1.7 Radome Interior Light Kit**

An interior lighting kit will be provided to allow illumination of the radome interior with flood lamps. The light provided will be sufficient for individuals to service the Radome, machinery, and radar system. The kit will include ON/OFF circuit breaker switches mounted in a control panel and a 30-amp circuit for the light system.

#### **3.5.1.8 Utility Power**

One 15-amp power outlet circuit rated at 220 VAC + 10%, 1 phase, 60 Hz + 5% shall (1) be provided. The circuit power disconnect box shall (2) be located at the radome deck level near the base ring and be provided with a ground connection. A minimum of five 15-amp outlets shall (3) be installed around the radome base ring perimeter.