

## Hangar, Maintenance. FAC: 2111

CATCODE: 211111

OPR: AF/A4L

OCR: N/A

**1.1. Description.** Maintenance hangars provide space for aircraft maintenance, tool rooms, aircraft weighing and other maintenance and inspection activities.

**1.2. Requirements Determination.** Hangars support aircraft maintenance, repair, and inspection activities that are most efficiently done under complete cover. One maintenance space may be provided in a hangar sized for the largest aircraft assigned to the base. Separate studies are used to determine hangar requirements to accommodate C-5, E-3A, E-4, and KC-10 aircraft. See UFC 3-260-01 for additional information on aircraft maintenance areas, support areas, and orientation of facilities.

**1.3. Scope Determination.** Determine the square footage requirements for maintenance hangars by the method described below for computing covered maintenance spaces.

1.3.1. Calculate the number of authorized covered maintenance spaces by using the procedures in [Table 1.1](#) or [paragraph 1.3.6](#). (Computation for Special Missions), or both. Dock space described under Large Aircraft Maintenance Dock (CATCODE 211173), Medium Aircraft Maintenance Dock (CATCODE 211175), Small Aircraft Maintenance Dock (CATCODE 211177), and Fuel System Maintenance Dock (CATCODE 211179) may be used to meet the space requirements.

1.3.2. To determine the most efficient combination of facility use and aircraft positioning, use templates representing the aircraft (see CATCODE 113321 for aircraft dimensions) and floor plans of existing and proposed docks and hangars made to the same scale. Arrange the templates in various combinations to find the arrangement that most efficiently conserves space and permits maintenance operations. Do not overlook tail heights, the height and width of door openings, structural protuberances in facilities, and the turn radius of tow vehicles connected to aircraft.

1.3.3. One additional covered work space is authorized if the corrosion control workload exceeds the covered work space allocated under [Table 1.1](#) and/or for special missions. An excessive corrosion control workload occurs with some combinations of numbers and types of aircraft, environmental and climatic factors, and the availability of scheduled depot maintenance. Provide the additional space as a single aircraft space because of isolation requirements stipulated in TO 42A-1-1, *Safety, Fire Precaution, and Health Promotion Aspects of Painting, Doping, and Paint Removal*. Contact OPR for latest version of TO 42A-1-1.

1.3.4. To determine the interior dimensions of dock and hangar bays, use the dimensions of the largest aircraft that occupies the bay plus the minimum clearances shown in [Table 1.2](#). To compute the gross area of the hangar, multiply the interior dimensions by a factor of 1.15.

1.3.5. Provide space for Contractor Operated Maintenance Base Supply (COMBS). Determine space requirements by the existing contract. Locate the facility in close proximity to the flight line and ensure the facility contains areas for receiving, inspection, storing, parking material, issuing, support equipment maintenance, and office functions.

1.3.6. **Computation for Special Missions.** The formula in [Table 1.1](#) applies only to units with repetitive flying hour programs or relatively constant monthly operations in non-arctic conditions. To calculate the number of authorized covered spaces for Air Force Materiel Command (AFMC) and for installations in arctic climates, use the following formula:

$$S = H \times A / 176$$

Where:

S = Spaces authorized

H = Average number of hours in dock per aircraft, based on maintenance experience or development and test experience data for new aircraft

A = Average number of aircraft programmed for maintenance each month  
176 = Hours per month (22 x 8)

1.3.7. **Generic Hangar Facilities for AMC Tanker Aircraft.** For large Air Mobility Aircraft (e.g., C-17, KC-10, and like-size aircraft, excluding C-5), maintenance facilities should be designed to maximize current and future utility. Wherever feasible, design maintenance facilities for generic aircraft use. A generic aircraft facility is defined as being suitable for an aircraft with a C-17's wing span, a KC-10's length, and a KC-10's height. Contact AMC/A7 for additional guidance and approval source documentation.

1.3.7.1. Special purpose space may be authorized when justified.

**1.4. Dimensions.** See [Table 1.1](#) and [1.2](#) below.

**1.5. Design Considerations.**

1.5.1. Ensure siting of new hangars complies with UFC 3-260-01. See [paragraph 1.2.](#) through [1.3 of CG 21 General Criteria.](#)

1.5.2. Floors of maintenance hangars should allow aircraft loadings as specified in [Facility Class 2](#) of this Manual. Ensure door openings are wide and tall enough for aircraft to be pulled into and out of the facility.

1.5.3. Some aircraft utilize an Auxiliary Power Unit (APU) for engine start. Any area where the APU is operated should be checked to prevent damage to overhead infrastructure. If an APU is to be used inside of a facility, considerations should be made for ventilation of the exhaust gases.

1.5.4. Space may be required within the covered aircraft maintenance area for portable maintenance aid docking stations and/or maintenance support workstations and equipment. The amount of hardware at any particular covered aircraft maintenance area depends on the planned maintenance activities. For example, within the hangar, if one or two bays are used for completing scheduled aircraft inspections,

then appropriate communication is required for supporting the docking stations and/or workstations. This is determined during the site-specific facility planning.

1.5.5. **Security Requirement.** Secured space is needed for the storage of classified components temporarily removed from aircraft. Alarm classified secure areas in accordance with applicable local security directives.

1.5.6. See ETL 09-1, *Airfield Planning and Design Criteria for Unmanned Aircraft Systems* (UAS) for dimensions, geometry, and pavement design.

**Table 1.1. Requirements for Covered Aircraft/Helicopter Maintenance Space.**

| Factors <sup>1</sup> |        |          |        |        |        |        |        |
|----------------------|--------|----------|--------|--------|--------|--------|--------|
| System               | Factor | System   | Factor | System | Factor | System | Factor |
| B-1                  | 0.3    | C-21     | 0.25   | E-4    | 0.3    | T-43A  | 0.15   |
| B-52                 | 0.15   | C/KC-135 | 0.15   | F-5E/F | 0.25   | UH-1   | 0.25   |
| C-5                  | 0.16   | C-130    | 0.15   | F-15   | 0.25   | CH-3   | 0.25   |
| C-9                  | 0.18   | KC-10    | 0.25   | F-16   | 0.27   | HH-53  | 0.25   |
| C-12F                | 0.1    | E-3A     | 0.15   | F-22   | 0.33   | HH-60  | 0.25   |
| C-17                 | 0.2    | F-35     | 0.27   | T/A-37 | 0.25   | CV22   | 0.25   |

NOTES:  
 1. Not all Air Force weapons systems are shown above. For weapon systems not shown consult your MAJCOM/A4M.  
 2. Formula: Multiply the Number of Aircraft by the Factor for Type = Required Covered Spaces. See Figure 3.1 for an example.

**Figure 1.1. Example Calculations for Required Covered Spaces.**

| Example Authorized Aircraft | Number x Factor | Required Covered Spaces |
|-----------------------------|-----------------|-------------------------|
| B-52                        | 16 x .15 = 2.4  | 2 large                 |
| KC-135                      | 10 x .15 = 1.5  | 2 medium                |
| F-16                        | 6 x .27 = 1.62  | 2 small                 |

NOTES:  
 For guidance on the number of spaces to be provided in hangars and fuel systems maintenance docks, see criteria under CATCODE 211111 and 211179, respectively. Maintenance spaces are otherwise provided in docks shown in CATCODE 211173, 211175, and 211177.

**Table 1.2. Aircraft Separation Dimensions Inside Hangars.**

| Minimum Clearances from Hangar Elements <sup>1,2</sup> |      |    |       |    |              |    |
|--|------|----|-------|----|--------------|----|
| Aircraft Element                                       | Door |    | Walls |    | Roof Framing |    |
|  | m    | ft | m     | ft | m            | ft |
| Wing Tip - under 30.5 m (100 ft) span                  | 3    | 10 | 3     | 10 | -            | -  |
| Fuselage - under 30.5 m (100 ft) span                  | 3    | 10 | 3     | 10 | 3            | 10 |
| Wing Tip - over 30.5 m (100 ft) span                   | 3    | 10 | 4.6   | 15 | -            | -  |
| Fuselage - over 30.5 m (100 ft) span                   | 3    | 10 | 4.6   | 15 | 3            | 10 |

|                        |     |    |   |    |   |    |
|------------------------|-----|----|---|----|---|----|
| Tail - Vertical        | 2.1 | 7  | - | -  | 3 | 10 |
| Tail - Horizontal      | 3   | 10 | 3 | 10 | 3 | 10 |
| Helicopter Rotor Blade | 3   | 10 | 3 | 10 | 3 | 10 |

**NOTES:**

1. Clearances between aircraft components should be at least 3 m (10 ft) where two or more aircraft are housed. Evaluate existing hangars for the above clearances and waivers requested in accordance with UFC 3-260-01, Attachment 2 (Waiver Processing Procedures), for facilities that do not provide the minimum clearances. The above clearances are also applicable to alert and hardened aircraft.

2. For KC-10 general purpose maintenance hangars, provide 10 m (32 ft) of clearance from the tail of the KC-10 aircraft to the hangar door. The engine maintenance stand for the number two engine extends aft 5 m (17 ft) beyond the tail of the KC-10 aircraft.