



CHECKLIST: PHYSICAL ACCESS				
CRITERIA	YES	NO	N/A	COMMENTS
1. Are accesses designed so that the removal of any replaceable unit requires opening of only one access, unless the accesses are of the latched or hinged door type?				
2. Are items that require visual inspection (e.g., hydraulic reservoirs, gauges) located so they can be observed without the removal of panels or other components?				
3. Are access covers that are not completely removable self-supporting in the open position?				
4. Do access covers that serve as stress-bearing structural members use large screws rather than small ones?				
5. Is the hinge on hinged access doors placed on the bottom or a prop should be provided so that the door will stay open without being held if unfastened?				
6. Is the manner in which a cover is opened obvious from its structure or labeled with appropriate instructions?				
7. Is a conspicuous label used to show how the pins on the tube or plug will line up with the holes in the socket when a tube or plug has to be put through a small hole?				
8. Is an access labeled with a number, letter, or other symbol that identifies it in the maintenance instructions?				
9. Are labels to indicate items that can be reached through an access and the service equipment, if any, to be used there?				
10. Is equipment left exposed (without coverings or housings) for maintenance whenever permitted by structural, environmental, operational, and safety conditions?				
11. Is the size of accesses determined by what the maintenance technician will have to do and should depend on factors such as (1) Size and shape of the part, component, or assembly to which access is desired; (2) Whether or not the object must be removed and replaced through the openings; (3) Movements of the human body member or members required once access is gained (turning, pulling, pushing, etc.); (4) The size of the body member or members required to enter through the access?				
12. Are the edges of accesses that might injure the technician's hands or arms protected with internal fillers or other protection?				
13. Do the handles have rounded comers and edges to minimize the possibility of injuries and equipment damage, access covers, cases?				
14. Are accesses that read to equipment with high voltages equipped with safety interlocks so that electrical circuits will be opened when the access cover is removed? If the technician must work on the equipment with the power on, is a "cheater" switch that automatically resets to its safety-protection position when the access cover is replaced provided?				
15. Are conspicuous warning labels provided on all accesses leading to high voltages, rotating machinery, or other hazards?				
16. Are positive indications designed to show that access covers are unsecured, even when they are in place?				
17. Are screwdriver guides provided to adjustment points which must be operated near high voltages?				



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18. Is visual access provided to the technician for all maintenance operations which require visual control, especially where hazards are present within the access?				
19. Are the following should be provided at the workplace whenever practical to assist the technician in performing the required maintenance: (a) Auxiliary hooks, holders, lights, outlets, etc; (b) Auxiliary stands/shelves built into equipment to support test equipment, removable units, or items to be repaired; (c) Lattice work, low cabinets, mirrors, open, etc. as necessary to allow observation related displays, moving parts, fasteners, test points, etc; and (d) communication aids?				
20. Does the workspace allow the technician to change posture if the maintenance task being performed requires prolonged kneeling, crawling, or crouching?				
21. Are non-skid treads, expanded metal flooring, or abrasive coatings provided on all surfaces which may be used for walking, climbing, or footholds?				
22. Whenever possible, does workspace design allow routine, frequent, and/or short-term maintenance to be performed from a standing position?				
23. Are displays, markings, etc. which must be read from the standing position within the following distances from the floor (a) Maximum limits: 40-70" for all visual lays on panels; and (b) Optimum limits: 40-55" for critical or high force controls?				
24. Are controls, test points, fasteners, etc, which require manipulation from a standing position within the following distances from the floor (a) Maximum limits: 30-70" for all controls; and (b) Optimum limits: 40-55" for critical or high force controls or fasteners?				
25. Is the work area length for standing work limited by time to move between points and/or requirements for reaching or visual contact between points? For work performed at a given position, distances from the center line should be: (1) 22.5" for all related work points. (2) 17.0" for critical manipulation points. (3) 11.5" for critical visual work points?				
26. Whenever personnel are required to perform in the sitting position for more than one hour at a time or more than 20% of the time, are chairs provided? Stools or benches will suffice for other sitting operations.				
27. Are maintenance workshops located and integrated into the overall facility layout in a manner that minimizes the time required for maintenance personnel to go back and forth between the shops and work areas within the facility?				
28. In multiunit facilities, where units contain different major systems, are separate maintenance organizations and workshops available for each unit?				
29. Does the facility offer convenient spaces and support facilities for temporary or permanent outside contractor personnel?				
30. Are lockers or cabinets available for personal storage so that workbenches and seats stay free of clutter?				



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31. Are entry and exit routes through the maintenance workshops maintained free of impediments to the passage of personnel, carts, vehicles, and moving and lifting devices?				
32. Are workshop areas not used as major thoroughfares for all facility personnel?				
33. Are maintenance activities that generate heat, smoke, sparks, or noxious odors conducted in separated, screened-in, and well-ventilated areas?				
34. Are appropriate cranes, monorails, forklifts, carts, and other movement aids available within the workshop to allow for moving of heavy equipment and hardware?				
35. Is the tool room integrated within the maintenance shop area or be in proximity to the shop area?				
36. Is the warehouse located close to the maintenance workshop?				
37. Are maintenance workshops properly shielded from plant noise?)				
38. Are workshops designed to be free of drafts that may cause discomfort or affect the availability of maintenance technicians to maintain close tolerances in operating plant machinery?				
39. Is the thermal/humidity environment within the workshop maintained at a comfortable level year round?				
40. Are separate "hot shops" available in normally contaminated areas to prevent the necessity for working on contaminated hardware in normally "clean" shops? Expedients such as tents, portable walls, plastic, fabric, or wood barriers may be used.				
41. Do workbench surfaces for standing positions conform to the following dimensions: (1) Height: 36-40" above the floor (2) Width: 30" maximum (3) Length: As required?				
42. Do workbenches offer illumination aids; space and supports for accommodating procedures, prints, and manuals; access to power sources; magnifiers as required; and built-in test equipment as needed?				
43. Are "hot" shops fully enclosed or glove boxes provided to avoid spreading contaminated particles that may result when maintenance machines are used to repair contaminated components?				
44. Are work surfaces for supporting job instruction manuals, worksheets, etc., 36" above the floor?				
45. For tasks requiring force, are the work surfaces 36" above the floor?				
46. Are tasks requiring precision done on surfaces 40" above the floor?				
47. Are the following factors considered when determining workbench height and design: (1) Characteristics of the equipment that will be placed on the surface. (2) How technicians will perform tasks. (3) Lifting problems (size or weight) for equipment to be placed on surface. (4) Uniqueness of tasks to be completed?				
48. For sitting/standing work stations, are adjustable seats to accommodate technicians of various heights and body dimensions provided?				
49. Are organized storage facilities available for seasonally used items such as fans and heaters?				



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50. Is adequate storage provided for materials and spares used on a recurrent basis that are not kept in a warehouse?				
51. Is special storage provided for tools and special equipment used during overhauls or outages?				
52. Is special storage provided for contaminated equipment that is used during outages?				
53. Are items stored in special locations controlled and inventoried?				
54. Are seasonally or infrequently used items stored so as not to interfere with normal entrance and exit pathways, vehicular traffic paths, and emergency escape routes?				
55. Are instrument and control facilities located near the control room?				
56. Do maintenance technicians have easy access to a well-organized and controlled technical library which includes procedures, vendors' manuals, plant schematics, etc?				
57. Are Health Physics facilities located as conveniently as possible for maintenance technicians so delays in making transitions from "clean" to "hot" areas and vice versa can be avoided?				
58. Are ramps, elevators, or equivalent means provided when equipment must be hand carried? Ladders should not be selected in such cases, since both hands should be free to grasp the ladder. Stairs and steps should not be used where hand-carrying bulky loads or loads in excess of 13 kg (29 lbs) is required.				
59. Are stairs, stair-ladders, fixed ladders, and ramps equipped with a handrail on each side? Where one or both sides are open, appropriate intermediate guardrails should be provided to prevent personnel injury. Non-fixed vehicular-boarding ladders are neither stair ladders nor fixed ladders and are exempt from this requirement. Ladders should not be selected in such cases, since both hands should be free to grasp the ladder. Stairs and steps should not be used where hand-carrying bulky loads or loads in excess of 13 kg (29 lbs) is required.				
60. Do stair ladder dimensions conform with the recommended values and within the specified minimum and maximum? The tread rise should be open at the rear. Landings should be provided every tenth or twelfth tread. The surface of treads on exterior stair ladders should be constructed of open grating material or should be treated with non skid material conforming with specification MIL-W-5044 applied in accordance with specification MIL-W-5050. Stair ladders should be of metal construction. Handrails should have nonslip surfaces.				
61. Do fixed ladder dimensions conform with the recommended values and within the specified minimum and maximum limits? Fixed ladders which are used to provide access to multiple levels should be offset at each successive level. Guardrails should be provided around the opening at the top of each fixed ladder. All fixed ladders more than 6 m (20 ft) high should be equipped with, or include provision for, a safety device to provide positive protection from falls.				
62. Where special environmental conditions require cleating of pedestrian ramps, are the cleats spaced 360 mm (14 in) apart and extend from handrail to handrail at right angles to the line of traffic?				



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63. When a ramp is required for both pedestrian and vehicle traffic, is the vehicle bearing surface located in the center of the ramp, with the pedestrian surface next to the handrails (a vehicle ramp with an adjacent pedestrian stairway is preferred for this situation)?				
64. Are the surfaces of exterior personnel platforms and work areas constructed of open metal grating? Exterior personnel platforms, for which utilization of open grating is impractical, and interior walkways should be treated with nonskid material conforming to specification MIL-W-5044, applied in accordance with specification ML-W-5050. All open sides of personnel platforms should be equipped with guardrails (with intermediate rails), with a top rail height not less than 1.070 m (42 inches) and a toeboard or guard screen height not less than 75 mm (3 inches). Hand holds should be furnished where needed. The distance between the platform edge and the centerline of the railing should not exceed 65 mm (2.5 inches).				
65. Are clearance dimensions (e.g., for passageways and accesses) which must accommodate or allow passage of the body or parts of the body, based upon the 95th percentile values for applicable body dimensions?				
66. Are limiting dimensions (reaching distance, control movement, displays, test points, handrails, etc.) which restrict or are limited by extensions of the body based upon the 5th percentile values for applicable body dimensions?				
67. Are seats, restraint systems, safety harnesses, belts, controls or any equipment that must be adjusted for the comfort or performance of the individual user adjustable over the range of the 5th to 95th percentile values for the applicable body member(s)?				
68. Are clothing and personal equipment (including protective or specialized equipment worn or carried by the individual) designed and sized to accommodate at least the 5th through the 95th percentile values of body dimensions? Pertinent dimensions of essential or critical equipment (e.g., aviators' helmets) should be based on the 1st and 99th percentile values. Where two or more dimensions are used simultaneously as design parameters, appropriate multivariate data and techniques should be utilized.				
69. Do all cabinet, consoles, and work surfaces that require an operator to stand or sit close to their front surfaces contain a kick space at the base at least 100 mm deep and 100 mm high to allow for protective or specialized apparel?				
70. Are handles on cabinets and consoles recessed whenever practicable, to eliminate projections on the surface? If handles cannot be recessed, they should be designed such that they should neither injure personnel nor entangle clothing or equipment.				
71. Is free floor space of at least 1220 in (4 feet) provided in front of each console?				
72. Is clearance from the front of the rack to the nearest facing surface or obstacle not less than 1.070 in (42 inches)?				



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73. Is the minimum lateral workspace for racks having drawers or removable equipment designed as follows (measured from the drawers or equipment in the extended position): (a) for racks having drawers or removable items weighing less than 20 kg (44 pounds): 460 mm (18inches) on one side and 100 mm (4inches) on the other, (b) for racks having drawers or removable items weighing less than 20 kg (44 pounds): 460 mm (18 inches) on each side. The minimum space between rows of cabinets should be 200 mm (8inches) greater than the depth of the deepest drawer or cabinet?				
74. Is adequate and suitable space provided on consoles or immediate work space for the storage of manuals, worksheets, and other materials that area required for use by the operational or maintenance personnel?				
75. Are work surfaces that support documents such as job instruction manuals or worksheets 915 ± 15 mm (36 ± 0.6 inches) above the floor?				
76. Are visual displays mounted on vertical panels and used in normal equipment operation placed between 1.040 m (41 inches) and 1.780 m (70 inches) above the standing surface?				
77. Are displays requiring precise and frequent reading placed between 1.270 m (50 inches) and 1.550 m (65 inches) above the standing surface?				
78. Are all controls mounted on a vertical surface and used in normal equipment operation located between 860 mm and 1.780 m (34 and 70 inches) above the standing surface?				
79. Are controls requiring precise or frequent operation and emergency controls should be mounted between 860 m-m and 1.350 m (34 and 53 inches) above the standing surface and no farther than 530 mm (21 inches) laterally from the centerline?				
80. Desk tops and writing tables should be 740 to 790 mm (29 to 31 inches) above the floor, unless otherwise specified?				
81. Where a writing surface is required on equipment consoles, is it at least 400 mm (16 inches) deep and 610 mm (24 inches) wide, when consistent with operator reach requirements?				
82. Is work seating provided as an adequate supporting framework for the body relative to the activities that must be carried out? Chairs to be used with sit down consoles should be designed to be operationally compatible with the console configuration.				
83. Are provisions made for vertical seat adjustments from 380 to 535 mm (15 to 21 inches) in increments of no more than 25 mm (1 inch) each?				
84. Is a supporting backrest that reclines between 1745 and 2005 mrad (100 and 115 degrees) provided. The backrest should engage the lumbar and thoracic regions of the back, and should support the torso in such a position that the operator's eyes can be brought to the "Eye Line" with no more than 75 mm (3 inches) of forward body movement.				
85. Are both the backrest and seat cushioned with at least 25 mm (1 inch) of compressible material and provided with a smooth surface?				



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86. Are armrests provided? Armrests that are integral with operators' chairs should be at least 50 mm (2 inches) wide and 200 mm (8 inches) long. Modified or retractable armrests should be provided when necessary to maintain compatibility with an associated console and should be adjustable from 190 to 280 mm (7.5 to 11 inches) above the compressed sitting surface.				
87. Is the knee and foot room that equals or exceeds the following minimum dimensions provided beneath work surfaces: (a) Height: 640 mm (25 inches). If a fixed footrest or a foot-operated control is provided, this dimension should be increased accordingly. (b) Width: 510 mm (20 inches) (c). Depth: 460 mm (18 inches)				
88. Are visual displays mounted on vertical panels and used in normal equipment operation placed in an area between 150 and 1170 mm (6 and 46 inches) above the sitting surface?				
89. Are indicators that must be read precisely and frequently placed in an area between 360 and 890 mm (14 and 35 inches) above the sitting surface, and no further than 530 mm (21 inches) laterally from the centerline?				
90. For "sit" consoles requiring horizontal vision over the top, are critical visual warning displays mounted at least 22.5 inches above the sitting surface?				
91. Are all controls mounted on a vertical surface and used in normal equipment operation located between 200 and 860 mm (8 and 34 inches) above the sitting surface?				
92. Are controls requiring precise or frequent operation mounted between 200 and 740 mm (8 and 23 inches) above the sitting surface?				
93. Is the total required left-to-right viewing angle less than 190 degrees? This angle should be reduced whenever possible through appropriate control-display layout.				
94. Where direct forward vision over the top of the console is not required by a seated operator, and when lateral space is limited, is the panel divided into three vertical/stacked segments whose surfaces should be perpendicular to the operator's line of sight with little or no head movement?				
95. Is the center of the central segment located 800 mm (31.5 inches) above the seat reference point? The height of this segment should not exceed 530 mm (21 inches).				
96. Are the following provided where appropriate: (a). Maximum load signs, located where they can be easily seen. (b). Guards, to prevent accidental operation of the lift. (c). Limit stops, to prevent injury to personnel and damage to equipment, (d). An automatic failsafe brake or other self-locking device in case of lift mechanism failure. (e). Provision for manually lowering the platform or elevator when feasible. (f). Surface construction or treatment of open platforms?				
97. Are sliding doors installed as the only personnel exit from a compartment? When a sliding door is used, a separate hinged door in the sliding door should be provided for personnel use. Fixed equipment should be at least 75 mm (3 inches) from the swept area of hinged doors.				



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98. Are wall hatches flush with the floor where structural considerations win permit this arrangement? Hatches should open with a single motion of the hand or foot.				
99. When a handle is used for unlocking a hatch, does the unlocking force required exceed 90 N (20 pounds)? Hatches placed in the overhead position should require no more than 220 N (50 b) force for opening and closing and should be operable by a suitably equipped and clothed user with 5th percentile arm and hand strength. The force of gravity should be used, where possible, for ease of opening.				
100. Do hatches accommodate suitably equipped and clothed user personnel in terms of limiting dimensions for location and operability, and clearance dimensions for size and passage factors? Where personnel must carry equipment through the hatch, allowance should be made for clearance of suitably clothed 95th percentile hands and/or arms, as applicable.				
101. Are boundaries of contaminated "hot" areas clearly marked and labeled?				