Technical Bulletin 00/06

Fixed access ladder systems

The contents of this Bulletin are Mandatory. This Bulletin gives guidance on the provision of fixed access ladders and platforms as may be required for masts, towers, hangar roofs and other high places. Compliance with this Bulletin is necessary to meet MOD’s Statutory Duties.

MANDATORY

SUBJECT CONTACT POINT:

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DEFENCE ESTATES
MINISTRY OF DEFENCE

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Fixed access ladder systems

INTRODUCTION

1. The contents of this Technical Bulletin (TB) are mandatory. No work involving expenditure on any Ministry of Defence (MOD) account is to be entered into without authority from the Property Manager (PROM) or the appropriate MOD officer for that location or facility.

2. Compliance with this TB is required to meet MOD’s Statutory Duties under the Health and Safety at Work etc Act 1974 and in particular the Workplace (Health, Safety and Welfare) Regulations 1992 and the Construction (Health, Safety and Welfare) Regulations 1996.

3. This TB is to be brought to the attention of all Top Level Budget Holders, Project Sponsors, Defence Estates Advisors and Property Managers with responsibility for MOD projects and Property Management Works Services.

4. For MOD Establishments occupied by the United States Visiting Forces (USVF), the responsibilities of Property Manager, Establishment Works Consultant, Works Services Manager are jointly held by the USVF and DE(USF). At base level this joint managed organisation is to take appropriate action to implement the contents of this TB. Where this TB contains procedures which differ significantly from USVF practice, a DE(USF) Code of Practice section is to be issued.

5. This TB sets out the criteria to be used for the selection of fixed accessways comprising vertical ladders and platforms as may be used on masts, towers, hangar roofs, and other high places and the minimum standards to be adopted for their design.

REQUIREMENT

6. So far as is reasonably practicable, all new works (and on an opportunity basis all existing works), shall eliminate the need for personnel to climb and work at height. Where it is deemed necessary to resort to fixed vertical ladders and platforms, their installation and use shall be discussed with, and agreed by, the PROM or his nominated representative.

7. Permanent vertical ladders shall be selected from one of three approved MOD ladder types dependent upon the frequency of their use, the location and the competencies of the personnel who will access them. The relative merits and uses of the three ladder types are summarised in Table 1 with further technical details being given under Background. The Subject Contact Point may be consulted for further assistance with the selection of the appropriate ladder type and sample specifications.
8. The design of an accessway, incorporating ladders, platforms and the supporting structure is to be adequate for the intended use and is to suit the proposed installation location. The components of the system are to comply with the dimensional and loading requirements as set out in this TB.

9. Where it has been decided to provide a climbable mast or tower, where practicable, an accessway shall be provided for the full height, reaching to the top of the structure.

BACKGROUND

10. The provision of access to high places requires careful consideration. The objective is to achieve a safe means of access and egress and a safe place of work. In order to achieve this, the sophistication of the access arrangements shall be balanced with the climbing competency and experience of the worker who needs the access. The nomogram below illustrates this principle.

11. Three different types of ladder and three different types of platform are available. By careful selection of the ladder and platform combination a protected accessway can be designed to suit the competency of the climbers who will be required to access them. Details of the three ladder types and platforms are given in Table 2 and sketches are provided at Figures 1, 2 and 3. Care must be taken to ensure that within

<table>
<thead>
<tr>
<th>LADDER TYPE</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Cost</td>
<td>high</td>
<td>medium</td>
<td>low</td>
</tr>
<tr>
<td>Maintenance Costs</td>
<td>low</td>
<td>medium</td>
<td>high</td>
</tr>
<tr>
<td>Control of access required</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>User skill required</td>
<td>low general worker</td>
<td>average screened worker</td>
<td>high competent climber</td>
</tr>
<tr>
<td>Primary use</td>
<td>industrial use</td>
<td>roof access and water towers</td>
<td>masts and towers</td>
</tr>
</tbody>
</table>

*Table 1: The relative merits and primary use of the three ladder types.*
an accessway the permanent protection is maintained in the transition between
ladder and platform and the final place of safety.

12. **Ladder Type 3.** Ladder Type 3 offers the maximum protection to the climber of all the
proposed ladder types and is suitable for use by the general worker. Permanent
protection is provided to the climber at all times by fixed hoops, side mesh or other
equivalent systems of containment. The Type 3 ladder should either lead direct to a
working platform or some other safe working place.

13. **Ladder Type 2.** Ladder Type 2 offers similar levels of permanent protection to that of
the Type 3 ladder, but allows longer lengths of ladders between platforms and
overall climbs. Therefore, it should only be used by authorised climbers who have
been cleared as competent for this type of access.

14. **Ladder Type 1.** Ladder Type 1 shall be considered as the basic specification for
ladders on masts and towers. It provides an economical ladder suitable for access
by authorised climbers who have received training to permit them to operate safely
at height. All new climbable masts and towers and, on an opportunity basis, all
existing mast and towers shall be provided with at least a Type 1 ladder to the top of
the structure. For structures of a sufficient face width an independent ladder is
recommended and, where possible, the ladder should be mounted on the inside of
the structure. For smaller structures it is permissible to utilise the bracing pattern as
part of the ladder to form a modified face bracing.

15. A Ladder Type 1 provides assistance to the climber, but no permanent handrails,
hoops or other forms of passive protection. Protection to the climber shall be
provided by a rigid rail fall arrest system to BS EN 363: 1993 (Ref A) to the centre of
the climbing facility. The fall arrest rail is to be positioned for ease of operation in
conjunction with the front chest “D” ring attachment as found on the Britannia
Super and similar full body harnesses. Two types of systems have been approved
for use:

a) Arresta-rail by Unistrut Safety Systems, and
b) Railok by Barrow Hepburn Sala Ltd.

Fall arrest systems shall be installed and maintained strictly in accordance with the
manufacturers recommendations.

16. Other types of fall arrest system may technically be suitable, but they are not
supported by MOD climbing courses or maintenance units. Therefore alternative
systems shall not be installed without the specific approval of the appropriate
PROM who should seek guidance from the Subject Contact Point before permitting
such an installation.

17. The supply and maintenance of the permanently installed part of a fall arrest system,
Ladder Type 1 only, is the responsibility of the Project Sponsor or PROM as
appropriate. The fall arrest traveller and associated full body harness used in
conjunction with the fall arrest track shall be issued and maintained as Personnel
Protective Equipment (PPE) to appropriately competent personnel and shall remain
the responsibility of the unit or organisation undertaking the climb.

18. **Platforms.** Three basic types of platforms are proposed:

a) Working platform
b) Access platform
c) Rest platform.

19. The use of the three terms working, access and rest are for descriptive purposes
only and whilst they may be indicative of the primary way in which the individual
platform will be used, the actual use of any platform may vary on a task by task
basis. Their use should not be confused with the definitions used in various Statutory Regulations.

20. **Working platforms.** A solid floor platform with full handrails offering maximum protection and sense of security to the user and a high level of containment to equipment thereby reducing the risk of dropping objects on to persons below. Working platforms shall be specified for all Type 3 ladders and only used with Type 2 and 1 ladders where there is a clear requirement for a frequent and involved maintenance task.

21. Owing to their solid floors, working platforms restrict light, making detailed inspection of their supporting members difficult. In certain circumstances, they can also become slippery in wet conditions and their use is not generally recommended for use on masts and towers.

22. Working platforms shall be sized to meet the actual requirement, but be of a minimum plan size 2000 x 1000mm. They shall be fitted with solid floors, 150mm toe-board, a top handrail between 1100 to 1200mm above floor level and a mid-rail. The solid floor is to incorporate a profiled or suitable non-slip surface. Working platforms shall incorporate a hinged trapdoor or gate to provide an enclosed safe working environment.

23. **Access platforms.** Access platforms are similar in layout to working platforms, but they have open grille floors and a lower kicker. Access platforms may be used for access and for working from, but they offer less containment to falling objects and offer the inexperienced climber a lower sense of security. Access platforms shall not be used in conjunction with a Type 3 ladder. They are the preferred platform for the majority of masts and towers.

24. Access platforms shall be sized to meet the actual requirement, but be of a minimum plan size of 750 x 750mm. They shall be fitted with an open grille floor, 100mm toe-board, a top handrail between 1100 to 1200mm above floor level and a mid-rail. Access platforms shall incorporate either a hinged trap door or gate system to provide an area in which climbing personnel may safely detach from any fall arrest system (Ladder Type 1 only).

25. **Rest platforms.** Rest platforms are provided as a place of rest and refuge for the climber. For this purpose it is recommended that platforms be fitted at a maximum interval of 15m. Where fitted, working and access platforms may be used in lieu of rest platforms.

26. Rest platforms are provided as a convenient means of supporting the full area of both of a climber’s feet. The platforms shall be located so that the climber may stand at rest whilst still attached to the rigid rail fall arrest system and no form of hand railing or other passive protection is required. As a guide, the platform may comprise open grille flooring of minimum plan size 500 x 300mm. No handrails, toe-boards or kickers are required. On smaller structures it may be adequate to provide the platform in the form of two separate “footholds” suitably positioned for ease of use. Rest platforms should not be used in conjunction with Ladders Type 2 or Type 3.

27. **Ladder and platform combinations.** The weakest link in the accessway will determine the required competency of the climbers and climbing team. There are four main features to be considered: the type of ladder, the type of platform, the maximum spacing of the platforms and the total height of climb. Guidance to the influence of these four characteristics is given in Table 2.
28. For example, the Ladder Type 3 is only suitable for the general worker if it is used with working platforms installed at a maximum spacing of 3m to a total climb height of 12m. However, a mast or tower where access will be limited to competent climbers may utilise any of the ladder types and platform combinations, although for practical reasons it will generally be preferable to limit the selection to a Ladder Type 1 with access or rest platforms.

29. Platforms should be provided for two main reasons: the first to suit the competency of the climber and the second to facilitate the operation of the structure to which they are providing access. Where practicable they should be provided at key work areas such as antenna locations, guy anchor points and aircraft warning lights. For larger structures using internal ladders a platform, preferably an access platform, should be provided approximately one metre below each guy attachment level and obstruction lightning level. For smaller masts utilising an external ladder or face bracing, rest platforms should be positioned adjacent to or immediately above guy attachment levels and one metre below obstruction lightning levels.

30. **Anti-climb Devices.** Entry to a hazardous area shall be prevented to all but authorised climbers. Access may be prevented by adequate fencing or anti-climbing devices attached to the individual structure. Depending upon the location of the access two types of anti-climbing device are proposed.

31. **Type 1 Anti-climb Device.** Where the structure is located within a secure establishment and there is adequate means to prevent access by the general public, the anti-climb device may be restricted to the vertical climbing facility only. It shall prevent climbing of the lowest 2.0m of the accessway.

32. **Type 2 Anti-climb Device.** Where there is no other means of limiting access to the general public or where additional security is considered necessary; the anti-climb device shall operate on the vertical climbing facility, the structural framework of the mast or tower and any vertical ancillaries which may offer alternative routes for ascent. It shall prevent climbing of the lowest 2.4m of the structure or alternatively a barrier may be placed at the 2.4m level.

33. **Loading Parameters.** All accessways shall be designed to be suitable for their particular use and shall be fit for purpose.

Ladder Type 3 and working platforms shall be designed to the minimum requirements of BS 5395: Part 3: 1985 (**Ref B**).

Ladder Type 2 and Ladder Type 1, access platforms and rest platforms shall be designed to the following minimum requirements:

a) All structural members with an angle of inclination to the horizontal of 30 degrees and less shall be able to withstand, without permanent deformation, a 1.5kN point load anywhere on the member, acting vertically downwards.

b) The ladder, modified bracing, or any component thereof, shall be designed to withstand the following simultaneous loads between supports, and shall not deflect more than 10mm or 1/200 of the span, whichever is smaller:

   i) 1.5kN point load acting vertically downwards
   ii) 0.5kN point load acting horizontally.

Where critical on a longer ladder run, the above loading should be considered to apply at a minimum interval of 5m.
c) Platform and walkway flooring shall be designed to withstand the following loads simultaneously and shall not deflect more than 10mm or 1/200 of the span, whichever is smaller:

   i) 1.5kN load over a square of 150mm side acting vertically downwards
   ii) 1.5kN/m² distributed load acting vertically downwards.

d) Platform and walkway hand railing shall be designed to withstand the following loads simultaneously and shall not deflect laterally more than 15mm:

   i) 1.5kN point load acting vertically downwards
   ii) 0.75kN point load acting horizontally.

e) All imposed loads due to access requirements shall be deemed to apply with a mean hourly wind speed of 10m/s and no ice loading.

34. **Special considerations for access to plant.** For access to plant and equipment in high places, this TB is to be read in conjunction with Defence Works Functional Standard Design and Maintenance Guide 08 "Space requirements for plant access, operation and maintenance" before finalising selection of an accessway design.

   **Bulletin authorised by:**

   
   J LAWLOR  
   Head of Specialist Services
## Fixed access ladder systems

<table>
<thead>
<tr>
<th>LADDER TYPE</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max height of climb (m)</td>
<td>12</td>
<td>24</td>
<td>no restrictions</td>
</tr>
<tr>
<td>Type of access</td>
<td>Unrestricted</td>
<td>Restricted</td>
<td>Restricted</td>
</tr>
<tr>
<td>Anti-climb device required</td>
<td>x</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Protection provided</td>
<td>Permanent by hoops, handrails etc</td>
<td>permanent by hoops, handrails etc</td>
<td>temporarily using permanently fitted fall arrest system</td>
</tr>
<tr>
<td>Suitable for use by</td>
<td>general worker</td>
<td>low competency Authorised Climbers</td>
<td>medium and high competency Authorised Climbers</td>
</tr>
<tr>
<td><strong>Dimensions (mm):</strong></td>
<td></td>
<td>Ladders</td>
<td>Face Bracing</td>
</tr>
<tr>
<td>Vertical rung spacing</td>
<td>min</td>
<td>225</td>
<td>225</td>
</tr>
<tr>
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<tr>
<td>Toe clearance</td>
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<td>150</td>
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<tr>
<td>Rung section</td>
<td>min</td>
<td>20 Ø</td>
<td>16 Ø</td>
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<tr>
<td>Stile section</td>
<td>min</td>
<td>65 x 10</td>
<td>60 x 6</td>
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<tr>
<td><strong>Platforms:</strong></td>
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<tr>
<td>Max spacing (m)</td>
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<td>15</td>
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<tr>
<td>Working platforms</td>
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</tr>
<tr>
<td>Access platforms</td>
<td>x</td>
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<td>✓</td>
</tr>
<tr>
<td>Rest platforms</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
<tr>
<td>Recommended minimum inspection intervals (or at PPE manufacturers recommendations)</td>
<td>every 2 years</td>
<td>every 2 years</td>
<td>every 2 years</td>
</tr>
<tr>
<td><strong>Minimum PPE Required by Climbers:</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Safety helmet</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Footwear</td>
<td>Firm soled, ankle support and clear defined instep</td>
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<tr>
<td>Full body harness</td>
<td>x</td>
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<tr>
<td>Fall arrest traveller</td>
<td>x</td>
<td>x</td>
<td>✓</td>
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<tr>
<td>Shock absorbing lanyard</td>
<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>Work positioning device</td>
<td>x</td>
<td>x</td>
<td>✓</td>
</tr>
</tbody>
</table>

Table 2: Summary of the technical details of the three ladder types
Figure 1: Ladder Type 1 with Rest Platforms

A) INDEPENDENT LADDER

For clarity supporting structure not shown

B) MODIFIED FACE BRACING

Supporting structure forms integral part of accessway
**Figure 2:** Ladder Type 2 with an Access Platform
Figure 3: Ladder Type 3 with a Working Platform
References

**REF A:** BS EN 363: Personal protective equipment against falls from height - fall arrest systems; 1993

**REF B:** BS 5395: Stairs, ladders and walkways; Part 3: Code of practice for the design of industrial type stairs, permanent ladders and walkways; 1985