

Linkspans and walkways, ship-to-shore access

SIM 5/2007/06

Target Audience:

HSE Inspectors

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This SIM provides a list of technical issues that need to be considered when planning, contracting, designing, installing, using and maintaining a ship-to-shore linkspan.

1 The collapse of a new ship-to-shore passenger walkway at Ramsgate in 1994 resulted in the death of 6 members of the public. This led to the publishing of the report by the Construction Industry Research and Information Association (CIRIA), RP 572 – ‘Ship-to-shore Linkspans and Walkways’. This provided practical information for the ports industry and designers, contractors, operators and health and safety advisors involved in procurement, operation and maintenance of linkspans. Copies of the report are available from Library Services or Transportation Section.

2 Although a considerable period of time has now passed since that specific incident, Sea France lost millions of pounds in 2005 following berth disruptions caused by a linkspan collapse in February of that year.

3 In view of the potential for harm in such cases the guidance in the Appendix of the original SIM is still considered relevant and is replicated here. Although it is not anticipated this will form part of routine inspection of docks it will be useful in answering requests for information from the industry and when discussing proposed new developments.

4 At the time of writing British Standard BS 6349 – 8 ‘Maritime structures Part 8. Code of practice for the design of ro-ro ramps, linkspans and walkways’ is at the public consultation stage. Inspectors can check the current status of this standard via British Standards Online.

Cancel and Destroy

SIM 5/2001/55

Appendix - Design and operational considerations for ship-to-shore linkspans and walkways

(para 5)

There are many aspects which need to be considered at each stage during the installation and use of a ship-to-shore link. They are listed below under 7 headings:

- Planning
- Contracting
- Design
- Fabrication
- Installation
- Maintenance
- Use

The lists of questions are not exhaustive and should be regarded both as initial guidance and as supplementary to the planning and assessment required by The Construction Design and Management Regulations 2007(CDM Regulations) that will apply to most new projects.

Planning

Will the contract for design, contract management, construction, operation etc be in house or external?

If external, what level of supervision, technical input, technical monitoring is the client/customer/operator to provide?

Will the client be the actual operator?

Which standards could/should apply to the project?

Will a specification be drawn up? Who will compile it?

Who is responsible for collecting environmental/operational data on which to base the design?

Is there to be any independent assessment of the project? At what stage or stages?

What quality assurance provisions of external organisations will be required?

Contracting

Do the CDM Regulations apply to this project?

Have the client, designer, principal contractor, CDM co-ordinator been identified?

What information is there on their competence?

Who is to be responsible for each aspect of the design, and each stage of the work?

How and by whom are these responsibilities to be monitored?

Design

Type, shape, size etc

What type of linkspan is proposed (pedestrian/vehicle/both, fully suspended, fully buoyant, floating/semi-submerged pontoon etc)?

Is a single service installation proposed, or should consideration be given to future use by larger ships, lorries, or further development?

What is the intended design life of the structure?

Which standards are to be adopted?

What vehicle clearances, height, width, length, turning circle, approach departure angles and ramp over-clearances are required?

Have gross vehicle weight, vehicle queue length, number of vehicles, speeds and frequency of vehicles, passenger queue length etc been considered?

What tidal range, sill/deck heights define the operating envelope?

What are the arrangements at the ramp end; i.e. ship ramp on top, or linkspan on ship deck, the location and operation of finger flaps, if any, and are they load bearing?

What are the vessel mooring plans (ship moored to ramp only, moored to ramp and adjacent quay or dolphins, or moored to adjacent quay or dolphins without attachment to ramp)?

Will any ramp-end finger flaps, hinges, pivots and associated hydraulics be subjected to excessive loading by ship or pontoon movement?

Can the bankseat (inland end) and vulnerable parts of the structure absorb ship impacts and other forces from all possible angles and directions?

Does the design methodology include a failure modes assessment to identify safety critical single load path components and does it consider the limits of movement together with what happens when they are reached or exceeded?

Has consideration been given to secondary support, i.e. safety chains, trapped mountings of some sort, or redundancy in design?

The above imply 6 degrees of movement, (linear in 3 planes and rotational about 3 axes) which will require articulation. Pivots hinges, supports and connections need to be purpose designed and should be protected against the ingress of salt, sand or other damaging materials and capable of being properly lubricated.

Local environmental and operational considerations

What are the local water conditions; wave height, current speeds and direction surges due to other vessel movements?

Have extreme tidal movements and astronomical plus worst weather effects been allowed for?

What are the worst combination loading from wind, wave and current that the structure will experience?

What pontoon location method is to be used?

Does the pontoon have sufficient size and buoyancy to be stable under the movement of the heaviest vehicle combinations?

What are the bedrock conditions?

What are the effects of silting or scour likely to be?

What happens when the extremes of ship movement, (ranging, drifting, rolling and pitching) are reached?

Are safety margins adequate?

Are there prior warnings (e.g. human operator or automatic position monitoring) and a method of disconnection at extremes?

What method of height adjustment is to be provided, automatic/manual?

Is the machinery vulnerable to flooding?

What happens in the event of power failure?

Have corrosion risks been fully considered?

Have maintenance requirements, including safe access, been considered and provided for?

Will a design package including concept drawings, design drawings and all necessary calculations be provided?

Fabrication

Which standards (BSI, EN, Industry etc) have been adopted?

Who is going to verify compliance?

Where is the fabrication to be carried out? On site? In another country?

Is it a one-piece construction or an assemblage of large sub-assemblies?

Will a package including fabrication drawings, materials certificates, and NDT certificates be provided?

Installation

Is the sequence of installation critical?

Does the sequence of assembly/construction avoid the imposition of excessive loads or stresses on or in any components or sub-assemblies?

Has any lifting equipment incorporated in the structure been tested/examined/ certified?

Are safety critical items; bearings, rams, chains, etc identifiable and traceable through the supply chain?

Have the maximum wind, tidal and other potential forces and loads on the partially assembled structure been calculated and allowed for?

Is there a specified commissioning procedure?

Has the buoyancy/stability of the incomplete structure been confirmed?

Maintenance

Was a maintenance programme part of the design specification?

Have all parts of the structure requiring inspection/maintenance been identified and listed?

Is routine examination of safety critical components including structural elements and supports and connections planned?

Does it include examination of stress points, welds, corrosion protection etc as well as lubrication, replacement and testing of wear/moving and load bearing components?

Are there any safety or reliability critical components that require replacement at set intervals?

Have wear limits been set?

Is safe access to all to all parts of the installation readily available for examination, lubrication etc?

Can maintenance work, component replacement etc be carried out without the need for major dismantling or reconstruction?

Do the necessarily removable components have built in lifting eyes, lugs, lifting attachments?

Is the maintenance programme being carried out?

Use

Is there a programme of pre-use trials?

Is there an operating manual?

Have operating staff been adequately trained and properly appointed?

Are there formal systems of cooperation between dockside operations staff and ships crew in respect of:

- mooring,
- linkspan connection/disconnection procedures (both routine and in emergencies),
- adequate communication for passenger/crowd control (both routine and in emergencies)?

Are there contingency plans to enable the passengers and cargo to be unloaded safely if the dedicated berth is unavailable or the ship unable to use it for any reason?

Are any flying lead controls sufficiently robust, e.g. waterproof?

Are the operating conditions fully understood by the users with respect to:

- operating envelope
- ship dimensions
- weather windows
- action if conditions exceeded?

Is there a defect reporting and action system in operation?