

INTERNATIONAL SAFETY PANEL  
TECHNICAL AND OPERATIONAL ADVICE SERIES #3

# **Guidelines on Lifting Persons at Work for Cargo Handling Purposes in the Port Industry**

by

Stephen Durham

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# GUIDELINES ON LIFTING PERSONS FOR CARGO HANDLING PURPOSES IN THE PORT INDUSTRY

## 1 Introduction

- 1.1 The traditional method of gaining access for work activities or to reach a place of work was the portable ladder but, as the heights that needed to be accessed increased and the locations varied, it became increasingly clear that such equipment was very limited and potentially unsafe.
- 1.2 The use of personnel carriers attached to cranes and other cargo handling equipment is an effective and efficient way of accessing difficult areas on board ships and in the dock environment. This might be for the purposes of gaining access to cargo, or for the inspection and maintenance of plant and machinery. However, it has long been recognised there are serious risks involved when suspending people in personnel carriers and numerous fatal accidents have occurred worldwide. The hazards are not just merely associated with falling out of the personnel carrier as fatal incidents involving whole body entrapment, as well as head and limb entrapment have been recorded. There are also risks associated with the lifting appliance itself, either toppling, collapsing, contacting live power lines, or other machinery, or even fire.
- 1.3 This document sets out to provide guidance in best practice when designing personnel carriers along with the planning and implementation in the use of such carriers within some of the aspects of dock operations. This document does not include access to container tops as this is already covered by a previous ICHCA publication, Research Paper # 4.
- 1.4 The safe procedures portrayed in this document are based on occupational health and safety standards from the USA and Europe and although best practice, guidance in this document may not ensure compliance with legislation in all countries and states. Users of this guidance must check their national legislation and standards.

## 2 Terms and Definitions

- 2.1 “**authorized person**” is a person authorized by the employer, the master of a ship or responsible person to undertake specific task or tasks, and possessing the necessary technical knowledge and experience
- 2.3 “**competent person**” is a person possessing the knowledge and experience required for the performance of a special duty or duties and acceptable as such to the competent authority. (ILO 152)

Generally such a person should have the necessary tools and equipment with adequate knowledge to recognize defects, metal fatigue, corrosion and deformation factors.

The competent person need not be an external body or person but may be employed ‘in-house’ by the operator of the equipment, but this person must be independent from the operations itself and not a user of the equipment. However, it should be ensured that ‘in-house’ examiners have genuine authority and independence to ensure that examinations are properly carried out and that the necessary recommendations are made without fear or favour.

- 2.3 “**integrated working platforms**” are personnel carriers that do have controls within them to operate the carrier or basket and the electro-mechanics fully integrate with the lifting appliance. In this case dual controls often exist whereby the movement of the carrier can be undertaken by the carrier operator. *This document does not cover the use of these frames.*

- 2.4 **“loose gear”** covers gear by means of which a load can be attached to lifting appliance but does not form an integral part of the appliance or load. Other terms include lifting gear, lifting accessories and lifting tackle. Examples are wire, chain and man made fibre slings, shackles, etc.
- 2.5 **“lifting appliance”** relates to lifting plant, machine or vehicle, such as a ship to shore or mobile crane, lift truck, straddle carriers, etc.
- 2.6 **“non-integrated working platforms”** are personnel carriers that do not have controls within them to operate the carrier or basket. In this case all lifting appliance and personnel carrier movements are controlled by the appliance operator.
- 2.7 **“personnel carrier”** means a device that is attached to a lifting appliance for the purpose of lifting people. This refers to all types of personnel carriers and baskets regardless of their method of attachment and by varying designs can be used by people to allow them to work at height, whether above or below ground level. Other terms include man-cage (or basket), personnel or access cage.
- 2.8 **“safe working load”** is the rated capacity, or sometimes known as the working load limit.
- 2.9 **“suspended basket”** refers to a *personnel carrier* suspended from a crane by these of wires or chains for the purpose of carrying people aloft, or below ground level.

### 3 General Design Standards for Personnel Carriers

- 3.1 Personnel carriers should be non- combustible and protected against corrosion and painted in a bright conspicuous colour.
- 3.2 Where there exists a risk of impact with other external structures, it is recommended that all external exposed handrails are inset by at least 100mm or internal grab rails are fitted. Grab rails should be designed so they can be held with a gloved hand and a gap of 90mm is recommended between the grab rail and any structural part of the frame. Ideally all hand rails and grab rails should be highlighted in a bright contrast colour to that of the personnel carrier itself.
- 3.3 When a personnel carrier is designed to be used in situations where falling objects might be a hazard, the carrier should have overhead roof protection and any aperture must not allow a sphere of 20mm to pass through it. Further, the roof structure should be capable of withstanding the impact of a 7 kg steel ball from a height of 2 metres without adverse deformation of the structure. Adverse deformation is deemed to be in excess of 50mm.
- 3.4 Any openings in mesh floors and roofs, or between the floor and toe-plates, or access gates should be of a size to prevent a 20mm diameter sphere passing through.
- 3.5 The floor of the personnel carrier should ideally be welded in position or by some other equally effective means and should be slip resistant with drainage.
- 3.6 Ideally the size of the floor area should be a minimum of 600mm x 600mm for one person, and at least 400mm x 400mm more for each additional person. The intended function of the carrier and limitations in cargo spaces where the carrier might be used may dictate overall floor dimensions. In these circumstances it is accepted that the space for each person might be smaller, but an assessment should be made as to maximum occupancy accordingly.
- 3.7 The floor should be structurally sound so that point loading over any area of 0.16m<sup>2</sup> must

withstand 125Kg without permanent deformation and likewise must withstand a uniform pressure of 1500N/m<sup>2</sup> without permanent deformation

- 3.8 Ideally and to ensure safety, the gate should open inwards and have an automatic catch to prevent it from being opened inadvertently once the personnel carrier is raised.
- 3.9 All personnel carriers must have anchorage points for the attachment of safety harnesses and lanyards.
- 3.10 Generally, all personnel carrier sides (unless fully enclosed), are to be guarded by a top rail, with the upper edge being between 1000mm and 1100mm from the platform floor. However, where people are expected to lean out to gain access to cargo or equipment over the side of these top rails, some countries may specify lower heights due to the ergonomic differences with the indigenous population, however this should not be less than 850mm in these circumstances. A toe-board from the floor having a minimum height of 150mm should also be fitted and at least one intermediate rail midway between the top of the toe board and the underside of the top rail.



Figure 1  
Illustration showing a typical suspended basket

- 3.11 Should the personnel carrier be used in close proximity to other fixed objects during its use and there is a risk of limb entrapment or impact, then effective means of guarding between the top rail and floor, such as wire mesh, metal panelling and/or safety glazing should be used.
- 3.12 Handrails and support rails need to be of adequate strength and capable of withstanding, without permanent deformation, horizontal and vertical forces of approximately 900N, concentrated at the weakest points.

- 3.13 Where the platform is intended to be used for more than one person then the hand and support rail test must be of 500N for each person of intended carriage. For example if the personnel carrier can carry four people then a test of 2000N must be applied.

#### **4 Safe Working Load**

- 4.1 When designing any personnel carrier and calculating the rated capacity, the weight of each person is taken as being 80kg plus 40kg for tools and equipment per person.
- 4.2 A safety factor of at least two should also be applied when calculating rated capacities. The basket should be attached to the crane hook with either steel wire rope slings, or chains with a safety factor of at least: X 8 for chains, and X 10 for wire ropes and this includes the end terminations.
- 4.3 In all cases the rated capacity for lifting appliances for handling loads are normally reduced by 50% when handling personnel in carriers.

#### **5 Suspended Baskets**

- 5.1 In addition to the design criteria as stated in section 3, suspended baskets should include the following design features.
- 5.2 The basket should have a minimum free-standing height of two metres.
- 5.3 The vertical distance between the floor of the basket and the crane hook should ideally be a maximum of three metres.
- 5.4 Slings should only be attached to the personnel carrier by a method that requires tools for removal.
- 5.5 All attachment points are to be rated fittings and not merely welded chain loops or similar arrangements.
- 5.6 Tag line attachment fittings should be available so tag lines can be used to prevent the basket from spinning, particularly if used with cranes with single falls of wire.

#### **6 Non-Integrated Personnel Carriers**

- 6.1 These personnel carriers are not part of the lifting appliance but consist of add on carriers that are attached to the appliance to allow personnel access to other machinery, cargo or to facilitate emergency rescue. In addition to the design criteria stated in Section 3, the following must be considered for inclusion in any design or use of non-integrated personnel carriers.
- 6.2 Only occasional use is allowed in the UK and in all cases it must be shown no other safer means of access exist. However, it is accepted that the use of such carriers, if properly designed and used correctly are much safer than using ladders.
- 6.3 In the United States of America a similar rule exists and their use is prohibited unless it can be shown no other safer access method exists.
- 6.4 Personnel carriers such as those used on lift trucks are not permitted for use in some European member states. As such, there is no free movement of non-integrated personnel carriers and working platforms throughout Europe and they must not be CE marked.
- 6.5 Once the carrier is fitted to the lifting appliance it must be ensured that access to any

moving parts on the appliance are guarded to protect occupants and prevent the risk of trapping or crushing by any of the appliance mechanisms. In addition, the operating mechanisms of the lifting appliance must not be capable of being reached or activated by carrier occupants and if necessary screened off.

- 6.6 Any screens or guards should provide adequate separation distances to prevent entrapment and guidance on separation distances to ensure that controls and mechanisms cannot be reached can be found in BS EN ISO 13857:2008.
- 6.7 Fork and carriage mounted personnel carriers must have fork pockets on their underside to accommodate the fork arms spaced at their widest practicable distance apart, without excessive clearance between the pockets and forks.
- 6.8 On the personnel carrier, there must be some form of positive locking device ideally behind the heels of the forks, or possibly under the forks, to hold it on when in use. Any loose items associated with the locking devices can be retained on the carrier by chains so they are not mislaid when not in use.
- 6.9 Fork pockets on the underside of the personnel carrier should be fully enclosed and run along its full length.
- 6.10 In addition to positive locking devices stated in 6.8 above, when carrying people it is best practice to fit a secondary safety chain, or some other secondary securing device to ensure the security and stability to the lifting appliance.
- 6.11 Carriage mounted personnel carriers are attached directly to a lift truck or reach truck carriages after the fork tines have been removed. It should be clearly specified on the personnel carrier for which type of carriage they are suitable.



Figure 2  
Example of a non-integrated personnel carrier  
Personnel carrier on forklift truck (*Note - the carrier is also clamped to forks underneath as well as safety chains shown*)

- 6.12 In addition to the design standards above, where personnel carriers are designed for direct attachment to carriages they should conform to ISO 2328. The locating (i.e. pickup) points on carriage mounted and fork arm mounted working platforms shall be symmetrical about the centre line of the personnel carrier.
- 6.13 The forward length of the platform should not exceed twice the rated load centre distance of the lifting appliance and the platform width should not exceed the outer width of the truck by more than 250mm either side



Figure 3  
Straddle driver emergency rescue attachment (See Section 17.1)

## 7 Identification plate

- 7.1 A plate should be attached to the platform giving the following information where relevant:-
- name and address of the platform manufacturer or authorised representative;
  - serial number and year of manufacture;
  - unladen weight of the platform and the position of the centre of gravity;
  - lost load centre (if the platform is carriage mounted);
  - maximum allowable load in kg;
  - maximum number of persons that the platform is intended to carry;

## 8 Container Spreader/Twistlock Mounted Personnel carriers and Platforms

- 8.1 In addition to the recommendations in the design of personnel carriers, any personnel carrier attached to, or suspended by container spreader twistlocks, should incorporate a physical secondary locking device to prevent inadvertent release by the twistlock due to



any electro-mechanical failure. In some countries a third supplementary locking device might be required and the national standards must be consulted.



Figure 4

A 'Stinis' Container Personnel carrier for access between container stacks

## 9 Use of Cranes

- 9.1 When lifting people in personnel carriers by use of cranes it is imperative the crane operator is competent and experienced. The crane must be operated at a slow speed without sudden movement or adverse sway. On modern cranes where 'man-ride' mode is available, this must be selected.
- 9.2 Ideally the personnel carrier should be operated in full view of the crane operator, however where good communication is available, particularly if a reliable private radio channel is available, it is possible to operate the personnel carrier safely on the blind side of vessel or cargo stacks.
- 9.3 Where single falls of wire, or rotating hooks are in use, particularly with derricking cranes, tag lines should be attached to enable people on the quay and the deck to control potential rotation of the personnel carrier as it is manoeuvred from the quay to the ship and vice versa. Great care must be taken with long tag lines to ensure they do not become entangled and snag causing adverse tilting of the personnel carrier.
- 9.4 Occupants of the personnel carrier must keep all parts of their body inside the structure of the carrier during all crane movements.
- 9.5 Due to the instability of this type of personnel carrier when suspended, it is not permitted to climb out of the frame under any circumstances and do to so could have fatal consequences.

## 10 Thorough Examination and Inspection

- 10.1 All personnel carriers and lifting appliances must be subject to a regular examination



scheme and the legislative requirements for individual countries and states must be referred to.

- 10.2 All lifting appliances, personnel carriers and associated loose gear, used for the lifting of persons, should be thoroughly examined at least every six months, or at shorter intervals as determined by a competent person, or after any repair or modification, in accordance with ILO Convention 152.
- 10.3 In some countries where personnel carriers are used infrequently, a competent person may draw up an examination scheme that differs from the above periodic scheme.
- 10.4 The examination scheme drawn up by the competent person should identify and specify those parts that should be thoroughly examined.
- 10.5 The examination scheme should specify what intervals the equipment (or individual parts) should be thoroughly examined and where appropriate, those parts that need to be tested.
- 10.6 Any examination scheme for lifting equipment should take account of;
  - Its condition;
  - The environment in which it is to be used; and
  - The number of lifting operations and the loads lifted.
- 10.7 Personnel carriers should also be visually inspected on each and every occasion prior to use.

## **11 Lifting Plans.**

- 11.1 A lifting plan should be prepared for all lifts involving the lifting of people. Where such work is regular and routine with little variation it will be suitable to adopt a generic plan or. Generic lifting plans, or fully documented safe systems of work, are a practical way of ensuring uniform safe working methods provided that they address the foregoing points.
- 11.2 The plan should directly relate to the complexity of the load movement (lift) involved. Many lifts will be of routine and repeat nature, e.g. loading or unloading piling equipment and supplies, or uniform loads of steel pipes.
- 11.3 All lifting plans should...
  - Have been prepared by a competent person and
  - adequately describe the activity and
  - address the risks identified in the risk assessment and
  - stipulate the level of training required for the person in charge and
  - remain valid for the entire range of the lifting operations that may be carried out.
  - Consider the Lifting Equipment and
  - consider the lifting accessories, the means of attachment to the load and how they will be used, including any necessary de-rating required to keep within the safe working load of the machine, and
  - consider proximity hazards such as: -
  - overhead power lines;

- other work equipment and structures;
- trenches, excavations; underground services;
- other lifting operations, and
- avoid locating lifting equipment on soft or sloping ground, unless adequate arrangements are taken to ensure stability of the machine at all times.
- Ensure a minimum of 600mm clearance between a fixed object and the nearest part of slewing lifting equipment.
- Documented safe systems of work/lifting plans should be reviewed regularly.

## **12 Communication**

- 12.1 Where the personnel carrier is being used in direct line of sight of the lifting appliance operator, then the use of hand signals or voice commands may be adequate. All personnel suspended from platforms or personnel carriers should be competent in the use of hand signals. However, these will not be acceptable if;
- the signals cannot be seen or understood because of extreme height;
  - they have to be made outside the confines of the personnel carrier and risk of entrapment or crushing exists;
  - adverse weather conditions restricting view (heavy rain or bright low sun);
  - the personnel carrier is used outside the vision of the lifting appliance operator.
- 12.2 Where the personnel carrier is used outside the direct line of sight a secondary signaller might be considered, but it must be accepted this will cause a delay in actions between the appliance operator and the personnel carrier. In hazardous situations where the personnel carrier may have to be moved quickly this will not be desirable.
- 12.3 Ideally two-way radios should be used on separate frequency channels to other operations. Radio discipline must be maintained particularly if two or more personnel carriers are working in close proximity.
- 12.4 With personnel carriers that are used frequently in blind areas, an in-built electronic voice communication might be permanently installed and connected directly to the lifting appliance by means of an umbilical cable.

## **13 Grounding**

- 13.1 When working with elevated personnel carriers and in particular where used adjacent to electricity supplies, or if using portable electrical tools within the carrier that are not battery operated or not double insulated, then an adequate grounding earth conductor should be used.
- 13.2 An earth grounding clamp may be attached to existing earthed structures such as crane rails or building conductors. Where these are not available then a ground stake or rod should be used.

## **14 Personal Protective Equipment**

- 14.1 Occupants of personnel carriers should wear safety harnesses with a suitable lanyard and must be attached to an adequate anchorage point at all times whilst aloft. However, the

exception to this might be when working directly over water whereby lanyards should be detached and a suitable lifejacket worn. This will enable escape in the event of any adverse event such as collision, or collapse of the appliance into the water.

- 14.2 Some consideration should be made to climatic conditions. When working at heights air turbulence and working over water can change the temperatures considerably compared to that on the ground. An assessment should be made and all occupants should be attired according to the conditions.
- 14.3 In all circumstances safety helmets and safety footwear is strongly advised and high visibility clothing is also recommended so the appliance operator can see the position occupants better. The latter also becomes imperative if working at extreme height outside the personnel carrier.

## **15 Pre- Work Checklist for Managers/Supervisors**

- 15.1 Below is a checklist to assist in identifying actions that should be taken to ensure adequate arrangements are in place.
- Are arrangements in place to ensure that all the lifting equipment involved is subject to regular inspection and thorough examination (with records retained)?
  - Are the lifting appliances, loose gear and personnel carriers provided within their correct inspection regime period?
  - Is the lifting appliance provided suitable for the intended use?
  - Have suitable and sufficient risk assessments been carried out for the use of lifting appliances and personnel carriers?
  - Are all lifting operations planned, supervised and carried out by a competent person?
  - Is a signaller ('banksman') available where necessary?
  - Is the lifting appliance and carrier of sufficient strength and stability?
  - Where lifting appliances themselves are designed to carry people, are they fitted with a suitably guarded carrier and a method of rescue in place?
  - Are suitable warning signs / markings displayed?
  - Have those using the equipment received adequate information, instruction, training and supervision?
  - Can it be ensured that whilst the personnel carrier is elevated or suspended the lifting appliance is 'manned' at all times by a competent operator?
  - Is there adequate communication between those inside the personnel carrier and the appliance operator?

## **16 Weather Conditions**

- 16.1 Before using personnel carriers outside an assessment must be made as to the existing weather and the likely forecast during the duration of intended work.

- 16.2 Extremes of weather should be avoided and in particular high winds. The lifting appliance manufacturer should be consulted with regards to maximum operating wind speeds and a further safety factor should be applied when lifting people.
- 16.3 To ensure safety it is generally recommended that with all personnel carriers suspended on wire or chain slings, work at height operations should cease at 15 Knots or 8 m/s. However, this should be subject to local assessment by a competent person with consideration of appliance capability, competence of operators, location of operations, wind exposure and the task in hand. As such the point at which personnel carriers should cease to operate could be higher or lower than that stated.

## **17 Emergency Rescue Carriers**

- 17.1 One form of emergency rescue carrier has been previously illustrated (see figure 3) and this functions by attaching it to an operational straddle carrier. By coming alongside the other 'incident' straddle carrier, the driver can be easily extracted from the cab without the need to descend the stairs or ladders. The frame has been designed to match the walkway structures of a second 'incident' straddle carrier when alongside.
- 17.2 All types of personnel carriers can be used to facilitate rescue but ideally the carrier should have sufficient floor space to take a two metre by one metre rescue stretcher and allow two rescuers to work with their equipment.
- 17.3 Where it is not possible to have carriers of a sufficient size due to lifting appliance or cargo configurations, emergency stretchers may be clamped across the handrails of smaller personnel carriers. However, proper clamping arrangements must be fitted for this eventuality and the casualty securely strapped into the stretcher. It is recommended that such operations are rehearsed thoroughly. As the stretcher will extend outwards beyond the confines of any such carrier, great care must be taken not to collide or crush against adjacent objects.

## References

ICHCA International Safety Panel Research Paper #11 Lifting People at Work for Cargo Handling Purposes in the Port Industry

ICHCA International Safety Panel Research Paper # 4, Container Top Safety, Lashing and Other Related Matters

ILO Convention 152 Safety and Health in Dockwork, ILO, Geneva

ILO Code of Practice Safety and Health in Ports, ILO, Geneva 2005 ISBN 92-2-115287-1

The Health and Safety Executive, UK. The Work at Height Regulations 2005.  
SI 2005 No. 735

The Health and Safety Executive, UK. Safe Use of Lifting Equipment; The Lifting Operations and Lifting Equipment Regulations 1998. L113. ISBN 0 7176 1628 2

BS EN 795 - Safety Harness Anchorage Points

BS EN ISO – 13857: 2008 – Safety of Machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs.

BS EN 14502-1 - Cranes – Equipment for the lifting of persons. Part 1: Suspended Baskets.

Occupational Health Administration, USA. – Safety and Health Regulations for Longshoring; CFR 1918:66 (5) Sub Part G.

Occupational Health Administration, USA. – Cranes and Derricks. Safety and Health for Construction, CFR 1926.550

Occupational Health Administration, USA. – Standards Interpretation. Use of crane handled personnel carriers. 05/24/1983