RoRo

Straight stern ramps

Planning the straight stern ramp

Our aim is to design a MacGregor stern ramp which is efficient, economic and safe, while fully meeting the specific operating requirements.

The more information that can be given on these prerequisites, the greater the chance to find the optimum solution. Under the following headings information requirements can found before commencing the project. If these answers are available at the earliest stage possible, work will be saved during the later stages, gaining valuable time by shortening the lead time between initial contact and delivery.

Photo: ShipPax Information

Interface between ship and quay

In order to establish the length of the ramp, we require certain important dimensions as well as information on the maximum angles at the knuckles (point of interchange between straight lines), also the maximum gradient.

Essential measurements are the height of the threshold deck above the water level under ballast or full load, together with the quay edge height above water level at both high and low tide. If either the knuckle angles or the gradient are not known, please indicate the types of vehicles, clear height, ground clearance and wheelbase.

If the ramp shall interact with a shore based or floating linkspan we need to get information about this.

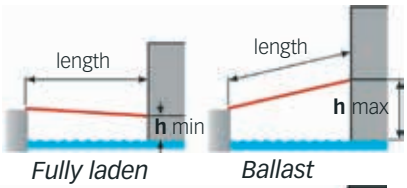
Where there is a need for high vehicle speeds during loading or unloading, a shallower gradient of the ramp will be needed.

The ramp will then be longer than if consideration is given only to the geometrical clearance at the knuckles. Based on these inputs we calculate the requisite length of the ramp to suit the various operating conditions. The longest calculated requisite length represents the minimum ramp length. In order to dimension the ramp we must know whether the quayside is horizontal or of a sloping design for RoRo ships. For a sloping quay, a shorter ramp will suffice. However, where the tidal shift is great, there may be a need to adjust position of ship during loading or unloading.

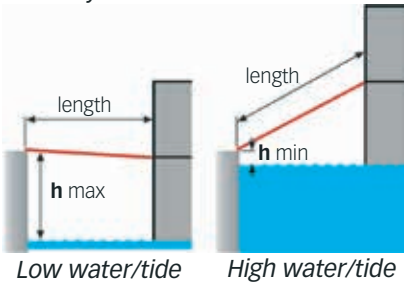
Loading

To arrive at correct dimensioning of the steel structure and achieve an acceptable strength to weight ratio, we need to know the following: What kind of vehicles will drive over the ramp? How much is the axle loading and the print area of the wheels? How many axles are there and how far apart are they?

What will be the required total load carrying capacity of the ramp, based on the maximum number of vehicles expected to be on the ramp at the same time? Will the ramp be provided with a preventer arrangement and what should be the maximum permissible total load?



Fully laden *Ballast*



Low water/tide *High water/tide*

Horizontal quay *Sloping quay*

Interface between ramp and ship

When designing the stern section of the ship, sufficient room should be reserved for the ramp and its associated equipment.

A space of 600 to 900 mm should be allowed at each side of the ramp, depending on size. This space is required for the kerb, railings, sealing system and operating equipment. If gangways are to be provided extra width should be allowed.

The operating system also requires space at each side of the ramp inside the ship. In the case of direct operating hydraulic cylinders which demand more space than other systems, a space of 2 to 4 m will be required inside the ship, depending on the size of the ramp. Here the surface width should also be between 600 to 900 mm.

Contact us early in the design stage if you require a more accurate estimate of the space requirement. If the ramp is of such a length that it reaches some 5 m or so beyond the cleating hooks, in stowed position, additional locking will be required for strength and safety. In such cases a support tower should be installed to carry the extra securing hooks.

Hydraulic capacity

The governing factors in dimensioning the hydraulic system capacity are the size of the ramp, time requirements for raising and lowering of the ramp and the outside temperatures to be encountered during operation. For opening and closing, 2 to 4 minutes are required, excluding opening and closing of the securing devices, for an average size ramp. The shorter the time, the greater will be the size and cost of the hydraulics. Clearly, there is also a limit to the technical feasibility.

An indication should be given of the maximum and minimum ambient temperatures in which the hydraulic system is to operate.

Regulatory bodies

Please specify which demands are to be met by the equipment. In other words, which classification societies, national authorities and other regulations (e.g. IMO) are to be satisfied.

Options

On the right we show the equipment or accessories which require your choice, also optional equipment which may be added to the ramp. These should be studied point by point when making an initial evaluation, based upon the particular operating conditions.

Flap options

There is a choice of two flap designs. The flap stowed in a vertically upright position offers the most economical solution.

In cases, where free visibility is required, choose the flap stowed in turndown position.

If the ramp is of such a length that it still obscures the vision, it can be constructed foldable in two sections.

The flaps stowed in upright position may as an alternative be secured by an internal device to avoid the support beam in front of the flaps.

Control options

Two different systems are available:

- **Automated control system**
  Press one button to initiate and complete the whole opening or closing sequence.
- **Manual control system**
  Each step in the operation is controlled by hand operated hydraulic valves.

The greater the degree of automation of the system, the easier and faster the operation.

An automated system will be particularly cost effective on shorter runs where there is a need for fast loading and unloading. 250 m², choose wire ropes operated by hydraulic/electric winch motors.

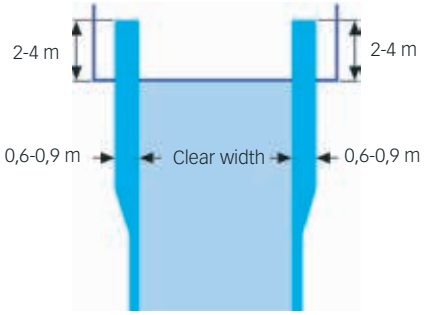
The manual control system is in practice restricted to simple ramps, non-tight, in locations on the ship which are not critical for the safety of the ship.

Operating options

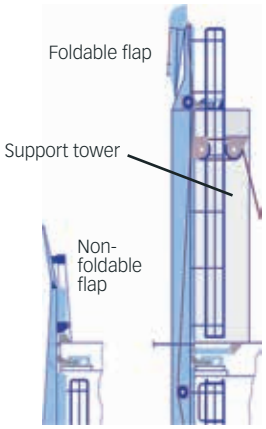
Two different systems are available:

- Direct hydraulic cylinders
- Wires by hydraulic/electric winch motors

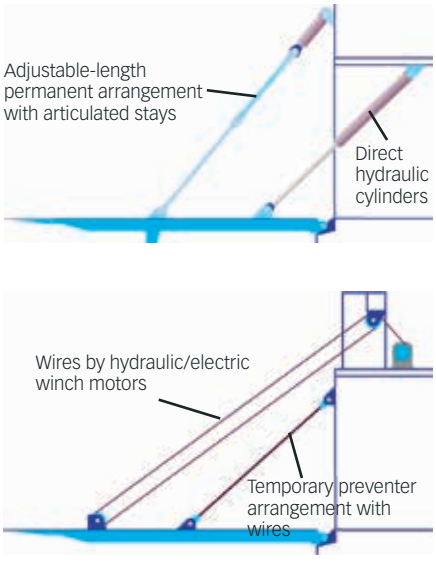
For a ramp with an area of less than about 200 to 250 m² you use hydraulic cylinders acting directly on the ramp. This is the most cost effective and reliable solution. For a ramp larger than about 250 m², choose wire ropes operated by hydraulic/electric winch motors.



Reserve space for direct hydraulic cylinders



Flap options



Operating options

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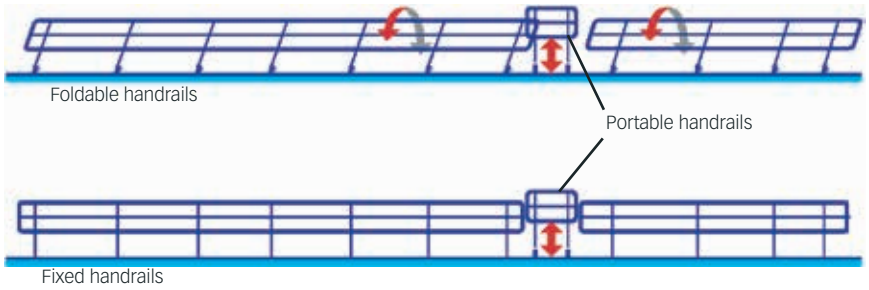


The handrail versions can all be combined on the same ramp

Handrail options

Handrails are available in three versions which can all be combined on the same ramp.

- Fixed to the ramp.
- Foldable in such a way that it does not protrude into the ship when the ramp is in the closed position.
- Portable handrails are stowed on board during the voyage.

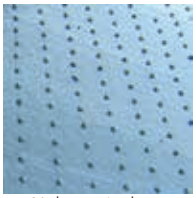
In all other respects, they are of similar construction. The fixed one is the simplest and most cost effective. However, if handrails might impede the cargo, equipment or gangways, the portable or foldable versions are the natural choice.

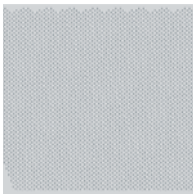
Anti-slip options

Four different anti-slip devices are available. Welded square bars in a herringbone pattern provide a robust skid-resistant but uneven surface with a high degree of friction. Expanded metal provides an even running surface with high friction at lower cost but the design is more prone to mechanical damage and wear, all of which may lead to higher maintenance costs. The design of Nelson studs is robust and the running surface is even although the friction is lower than with the other types. The fourth alternative is anti-slip coating consisting of epoxy mastic dressed with resistance friction material, which provides a high friction and an even surface.


Herringbone


Expanded metal


Nelson studs


Anti-slip coating

Preventer stay options

Preventer stays support the ramp during docking and service, for example when transporting equipment for repair and maintenance, also when loading and unloading without additional support at the quay, and so avoid overload (for example in harbours with limited quayside strength).

The first decision is therefore whether or not you need preventer stays. The next decision is whether a temporary solution will suffice, for instance just for docking, or is there a need for a permanent preventer stay?

For temporary use, wire ropes offer the most reasonable alternative. They are easier to mount and dismount, and can be stowed on board.

If a permanent preventer stay is required, there is a choice between an articulated stay and chain, either of which may be fixed or hydraulically adjustable.

With the hydraulically adjustable version the height of the ramp can be altered to suit the quayside conditions.

Preventer stay	Wire	Stay	Chain
Temporary	X	—	—
Permanent			
- fixed length	—	X	X
- adjustable length	—	X	X

MacGregor's standard for straight stern ramps

Over the years MacGregor has designed and manufactured a great variety of straight stern ramps for different types of ships. We therefore promise that your ramp will meet your needs in terms of quality, efficiency, security and overall economy. Yet it will be standardised in all major functions.

In other words, you will be supplied with well-proven equipment which is easy to repair in the event of an accident and easy to maintain for long-term trouble-free operation. We believe in high quality in every respect.

Steel structure quality

The ramp is designed as a flat top plate with an open web construction to meet the demands for torsional strength due to the movements of the hull or heel of the ship. High tensile steel is used throughout the ramp as standard.

Fixed wheel kerbs are fitted at each side of the driveway and fixed or foldable handrails wherever possible. Elsewhere, portable handrails are employed.

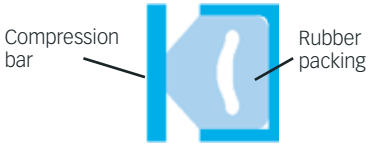
Open web construction

Quality of fittings

Shafts and pins exposed to the weather are of stainless steel. Main hinges and cylinders are fitted with spherical bearings.

Sealing and securing quality

The team of MacGregor engineers have developed an efficient and secure watertight seal. The result is a simple but high-performance design.

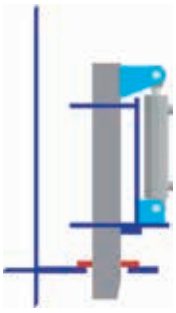


Sealing

A rubber packing is placed in and around the perimeter of the opening of the hull. When closing the ramp the rubber is pressed against compression bars made of stainless steel. These have a very smooth surface to guard against any penetration of water. The packing is of the sliding type which allows relatively large racking deflection of the stern opening.

The ramp is secured in the closed watertight position by hydraulically operated hook cleats and bolts. They are well-proven MacGregor innovations which can be relied upon in all weathers. The hooks are placed above the stern opening and the bolt cleats at each side of the opening.

Hook cleat

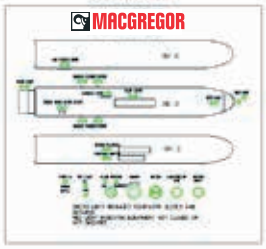


Bolt cleat

Safety quality

Being the market leader, MacGregor's ship experts are invited by national authorities and classification societies to use its expertise and experience, gained from numerous installations, to help develop and evaluate new rules and regulations.

Your MacGregor stern ramp will incorporate a number of items of safety equipment regulated by classification societies and authorities. When the ramp is closed and cleated, the true status is confirmed by the indicator lamps both at the operating panel and the bridge panel.



Bridge panel

By-pass valves (float valves) are fitted in the system to ensure that the hydraulic cylinders have un-restricted movement when the ramp is supported on the quay. Custom designed load control valves are normally fitted directly on the cylinders. This will prevent the ramp from falling down in the event of hydraulic or electrical failure.

Only high quality components of marine design from approved suppliers are used in MacGregor equipment.

MacGregor *is the world's leading brand of engineering solutions and services for handling marine cargoes and offshore loads. MacGregor products serve the maritime transportation, offshore and naval logistics markets, in ports and terminals as well as on board ships. Our cargo flow solutions integrate cargo access, stowage, care and handling functions to suit a particular ship's cargo profile. This benefits its productivity, environmental impact and profitable service lifetime.*

MacGregor *is part of Cargotec. Cargotec's class B shared are quoted on NASDAQ OMX Helsinki.*

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