



*Lifting & Handling operations*

## 7.3. Overhead and Gantry Cranes

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Summary of chapter 7

- **Detailed program**
  - Chapter 7.0: Forklift
  - Chapter 7.1: Aerial Platform
  - Chapter 7.2: Lifting accessories
  - **Chapter 7.3: Overhead / gantry crane**
  - Chapter 7.4: Truck crane
  - Chapter 7.5: Mobile crane
  - Chapter 7.6: Offshore crane

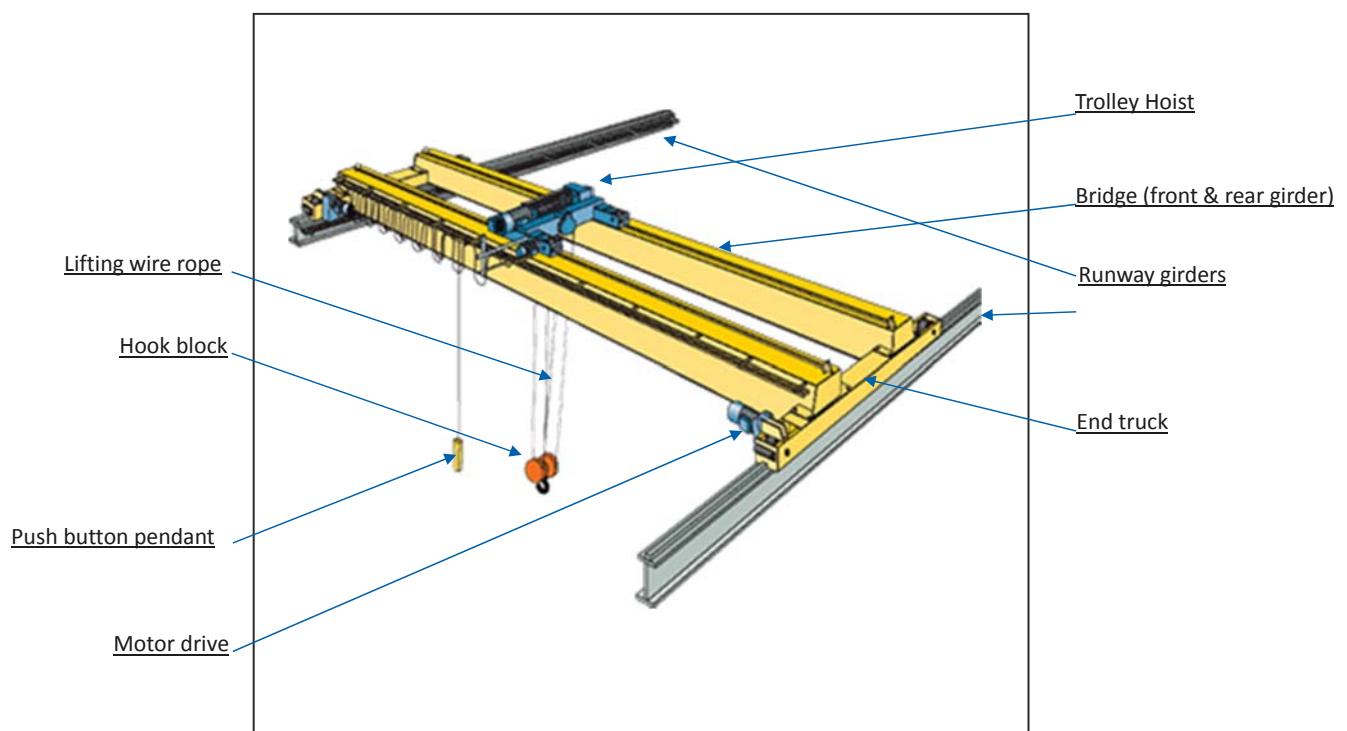
# Chapter 7.3: Overhead and gantry cranes

- **Technology and constitution**
  - **Stability conditions**
  - **Risk prevention and inspection**
  - **Specific risk analysis for overhead and gantry cranes operations**
- CR EP LSO 520 appendix 1

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## Technology and constitution

### Overhead cranes



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## General description

- Overhead cranes run on an elevated runway system along the length of a factory and are adapted to carry a suspended load horizontally. They provide three axis of hook motion:
  - the hoist moves the load up and down,
  - the trolley moves the load right and left,
  - the bridge of the crane moves the load forward and backward.



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# Technology and constitution

## Components

### Trolley hoist



- The unit consisting of both the hoist and the trolley frame. In situations where more than one hoist is required on one crane, hoists can be mounted on a single trolley or on separate trolleys.

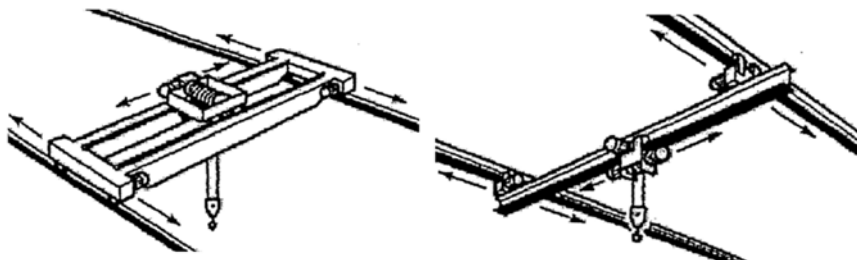
### Hoist



- The hoist is mounted to the trolley and performs the actual lifting function via a hook or lifting attachment. There are two basic types of hoist:
  - Wire Rope hoist which is very durable and will provide hoist long term, reliable usage;
  - Chain hoist used for lower capacity, lighter duty applications.

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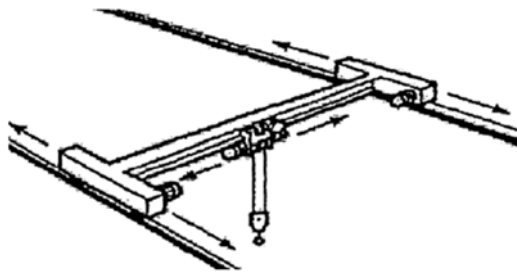
## Overhead cranes types



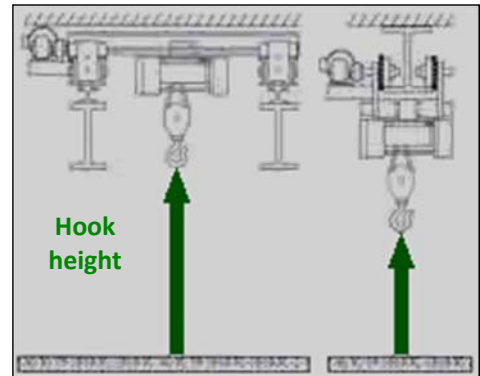
Top running bridge crane  
(double girder)

Underhead bridge crane

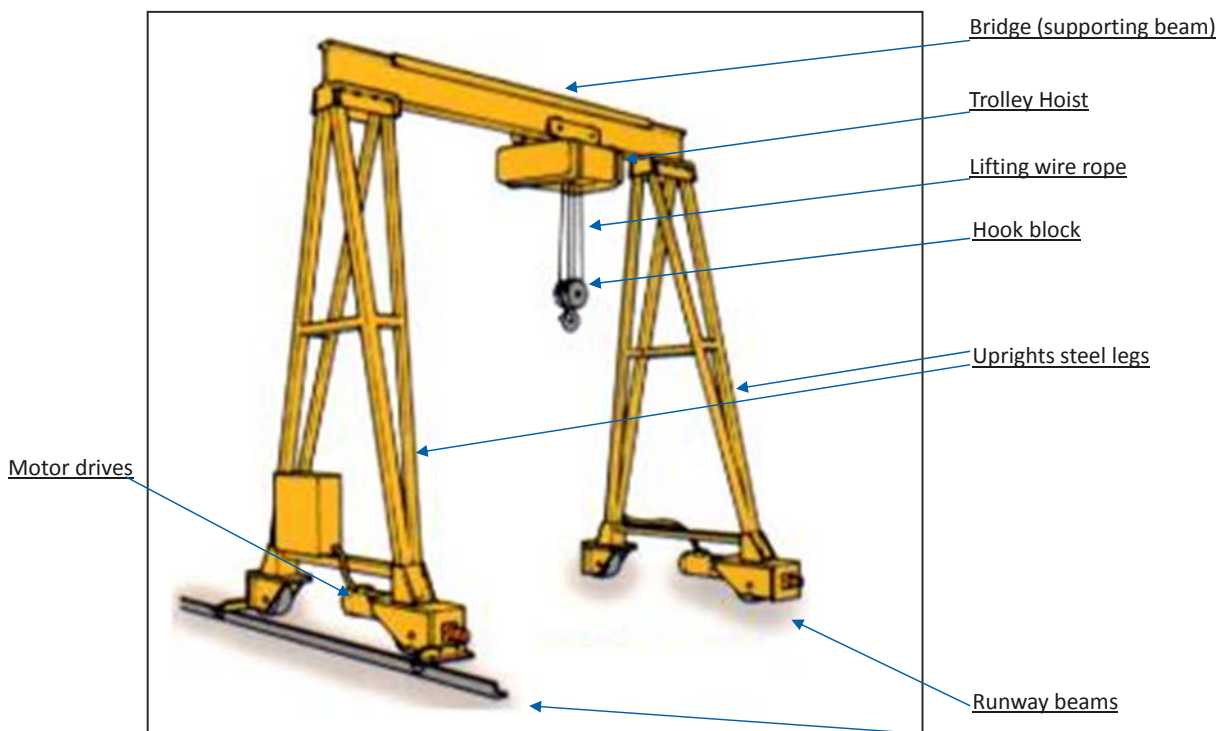
- The principle difference between single and double girder cranes is hook height (how far above the floor your hoist will lift). Double girder cranes provide better hook height.



Top running bridge crane  
(single girder)



## Gantry cranes





## General description

- Cranes which lift objects by a hoist which is fitted in a trolley and can move horizontally on a rail or pair of rail fitted on a supporting beam.
- This mechanism is supported by uprights, rigid steel legs, usually with wheels at the foot of the uprights allowing the whole crane to traverse.



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# Technology and constitution



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## General description

- Most gantry crane installations are outdoors such as construction site and stockyards. Special tracks are installed, usually with steel beams to allow the crane to travel in its working area.



## Track less cranes

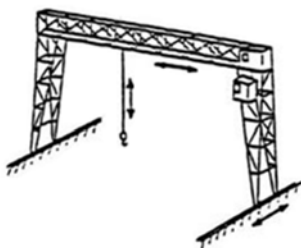
- However, gantry cranes are also available running on rubber tyres so that tracks are not needed therefore eliminating travel barriers, and permits unobstructed access to the cranes' work area by forklifts and personnel.

## Single-Leg Gantry

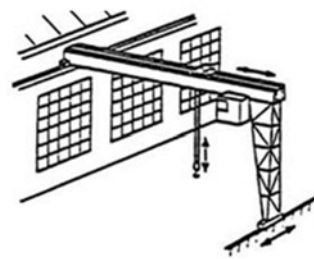
- A combination of the bridge crane and gantry crane. One leg rides on the floor, while the other side's end truck rides on a runway beam.

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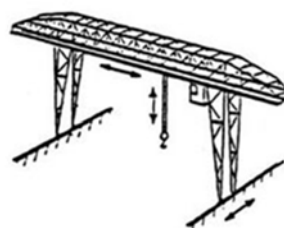
## Gantry cranes types



Gantry crane



Semi-Gantry crane

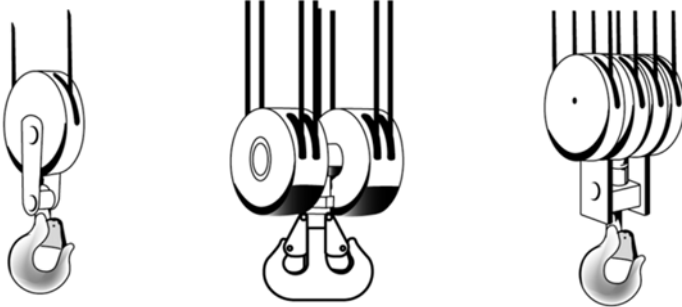


Cantilever Gantry crane





















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## Hook types



**Safety catch is mandatory on hooks for lifting and handling operations.**

## Control commands

	Normal speed	High speed	Normal & High speed
LIFTING	 	 	 
TROLLEY TRAVELING	 	 	 
BRIDGE TRAVELING	 	 	 



Operator cab



Push button pendant

or

Remote control



# Chapter 7.3: Overhead and gantry cranes

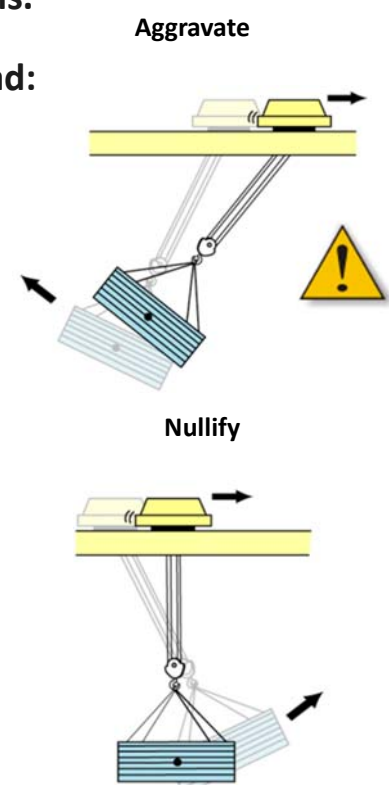
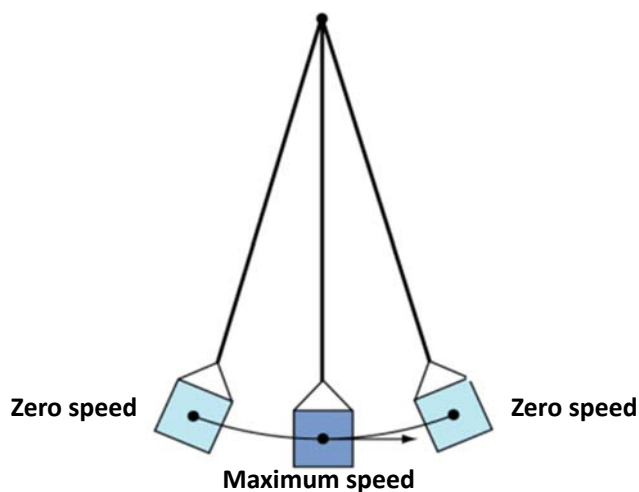
- Technology and constitution
  - **Stability conditions**
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## Stability conditions

### Swinging load

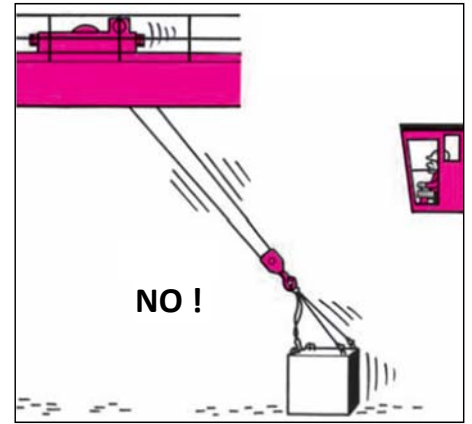
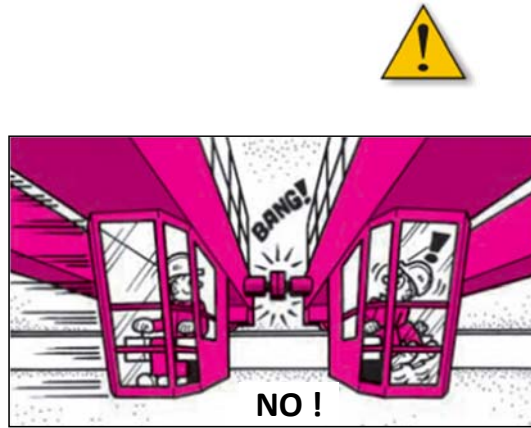
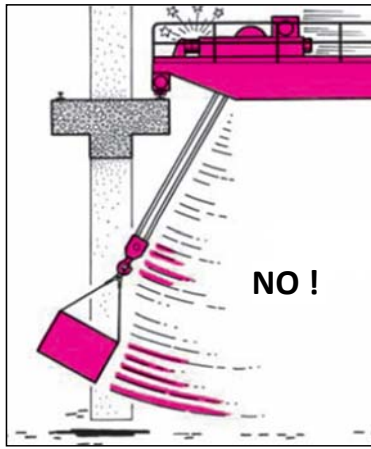
- Do not allow a load to swing and avoid violent motions.
- Operate the trolley to nullify the swinging of the load: follow the load's movement.



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## Unauthorized movement or use



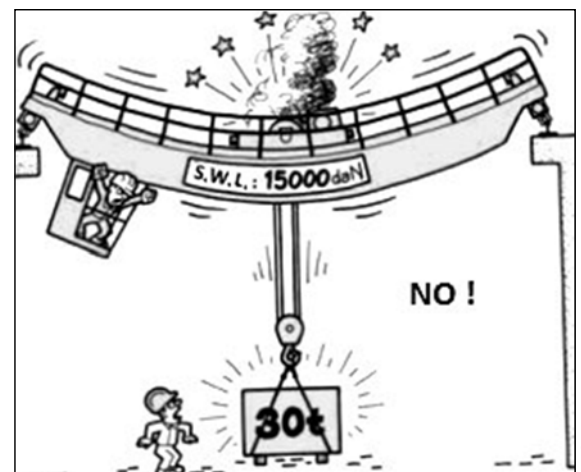
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## Risk associated with the use of overhead and gantry cranes

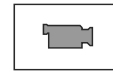
- When not in use
  - Crane parked. Load on the ground, not on the hook. Hook in maximum upper position.
- Swinging loads - Shock with the personnel, mobile or fixed obstacles
  - Avoid sudden stops or accelerations. Operate the trolley to nullify the swinging. Assure regular maintenance of the movements braking system. Survey the site for potential interference, and working anti collision device.
- Falling loads
  - Severe hazard to operators and nearby workers. Never exceed the load capacity. Properly secure the loads, and working top and low limit switches.
- Structure collapsing – End truck falling
  - Never exceed the load capacity. Inspect structure and safety devices.
- Personnel falling
  - Use appropriate path to access the operator's cab.



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Overhead crane – Load falling



Overhead crane collapsing



Gantry crane interference



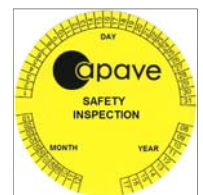
## Risk prevention and inspection



- All Cranes shall be subject to a **general visual inspection by the crane driver either daily or before use**. The results of this daily inspection shall be recorded in the crane log book normally in the form of a signed check list.

### Daily general visual inspection

- On a **weekly basis** the crane driver shall **inspect the moving and static wire ropes** along their entire working length. The **crane alarms and limit switches shall be function tested** along with its **brake and load cell**. On **lattice structure** cranes the complete **boom section** shall be visually inspected for damage. All weekly checks shall also be recorded in the crane log book by the crane driver.



### Wire ropes and safety devices inspected weekly

- At a **six monthly** frequency the **complete crane** shall be subject to a **thorough examination**. Lattice structure booms shall also be subject to a general visual inspection every six months AND during boom changes.

### Thorough examination half-yearly of complete crane and lifting equipment associated and load test

ODAVE OVERHEAD / GANTRY CRANE CONDITION CHECK REPORT		06
Inspector: M. Reyes / P. Bennett (Tech)	Date: 27 to 28/11/2009	Client: H&M/COOCS
INSPECTED EQUIPMENT		
Inspection according to TGH, CE EXP 311 and relevant standards		
Line identification: 08	Location: PRESSURE VESSELS division	
Manufacturer: Technical Crane Ltd	Serial number: F383	
Type: Double girder	Year of manufacture: 1998	
Capacity (kg) max/min: 15T	Span (m):	
Height (m):	Load test date:	
Number of manufacture: CE	Conforming (Y/N):	CE
SPECIAL FEATURES		
Accessories: Double girder over head crane, travelling on runways, all rollers and heads SSP, Knafractrak		
Bridge type or crane: Double girder	Power supply: 415V 50Hz	
No. of rollers: 7	Maximum height (m):	
	Controls (cable or floor):	Open cab
LOAD TEST (last performed)		
Max. test load (t):	Auxiliary test load (t):	
INSPECTION RESULTS		
The test and examination of this appliance did not reveal problems requiring his stop. However, take account of the remarks below:		
<ol style="list-style-type: none"> <li>1 Improve safety of access to operator stand</li> <li>2 Place lock nuts on operation cab attaching bolts</li> <li>3 Install bearing and operating limit switches</li> <li>4 Hoisting performed on structure (before after installation (under procedure, certification))</li> <li>5 Electric collector to be replaced by installed type</li> <li>6 Check the supporting structure assembly (bolts found tightened)</li> <li>7 Install a permanent access to master switch and upper parts or provide a 'lively picket' permanently available on site</li> <li>8 Install an collision device with 10.3 CE code</li> </ol>		
<b>REPAIR</b>		

# Chapter 7.3: Overhead and gantry cranes

- Technology and constitution
- Stability conditions
- Risk prevention and inspection
- **Specific risk analysis for overhead and gantry cranes operations**

CR EP LSO 520 appendix 1

## Specific risk analysis applied to lifting operations done with overhead and gantry cranes

Complete the following table to determine if the lifting operation is CRITICAL.		Yes	No
1.	This lifting operation has never been carried out before.		
2.	A specific procedure is required since there is no prior documented procedure and no suitable general procedure for the lifting operation.		
3.	The personnel is not familiar with the equipment / devices to be used.		
4.	The lifting exceeds 80 % of the capacity of the cranes at the radius used.		
5.	Lifting using more than 85 % of the maximum jib length.		
6.	The load will travel above an installation where a process is in progress / above unprotected machines (the crane moves with the load suspended).		
7.	Lifting above, beyond or near active installations (crane stationary).		
8.	Once lifted, it is more dangerous to recover the load than to place it at its final location.		
9.	Lifting of personnel.		
10.	Horizontal or vertical lifts over 40 tonnes.		
11.	Lifting over 20 tonnes requiring a jib dimension over 160ft.		
12.	Lifting using a fixed or luffing fly jib over 10 tonnes (lattice boom crane) or 5 tonnes (hydraulic crane).		
13.	Lifting from a boat / barge liable to move greatly during the operation.		
14.	Lifting in a zone where environmental conditions play a major role (high tide variations, bad visibility due to fog, extreme temperatures, etc.).		
15.	Load without specific lifting points or with sharp edges.		

**If the answer to any one of the above questions is YES, it is a CRITICAL LIFTING OPERATION and the operation must be the subject of an in-depth study before it can be carried out.**



# Specific risk analysis applied to lifting operations done with overhead and gantry cranes

16	Lifting requiring a prior modification of the lifting equipment.		
17	Lifting requiring a special lifting equipment configuration (e.g. tower crane for a crawler crane or Super Lift configuration).		
18	Lifting requiring special lifting equipment to be designed or manufactured.		
19	Lifting loads over 20 tonnes requiring the load to be moved with a crawler crane or mobile crane.		
20	Use of two or more cranes (multi-crane operation).		
21	Crane movement / lifting near high voltage power lines, at a distance less than the recommended safety distance.		
22	Lifting involving high-value loads.		
23	Lifting a major component whose loss: would stop operations for a long period; would represent an unacceptable risk of personnel accidents or equipment damage; would result in the discharge of dangerous substances; would cause undetected damage which would create future safety problems.		
24	The load's centre of gravity is above the lifting points or the centre of gravity is high.		
25	The weight of the load is unknown and/or the load's size or shape makes it difficult to handle.		
26	The load can be easily damaged, e.g. by twisting a long flat load.		
27	The load must be rotated (e.g. 2 cranes lifting a column) or be moved diagonally (e.g. 2 or more cranes moving with a load).		
28	Lifts in a confined space or in a zone where the max. hook height is limited.		
29	The load has a large surface area which can act like a sail.		
30	The lifting operation is carried out under water or involves divers.		

**If the answer to any one of the above questions is YES, it is a CRITICAL LIFTING OPERATION and the operation must be the subject of an in-depth study before it can be carried out.**