



FEDERATION EUROPEENNE DE LA MANUTENTION  
Section IX  
STORAGE AND RETRIEVAL MACHINES

**FEM**  
**9.871**

**Logbook for Storage and  
Retrieval Machines and Transfer Devices**

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Fédération Européenne de la Manutention (Section IX)

## Foreword

This logbook for storage and retrieval machines and transfer devices was produced in a working group within the German national committee and adopted by the Technical Sub-Committee "Storage and Retrieval Machines, Stacker Cranes". Efforts were made to adapt the logbook to the requirements of the European Machinery Directive.

A logbook shall be permanently allocated to every individual storage and retrieval machine and to every transfer device.

## 1 Scope

The logbook applies to all types of machines restricted to the rails on which they travel within and outside of aisles which embody lifting means and may embody lateral handling facilities for the storage and retrieval of unit loads and for long goods such as bar materials and/or order picking or similar duties. Also included is the transfer equipment used to change between aisles. Control of the machines may range from manual to fully automatic.

## 2 Object

The purpose of this document is to provide manufacturers of storage and retrieval machines and transfer devices with a standard logbook which contains the most important data including tests, inspections and records thereof for the machine in question.

The logbook may be adapted by each manufacturer to suit his special needs. However, the contents of this document should be included as minimum requirements.

One logbook shall be made for each storage and retrieval machine and for each transfer device. It must be filled in with the data related to that machine.

## 3 Abbreviations

For better understanding, the following abbreviations are used:

SRM:	Storage and retrieval machine
TD:	Transfer device
MD:	EC Machinery Directive

## 4 Terminology used in the logbook

The terms are listed in the order of their occurrence in the logbook. The definitions are listed to explain these terms. As the arrangement of the terms reflects the different form sheets in which they appear some of the terms are listed several times. This terminology relates to standard machines and should not be considered exhaustive.

### 1 Specification sheet for storage and retrieval machines/ transfer devices

Manufacturer	The Company responsible for the design and manufacture of the machine and the issue of the declaration of incorporation.
Model designation	Model designation designation specific to the manufacturer
Serial number	Number allocated to an individual machine as [definitive] [unequivocal] identification within the family of numbers used by that manufacturer
Year of construction	The year in which the machine was built.
Rated load	The weight of the maximum load that the load handling device may pick up during operation as intended, excluding the weight of any operator(s).

	For TD's: the mass of the complete SRM, with its rated load and including the operator, if applicable.
Type of SRM/TD	Singe or dual mast machine.
Structure classification	Classification of the supporting structure into lift categories (a function of lift speed) and stress groups (function of stress spectrum and frequency), e. g. FEM 9.311
Dead-weight (mass) of SRM	Mass of the complete SRM without rated load, test load and operator.
Dead-weight /mass) of Lifting carriage	Weight (mass) of the complete lifting carriage without rated load, test load and operator. The lifting carriage includes all components and assemblies which are moved vertically with the vertical movement of the SRM. Components and assemblies which only partially move with the lifting carriage, e.g. an energy supply chain, are included on a pro rata basis.
Mode of operation	<ul style="list-style-type: none"> <li>• manual (requires an operator on the machine)</li> <li>• automatic (no operator required.)</li> </ul> <p>Model designation of operator's position classified by the extent of manual operation.</p> <ul style="list-style-type: none"> <li>• Emergency control position: Protected position from which the machine may be controlled during an emergency or for maintenance,</li> <li>• Driving position: A position on or off the machine from which the movements of the machine may be controlled.</li> <li>• Operator's position: Position on or off the machine comprising the driving position and the operator's work area.</li> <li>• on the lifting carriage (travelling vertically)</li> <li>• stationary on the SRM (not travelling vertically), or otherwise, e.g. in the aisle or in the access area.</li> </ul>
Height of SRM	Vertical distance between the surface of the floor on which the travel rail is anchored to the bottom surface of the rack head carriage.
Height of a TD	the overall height taken from the floor surface.
Extension travel (reach)	the length of the path on which the load can be moved by the load holding device from its starting position at right angles to the aisle.
Wheelbase	distance between the axles of the two track wheels of the bottom carriage or travel unit.
Track width	distance from centre to centre of track rails (TD's)
Unobstructed aisle width	smallest width of the unobstructed section profile of the rack aisle, measured between unit loads, or, as the case may be, between rack struts.
Track rail profile	profile and, if applicable, the standard for the track rail
Operating voltage	nominal voltage in Volts and frequency in Hertz of the electric power supply system for machine operation.
Control voltage	nominal voltage in Volts and frequency in Hertz of the electric power supply system for control of the machine.
Total connected load	maximum apparent power drawn simultaneously from the power supply by several electric devices.

Units	drive modules for movements in one axis.
FEM 9.512 classification	classification of mechanism into groups composed of the daily operating time and the load spectrum, i.e. the cubic mean value of the relative payload.
Speed $v$	speed of linear movement that each mechanism achieves, in m/min  $v_x$ = horizontal speed $v_y$ = vertical speed $v_z$ = horizontal speed at right angles to the track rail.
Motors	
• Model	Model designation specific to the manufacturer of the drive motor.
• Power $P$	rated electric power of the drive motor in kW
• Speed $n$	speed of the drive motor in RPM
• Duty cycle	projected duty cycle of the drive motor as a percentage. i.e. the relative running time of the motor during operation.
• Type of control	Control of mechanisms for travel, lifting, load handling device, e.g. 3-phase AC, with reversal of poles, 3-phase AC with frequency converter, DC, stepping motor, servomotor (electronically commutated synchronous drive)
• Type of brake	e.g. disk brake, multidisk brake, cone brake, drum brake.
Travel unit	Drive module for moving the entire machine in horizontal travel direction (x-direction, parallel to the track rail).
Hoist unit	Drive module for vertical movement of the entire lifting carriage (y-direction, vertical to the track rail).
Load handling device	module attached to the lifting carriage for picking up and releasing unit loads in relation to the lifting carriage (usually in z-direction, at right angles to the track rail).
Overspeed governor	device to trip the safety gear when the lifting carriage reaches a critical drop speed.
• Type tested	indication whether or not a type testing certificate from an independent test institute exists for the overspeed governor.
• Operating speed	rated lowering speed of the lifting carriage for which the overspeed governor has been designed.
• Tripping speed	lowering speed of the lifting carriage at which tripping of the overspeed governor takes place (usually 40 to 70% above operating speed).
Safety gear	device to decelerate and stop the lifting carriage on triggering of the overspeed governor.
• Type	braking method used, e.g. catching device or friction braking device.

- Type tested indication whether or not a type testing certificate from an independent test institute exists for the safety gear.
- Load control device for controlling the load (e.g. overload, slack rope).
- Type e.g. electromechanical with microswitches or elastoelectric with strain gauges and processing logic.
- End stop device end stop device for the travel movement of the machine in case, because of a disorder, the machine moves past the operating end stop position.
- Type Type of shock absorption e.g. hydraulic, with elastomere components or by friction.
  - Compressed in normal operation indication whether or not in normal operation the buffer at the end stop is compressed by the machine.
  - Buffer path maximum displacement of the buffer within which the machine must be brought to a halt in an emergency.
- Guarding of ladder-access safety gear enabling safe access and egress to and from the machine when using a ladder.
- Type a flexible rope as the supporting element in combination with a fall braking device and a parachute harness, alternatively a rigid bar as the supporting element.
  - Type tested indication whether or not a type testing certificate from an independent test institute exists for the guarding of the ladder access.
- Suspension/traction transmission element which elements are used to transmit suspension/traction forces for drives and other assemblies.
- Type e.g. wire cable, fibre rope, profile belt, chain
  - Dimensions standard dimension designation of the transmission element.
- ## 2.2 Test/inspection report
- EN 528 "Rail dependent storage and retrieval equipment- safety"
- Design verification the verification of design and manufacturing documentation by a qualified person authorised to do so (see EN 528, Section 9.2a).
- Verification of conformity Verification that the machine has been manufactured in conformity with design specifications and proper workmanship, by a qualified person authorised to do so (see EN 528, Section 9.2b).
- Acceptance testing testing under load, a test of the efficacy of safety gears, a check on proper assembly and installation as well as a verification of completeness and correctness of entries in the manufacturer's documentation by a qualified person duly authorised to do so (see EN 528, Section 9.2c).

### 3.1 Periodic inspection and testing

Periodic inspection and testing      Machines shall be inspected for operational safety in accordance with the instruction handbook but at least once a year. This periodic inspection and testing must be carried out by persons authorised for this duty in accordance with national regulations. (See EN 528, Section 10.4.2).

### 3.2 Testing of suspension elements

Function      Function of suspension elements, e.g. for the hoist unit, safety gear.

Classification      classification of suspension element in accordance with the technical guidelines.

### 3.3 Testing of safety gear

Type of safety gear      braking method used, e.g. catching device or friction braking device.

Model designation      Model designation specific to the manufacturer of the safety gear.

Manufacturer      manufacturer of the safety gear.

Setting      for adjustable safety gears, setting data can be recorded so that in case of replacement or maintenance the original condition can be reconstituted.

### 5.1 Records of safety gear trippings (hoist unit)

Model designation      Model designation specific to the manufacturer of the safety gear.

Position when triggered      from recordings of the height position when triggered, conclusions can be drawn, in cases of repeated triggering, as to whether proneness to disorders is locally defined or independent of location.

Payload when triggered      the load caught, in connection with the stopping distance, permits conclusion to be drawn on the correct setting of the safety gear.

Measured braking path      Length of brake marks on the catching rail.

### 5.2 Records of buffer collisions during operation (travel unit)

Position      definitive identification of the buffer by indicating its position in relation to the aisle.

Compressed in normal operation      indication whether or not in normal operation the buffer at the end stop is compressed by the machine.

Speed at collision      to the extent possible, persons who have witnessed a buffer collision should classify the severity by estimating the relative speed at collision.

### 5.3.1 Records of replacement or repair of safety related parts

Safety related parts      The enclosed list of safety related parts should not be considered exhaustive, especially where special designs are used.

**Logbook**

Page of

Serial No.:

# Logbook for

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**Serial No.:**

\_\_\_\_\_

**User: Company**

\_\_\_\_\_

\_\_\_\_\_

**Place**

\_\_\_\_\_

## Contents of Logbook

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Serial No.:

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Certificate for suspension element:	Hoist unit Safety gear
Safety gear	Test certificate
Overspeed governor	Test certificate Description of function
Guarding of ladder-access	Test certificate Parachute harness Rope with retractor Fallarrester gear

\* These documents are added to the logbook by the manufacturer.



<b>1 Specification sheet for SRM</b>						Page	of	
						Serial No.:		
Manufacturer _____ Model designation _____ Serial No. _____ Year of construction _____ Rated Load _____ kg + Operator. _____ SRM description _____ Operation: manual ± automatic ± emergency control stand ± operator stand ± driver's stand ± on lifting carriage ± on SRM stat. ± other. ±			Structure classification Standard _____ H _____ B _____ dead-weight (mass) of SRM _____ kg of which lifting carriage _____ kg rated load _____ kg SRM-height _____ mm extension travel (reach) _____ mm wheelbase _____ mm unobstructed aisle width _____ mm track rail profile _____					
Operating/control voltage _____ / _____ V / _____ Hz						total connected load _____ kW		
Units	Classificat	speed. v[m/min]	motors Model	P[kW]	n [min <sup>-1</sup> ]	PDC %	Description of control	Description of brake
	FEM 9.512							
Drive unit								
Hoist unit								
Load handl. device								
<u>Overspeed governor</u>				<u>Safety gear</u>				
Type tested		yes ±	no ±	Type tested		yes ±	no ±	
operating speed $V_{ynom}$		_____ m/s		Type:				
Tripping speed $V_{vtdg}$		_____ m/s		Dead stop gripping dev. ±		Friction braking dev. ±		
<u>Load control</u>				<u>End stop device</u>				
Type: _____				Position: top ± bottom ±				
<u>Guarding of ladder access</u>				Designed for _____ % of $V_{xnom}$				
Type tested		yes ±	no ±	Compressed in normal operation		yes ±	no ±	
Type		flexible rope ±	rail ±	buffer path: top _____ mm, bottom _____ mm				
				Type top: hydr. ± elastomere ± friction ±				
				Type bottom: hydr. ± elastomere ± friction ±				
<u>Lifting traction unit</u>				Place, date _____				
Axle	Type	Dimension		Stamp and Signature _____				
Hoist unit								
Safety gear								
Drive unit								

<b>1 Specification Sheet for Transfer devices</b>						Page      of		
						Serial No.:		
Manufacturer _____ Model designation _____ Serial No. _____ Year of construction _____ Rated Load _____ kg      +      Operator. _____ Description of TD _____ Operation:              manual ±              automatic ± emergency control stand              ±      operator stand ± driver's stand                                      ± on SRM              ±              on TM ±              other. ±			Structure classification Standard _____              H _____, B _____ dead-weight (mass) of SRM              _____ kg rated load                                      _____ kg TM height                                      _____ mm wheelbase                                      _____ mm track width                                      _____ mm track rail profile                                      _____ mm					
Operating/control voltage _____ / _____ V      /      _____ Hz					Total connected load      _____ kW			
Mecha- nisms	Classificat. FEM 9.512	speed. v[m/min]	motors Model designati on	P[kW]	n [min <sup>-1</sup> ]	PDC %	Description of control	Description of brake
Drive unit								
<u>End stop device</u> Type.: hydraulic ±      elastomere ±      friction ±				designed for              _____ % of v <sub>nom</sub> compressed in normal operation yes ±      no ± buffer path                                      _____ mm				
Place, date : _____								
_____ Stamp and Signature								

<b>2.2 Test Report</b> <b>2.2.1 Verification of Design/Conformity</b>	Page      of
Serial No.:	
<p>Indicate which verifications have been made and describe procedure of the verifications in accordance with EN 528 (For machines designed and built to EN 528 the verifications of design and of conformity are replaced by the manufacturer's declaration enclosed in 2.1.</p> <p><b>Design verification:</b></p> <p>_____</p> <p>Place, date</p> <p>_____</p> <p>Stamp and signature of authorised person</p> <p><b>Verification of conformity:</b></p> <p>_____</p> <p>Place, date</p> <p>_____</p> <p>Stamp and signature of authorised person</p>	

<b>2.2 Test Report</b> <b>2.2.2 Acceptance test</b>	Page      of
	Serial No.:

Following EN 528, Section 9.2.1, the acceptance test must be carried out on the user's premises on the system fully installed and ready to operate; it also covers the environment of the installation such as guards, access ways, transfer stations, etc. Among other things, this acceptance test is a prerequisite for the declaration of conformity for the entire system.

**Acceptance test:**

\_\_\_\_\_

Place, date

\_\_\_\_\_

Stamp and signature of authorised person

<b>3.1 Record of periodic inspection and testing</b>		Page      of
		Serial No.:
Indicate which periodic tests and inspections are made and describe procedure following EN 528, Section 10.4.2.		
Interval:      times per year or once every      years		
Theoretical design data:      _____	Working days / inspection interval:      _____	
Operation in hours/day:      _____		
Working days /Inspection interval:      _____	Operation in hours/day:      _____	
End of inspection interval      ±		
Exceptional repair/conversion      ± (see also Section 5.3)		
The periodic inspection has been carried out.: No <sup>1)</sup> defects were found- see inspection records <sup>1)</sup> . sheet no.:      _____		
Date/signature (inspector)      _____		Date/signature (user) <sup>2)</sup> _____
Working days /Inspection interval:      _____		Operation in hours/day:      _____
End of inspection interval      ±		
Exceptional repair/conversion      ± (see also Section 5.3)		
The periodic inspection has been carried out.: No <sup>1)</sup> defects were found- see inspection records <sup>1)</sup> . sheet no.:      _____		
Date/signature (inspector)      _____		Date/signature (user) <sup>2)</sup> _____
Working days /Inspection interval:      _____		Operation in hours/day:      _____
End of inspection interval      ±		
Exceptional repair/conversion      ± (see also Section 5.3)		
The periodic inspection has been carried out.: No <sup>1)</sup> defects were found- see inspection records <sup>1)</sup> . sheet no.:      _____		
Date/signature (inspector)      _____		Date/signature (user) <sup>2)</sup> _____
Working days /Inspection interval:      _____		Operation in hours/day:      _____
End of inspection interval      ±		
Exceptional repair/conversion      ± (see also Section 5.3)		
The periodic inspection has been carried out.: No <sup>1)</sup> defects were found- see inspection records <sup>1)</sup> . sheet no.:      _____		
Date/signature (inspector)      _____		Date/signature (user) <sup>2)</sup> _____
<b>Notes:</b> 1) Delete what is not applicable 2) Confirmation of the user to confirm that since the last inspection the machine has been operated in accordance with the operating instructions and as it is intended..		



<b>3.3 Inspection of Safety gear</b>		Page    of
		Serial No.:
Type/Designation:		
;Manufacturer:		
Setting		
<b>Initial setting and commissioning of safety gear</b>		
	Date	Name/Signature
<b>Further adjustments and inspections:</b>		
Reason:	Date	Name/Signature
Reason:	Date	Name/Signature
Reason:	Date	Name/Signature
Reason:	Date	Name/Signature
Reason:	Date	Name/Signature
Reason:	Date	Name/Signature





<b>5.2 Record of Buffer Collisions during Operation (drive unit)</b>		Page      of
		Serial No.:
Type/Designation:		
Manufacturer:		
Designed for	$\% V_{xnom}$	
Arrangement/position of buffer	front front area top	±      rear ±      rear side ±      bottom
Buffer collision occurred	on: _____	at: _____ am/p.m.
Reason for buffer collision: _____		
Collision speed	$\approx 100 \% Vx \quad \pm$	$\approx 50 \% Vx \quad \pm$ $< 10 \% Vx \quad \pm$
Comment: _____		
Buffer collision recorded by:	_____	_____
	Date	Name/Signature
Work executed/ observe operator's instructions: _____ _____ _____		
Components replaced: _____ _____ _____ _____		
Checks/work executed by:	_____	_____
	Date	Name/Signature
<p><b>Note:</b> After every unplanned buffer collision the manufacturer of the storage and retrieval machine must be informed and the above record sheet must be filled in. Repair of the disorder must be by specialised personnel only! In cases of doubt call manufacturer.</p>		

<b>5.3 Records</b> <b>5.3.1 Replacement or Repair of Safety Relevant Components</b>		Page	of
		Serial No.:	
Maintenance work on safety related parts or assemblies may be carried out only by specialised personnel of the manufacturer of the storage and retrieval machine or by duly authorised persons.			
Safety-relevant component	replaced or repaired	Date	Signature
Safety gear			
Overspeed governor			
Overspeed governor rope			
End of aisle equipment, e. g. limit switch, ultimate limit switch, buffer, speed monitoring			
Overload measurement			
Safety related actuators			



Erstellt durch den Technischen Unterausschuß "Regalbediengeräte und Stapelkrane" der Sektion IX der Fédération Européenne de la Manutention (FEM)

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