



FEDERATION EUROPEENNE DE LA MANUTENTION
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SERIES LIFTING APPLIANCES

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**Project Planning Data for Selection of Drives for
Storage and Retrieval Machines**

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Fédération Européenne de la Manutention (Section IX)

1 Introductory remarks and objectives

This guideline is intended to lay down the essential framework and environmental conditions for the selection and design of drives for storage and retrieval machines and to give clarity and explicitness for customers, system planners, those responsible for systems and manufacturers of storage and retrieval machines. Compliance with the EC Machinery Directive and harmonised standards also requires clear arrangements between the partners in the system.

The checklist in chapter 6 is intended to serve as an information sheet for the customer, a technical description for the system planner and as a design basis for the manufacturer of storage and retrieval machines.

2 Scope

This guideline applies to rail-guided, electrically driven storage and retrieval machines and also to transfer devices for storage and retrieval machines.

3 Definitions and abbreviations

Drive: unit consisting of motor, power dividers, control part, gearbox, mechanical brake, analogue position feedback transmitter for speed and, if applicable, positional control

EMC: EC Directive "Electromagnetic compatibility" 89/336/ECC as amended by Directives 92/31/ECC and 93/68/ECC

General overhaul: A general overhaul is understood to be the measures taken by the manufacturer for the testing and/or replacement of parts when the calculated useful life has been reached in order to gain a further "safe working period" (S.W.P.) (also see FEM 9.755).

Load handling attachments (LHA): Serves to pick up the load make-up accessory (e.g. pallet) with load or the load directly.

Mains regeneration: Process of feeding electrical energy back into the supply network through the driven working machine in certain operation conditions, for example lowering a load or braking. This is possible on certain drive motors with additional current converters and controllers if applicable.

Positional control: A device for the position-dependant control of the speed of one or more drives in order to control the movement of it/ them to a target which is specified by positional co-ordinates as a nominal value whereby the target is arrived at with a specifiable repeatable accuracy of the position.

4 Design criteria and limiting conditions

The interaction between drive and control technology and the mechanics of the storage and retrieval machine (statics/dynamics/vibration) decisively determines the dynamic behaviour and thus the performance of the storage and retrieval machine. The behaviour (stability) of the load on the load make-up accessory and/or load handling attachment during acceleration and deceleration in operation fundamentally influences the required travelling characteristics of storage and retrieval machines.

According to the demands placed on drives, motors are used which are either step-controlled, continuously controlled or positionally controlled.

Different demands are placed on the design and the travelling characteristics respectively of automatic storage and retrieval machines, manual storage and retrieval machines for order-picking and of transfer units. The incorrect selection at the planning stage of design data to be specified, e. g. operating classification or hoisting class, can result in impracticable limitations and/or increases in price.

The following criteria are essential in the selection of drives for storage/ retrieval machines:

- Masses to be moved
- Tractive resistance
- Service life
- Cycle time

- Positioning accuracy
- Starting and braking characteristics
- Running smoothness, vibrational characteristics

- Mains power supply
- Energy consumption, efficiency, mains regeneration
- Electromagnetic compatibility
- Type of protection

- Commissioning, operational reliability, maintenance

Additionally, the following environmental conditions, in which present-day storage and retrieval machines can operate, are to be considered:

- Surroundings which are extremely dirty and dusty
- Refrigeration plants
- Clean room systems
- Explosion-proof areas
- Chemical stores
- Noise-sensitive environments

5 Project planning data

After the material flow concept has been drawn up, the basic project planning data - length, height, required throughput, ambient conditions, etc. - for the selection or design of the drives for the storage and retrieval machines which was established in the process, are to be based on the checklist for project planning data. The selection and design is carried out by those responsible for the system, normally the manufacturer of the storage and retrieval machine, on the basis of the basic planning data and taking into consideration the possible effects of these influencing factors on the drive concept.