



FEDERATION EUROPEENNE DE LA MANUTENTION  
Section IX  
SERIES LIFTING EQUIPMENT

**FEM**  
**9.751**

**Power driven series hoist mechanisms**  
**Safety**

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## **ANNEX E (INFORMATIVE)**

### **Additional requirements for operation at low temperatures ( $< -10^{\circ}\text{C}$ )**

In the case of series hoist mechanisms designed for operation at low temperatures, attention is drawn to the following, for example:

- Suitability of the materials for load-bearing components
- Suitability of the lubricants
- Suitability of the welding process
- Icing of the motors, brakes and switchgear
- Tendency of the seals to become brittle
- Tendency of the cables and insulation to become brittle
- Tendency of the plastics to become brittle
- Corrosion as a result of dew forming
- Suitability of ropes, chains and belts
- Compliance with relevant standards and regulations
- Test of the complete series hoist mechanism under the specified operating conditions, as required.

## 0 Introduction

This rule has been compiled along the same lines as EN 414 in order to act as a safety rule representing a means for achieving agreement with the fundamental safety and health requirements of Directive 89/392/EEC.

Within the scope of application of this rule, it is stated which hazards are covered. For hazards not covered by this rule, the series hoist mechanisms, where applicable, shall comply with EN 292.

When this rule comes into effect, rule FEM 9.811 shall be withdrawn.

## 1 Scope of application

This rule applies to power driven series hoist mechanisms for lifting and lowering loads.

This rule establishes the safety requirements for constructing and equipping power driven series hoist mechanisms.

Series hoist mechanisms in the sense of this rule are:

- rope hoists winding in single layers with round steel wire ropes (Annex A, fig. 1),
- chain hoists with round steel chains (Annex A, fig. 2) or roller chains,
- belt hoists (Annex A, fig. 3) in the case of which a belt is wound in one winding with several layers on a drum.

Power driven in the sense of this rule means electrically, hydraulically or pneumatically driven.

This rule covers the specific hazards given in section 4 that can arise when putting into service, operating and maintaining series hoist mechanisms.

This rule does not apply to series hoist mechanisms intended for lifting persons.

Additional requirements shall be taken into consideration for automatically controlled series hoist mechanisms.

## 2 References to standards

- EN 292      Safety of machinery -Basic concepts, general principles for design -  
Part 1: Basic terminology, methodology  
Part 2: Technical principles and specifications
- EN 294      Safety of machinery - Safety distances to prevent danger zones being reached by the  
upper limbs
- EN 349      Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
- EN 418      Safety of machinery - Emergency stop equipment, functional aspects - Principles for design
- EN 954-1    Safety of machinery - Safety-related parts of control systems -  
Part 1: General design principles
- EN 982      Safety of machinery - Safety requirements for fluid power systems and their components -  
Hydraulics
- EN 983      Safety of machinery - Safety requirements for fluid power systems and their components -  
Pneumatics
- EN 1037     Safety of machinery - Prevention of unexpected start-up
- EN 1050     Safety of machines - Principles for risk assessment
- EN 60204-32 Safety of machinery - Electrical equipment of machines -  
Part 32: Particular requirements for hoists
- prEN 818-7   Short link chain for lifting purposes - Safety -  
Part 7: Fine tolerance chain for hoists, Grade T (Types T, DAT and DT)
- prEN 12077-1 Crane safety - Requirements for health and safety -  
Part 1: Controls and control stations
- prEN 12077-2 Crane safety - Requirements for health and safety -  
Part 2: Limiting and indicating devices
- prEN 12644-2 Crane safety - Requirements for inspection and use -  
Part 2: Marking
- prEN 13411-4 Terminations for steel wire ropes - Safety - Part 4: Metal and resin socketing
- prEN 13411-6 Terminations for steel wire ropes - Safety - Part 6: Asymmetric wedge socket clevis
- ISO 606      Short-pitch transmission precision roller chains and chain wheels
- ISO 2408     Steel wire ropes for general purposes - Characteristics
- ISO 4301-1   Cranes and lifting appliances - Classification - Part 1: General
- ISO 4308-1   Cranes and lifting appliances - Selection of wire ropes -Part 1: General
- ISO 4309     Cranes - Wire ropes - Codes of practice for examination and discard

ISO 8793	Steel wire ropes - Ferrule-secured eye terminations (Rope clamps of aluminium malleable alloy, flemish boss with steel rope clamps)
ISO 12482-1	Cranes - Condition monitoring - Part 1: General
BS 2903	Specification for higher tensile steel hooks for chains, slings, blocks and general engineering purposes
BS 3017	Specification for mild steel forged ramshorn hooks
DIN 15400 ff	Lifting hooks, mechanical properties, load capacities, stresses and materials
FEM 9.511	Rules for the design of Series Lifting Equipment; Classification of mechanisms
FEM 9.661	Rules for the design of Series Lifting Equipment; Dimensions and design of rope reeving components
FEM 9.671	Series Lifting Equipment; Chain qualities, selection criteria and requirements
FEM 9.683	Series Lifting Equipment; Selection of lifting and travel motors
FEM 9.755	Serial Hoist Units; Measures for achieving safe working periods for motorized serial hoists units (S.W.P.)
FEM 9.761	Series Lifting Equipment; Lifting force limiters for controlling the loading of motorized series hoist mechanisms
FEM 9.852	Series Lifting Equipment; Power driven series hoist mechanisms; Standardised test procedure for verification of the classification
FEM 9.941	Series Lifting Equipment; Symbols for control devices

### **3 Definitions**

#### **3.1 Rope drive**

A rope drive in the sense of this rule includes wire ropes running on rope drums and/or over rope sheaves as well as rope drums, rope sheaves, compensating sheaves, rope guides and suspensions.

Compensating sheaves are rope sheaves which the wire rope runs over during operation generally for no greater path than three times its diameter.

#### **3.2 Chain drive**

A chain drive includes calibrated round steel chains (prEN 818, Part 7), roller chains, driven and non-driven chain sprockets, as required, chain guides and suspensions.

#### **3.3 Belt drive**

A belt drive includes belts, belt rollers, belt guides, belt drum and suspensions.