General HSE Requirements for Machines, technical Installations and Utilities

1 Purpose

MHN 690 000 describes general health, safety and environmental requirements for new machines, installations, utilities. The application of this MHN is optional for retrofitted equipment.
This MANN+HUMMEL Norm is a binding document for the procurement of corresponding items.

2 Scope of Application

This MHN 690 000 is binding for all locations and business units worldwide according to the scope defined in the Corporate Business Manual (MHG-QU-M-0001).

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Translation verified	n.a	n.a.

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Contents

3 Definitions / Terms / Abbreviations

CMR	cancerogenic, mutagenic and reproductive toxic
HSE	Health, Safety and Environment
PID	Proportional-Integral-Derivative
PLC	Programmable Logic Controller
SDS	Safety Data Sheet
VSD	Variable Speed Drive

Machine: Equipment used for manufacturing, processing, or assembling goods with at least one component which is moved and power-driven. This equipment includes test stands.

Installation: Equipment which supports the manufacturing or assembly process, e.g., cranes, washing lines, etc.

Utility: Technical building system, e.g. air conditioning, ventilation, heating, etc.

Hierarchy of Controls: The hierarchy of controls is a structured approach to minimizing and eliminating workplace hazards, prioritizing control measures from most to least effective.
It follows the following order: 1. Elimination, 2. Substitution, 3. Engineering Controls, 4. Administrative Controls, and 5. Personal Protective Equipment (PPE).

4 Requirements

Machines, installations and utilities shall be designed in accordance with the ISO standards described in this document. The state of the art and the legal regulations on occupational health and safety and environmental protection applicable at the place of commissioning must also be complied with. Wherever possible, the hierarchy of controls shall be adhered to reduce HSE risks.
Exceptions are possible only in justified individual cases with a deviation permit from MANN+HUMMEL.

4.1 Machine Safety

4.1.1 General Topics

Risk Assessment
The Supplier shall provide the risk assessment according to ISO 12100 in written or digital form.

- EN ISO 12100:2010 Safety of Machinery - General Principles for Design, Risk Assessment and Risk Reduction

Performance Level
The detection of all safety-related signals (safety doors, light barriers, etc.) shall be carried out in accordance with ISO 13849-1. At least the minimum Performance Level PL is level “c” with Category 3. Exceptions are possible if there is a C-Norm which sets lower standards for the Performance Level.

- ISO 13849-1:2023 Safety of Machinery - Safety-related Parts of Control Systems - Part 1: General Principles for Design
- ISO 13849-2:2012 Safety of Machinery - Safety-related Parts of Control Systems - Part 2: Validation

As an alternative to calculating the Performance Level PL according to ISO 13849-1, it is also possible to determine all safety-related signals in accordance with IEC 62061. At least the minimum Safety Integrity Level SIL is level “1”. Exceptions are possible if there is a C-Norm which sets lower standards for the Safety Integrity Level.

- IEC 62061:2021 Safety of Machinery – Functional Safety of safety-related Control Systems

Equipment with stored energy (e.g., pneumatic, or hydraulic systems, springs, etc.) should be avoided, otherwise it should be clearly labeled. In addition, a device is required to safely release or secure the stored energy.

Operating Manual
The supplier shall provide an operating manual, according to ISO 20607 and/or ISO 12100 in written or digital form. At least, the following items shall be included:

- Information relating to the HSE-related risks
- information relating to transport, handling, and storage
- information relating to installation and commissioning

- information relating to the use of the equipment
- information for cleaning, maintenance, inspection, troubleshooting and repair,
- information relating to dismantling, disabling, and scrapping,
- information for emergency situations.

For safety-relevant components, the supplier shall specify the maximum operating time after which the component must be replaced in the operating manual (e.g. switching cycles, operating hours, age, etc.).

Drawings, spare part lists and the electrical maps shall be part of the operating manual as well.

The Manual shall be provided in local language as well as in English language.

- ISO 20607:2019 Safety of Machinery – Instruction Handbook – General drafting Principles
- EN ISO 12100:2010 Safety of Machinery - General Principles for Design, Risk Assessment and Risk Reduction

Unexpected Start Up
To avoid unexpected start up, the requirements of ISO 14118 shall be followed.

- ISO 14118:2017 Safety of Machinery – Prevention of unexpected Start-Up

Emergency STOP
If the manufactures safety concept provides Emergency STOP buttons, these devices shall comply with ISO 13850 and shall be designed in red / yellow color and palm or mushroom shaped.
The machine must not restart if an emergency stop switch is reset.
The minimum Performance Level of an Emergency Stop is level “c” without exceptions.

The Supplier shall provide information about the scope of action for all emergency stop installations.

- ISO 13850:2016 Safety of Machinery – Emergency Stop Function – Principles for Design

Two-Hand Controls
If the manufactures safety concept provides a 2-hand-control unit, this device shall comply with ISO 13851, at least Type III and provide the following functions:

- Use of both hands at the same time (simultaneous actuation)
- Relationship between input signals and output signals
- Cessation of the output signal
- Prevention of accidental operation
- Prevention of defeat

- Re-initiation of the output signal
- Synchronous actuation

The corresponding classification letter according to ISO 13851 (A, B or C) depends on the required performance level and must be defined by the manufacturer by performing a risk assessment in accordance with ISO 12100.

- ISO 13851:2019 Safety of Machinery - Two-hand Control Devices - Principles for Design and Selection

The supplier shall provide a calculation and confirmation according to ISO 13855 of the required safety distance of the 2-hand control in written or digital form.

- ISO 13855:2010 Safety of Machinery - Positioning of Safeguards with Respect to the approach Speeds of Parts of the human Body

Light Curtains
If the manufactures safety concept provides light curtains, this device shall comply with IEC 61496-1 und IEC 61496-2.

- IEC 61496-1:2020 Safety of Machinery – electro-sensitive protective Equipment – Part 1: General Requirements and Tests
- IEC 61496-2:2020 Safety of Machinery – electro-sensitive protective Equipment – Part 2: Particular Requirements for Equipment using active opto-electronic protective devices (AOPDs)

The supplier shall provide a calculation and confirmation according to ISO 13855 of the required safety distance of the light curtain in written or digital form.

- ISO 13855:2010 Safety of Machinery - Positioning of Safeguards with Respect to the approach Speeds of Parts of the human Body

Fixed Guards and Fences
If the manufactures safety concept provides fixed guards or fences, these guards and fences shall comply with ISO 14120 and ISO 13857.

- ISO 14120:2015 Safety of Machinery – Guards – General requirements for the Design and Construction of fixed and movable Guards
- ISO 13857:2008 Safety of Machinery – Safety Distances to prevent hazard Zones being reached by upper and lower Limbs

Main Switch
Machines, installations and utilities shall be equipped with a lockable main switch which complies with IEC 60204-1 (chapter 5.3). Depending on the size of the machine, the main switch could be positioned directly at the machine or at the electrical cabinet. Furthermore, every other type of energy, in particular stored energy (e.g. hydraulic, pneumatic, steam, spring, etc.) shall be provided with a lockable main switch (e.g. lockable valve) and shall be clearly labeled. In addition, a device is required to safely release or secure the stored energy.

- IEC 60204-1:2016 Safety of Machinery – Electrical Equipment of Machines – Part 1: General Requirements

Qualification Interlocking
Presses, Curing Ovens, Injection Molding Machines and Blow Molding Machines, as well as Bridge Cranes shall be equipped with a personal and digital interlocking system, e.g. RFID-Chip, fingerprint etc. which ensures separate access rights according to the qualification and role of the employee (e.g., operator, setter, maintenance staff, software engineer, etc.).
For other machines, installation or technologies, the need for qualification interlocking shall be agreed between the supplier and MANN+HUMMEL on a case-by-case basis. Access via PIN or key does not meet the requirements for qualification interlocking and is therefore not permitted.

Training & Instruction
Before commissioning, on-site trainings and instructions shall be conducted by the supplier for operators, setters as well as maintenance staff. The content of the training will be aligned between the supplier and MANN+HUMMEL.

4.1.2 Presses

Presses shall be designed according to ISO 16092 1-4. The safety concept of the press shall take into account the entire workplace e.g., incl. material feeding, scrap collection unit etc..

- ISO 16092-1:2017 Machine tools safety – Presses – Part 1: General safety Requirements
- ISO 16092-2:2019 Machine Tools safety – Presses – Part 2: Safety Requirements for mechanical Presses
- ISO 16092-3:2017 Machine Tools Safety – Presses – Part 3: Safety Requirements for hydraulic Presses
- ISO 16092-4:2019 Machine Tools Safety – Presses – Part 4: Safety Requirements for pneumatic Presses

The supplier shall provide the risk evaluation of the machine safety concept in written or digital form. This includes at a minimum the risk assessment (ISO 12100), determination of PL (ISO 13849-1 and 2) or SIL (IEC 62061) of safety devices as well as calculation of safety distances of guards/fences.

- EN ISO 12100:2010 Safety of Machinery - General principles for Design, Risk Assessment and Risk Reduction
- ISO 13849-1:2023 Safety of Machinery - Safety-related parts of Control Systems - Part 1: General Principles for Design
- ISO 13849-2:2012 Safety of Machinery - Safety-related parts of Control Systems - Part 2: Validation

- IEC 62061:2021 Safety of Machinery – Functional Safety of safety-related Control Systems
- ISO 13855:2010 Safety of Machinery - Positioning of Safeguards with Respect to the approach Speeds of Parts of the human Body

4.1.3 Injection Molding Machines

Injection molding machines shall be designed according to ISO 20430 and MHN 810 501.

- ISO 20430:2020 Plastic and Rubber Machines – Injection Molding Machines – Safety Requirements
- MHN 810 501:2025 HSE-Relevant Aspects and Hazards on and around Injection Molding Machines

4.1.4 Curing Ovens

Curing Ovens shall fulfill the following requirements and/or shall be equipped with the following (safety) devices:

- avoiding of uncontrolled movement of filter media / filter elements e.g., flying, falling from the conveyor e.g. by vertical straps, rails or horizontal top conveyors,
- an automatic shutdown process is installed to prevent overheating e.g., in case of technical defects or errors. For this purpose, the oven and afterburner temperatures are continuously monitored. If the temperature required for the process is exceeded, an alarm is triggered, and the heat supply is automatically stopped,
- monitoring system for periodically monitoring of the real oven temperature,
- the surface temperature of the oven and the stack shall not exceed a temperature of 40°C / 105°F,
- openings are in place, that allow to perform the legally required exhaust gas measurements (e.g., Formaldehyde, NO_x, SO_2, CO, PM10, ...),
- an Emergency Stop is installed at all workstations of the oven. The distance between the Emergency Stops is max. 10 m. The Emergency Stop stops mechanical, electrical and thermal installations of the entire equipment (oven and afterburner),
- installation of Fire Alarm Buttons at least at the workstations near the inlet and outlet of the oven,
- the fuel train of the oven and of the afterburning system is equipped with safety shutoff valves,
- installation of a heat recovery system that allows the waste heat to be used, e.g. to heat the supply air.
- stacks are insulated according to MHN 830 300,
- lightning conductors for stacks are installed at the highest point of the chimney according to MHN 830 300,

Curing ovens that are operated with fossil gas shall be designed and equipped in such a way that the oven and the related afterburning system can be converted to electric heating.

- MHN 830 300:2020 Exhaust Chimneys and thermal - regenerative afterburning Systems

4.1.5 Working Platforms, Ramps, Stairs and Ladders

Working Platforms, ramps, stairs and ladders for access to machinery shall be designed according to MHN 810 510, and according to ISO 13857, ISO 14120 and ISO 14122 1-4.

- MHN 810 510:2023 Permanently installed working Platforms, Ramps, Stairs and Ladders for Access to Machinery
- ISO 13857:2019 Safety of Machinery - Safety Distances to prevent hazard Zones being reached by upper and lower Limbs
- ISO 14120:2015 Safety of Machinery - Guards - General Requirements for the Design and Construction of fixed and movable Guards
- ISO 14122-1:2016 Permanent means of Access to Machinery – Part 1: Choice of fixed means and general requirements of access
- ISO 14122-2:2016 Permanent means of Access to Machinery – Part 2: Working Platforms and Walkways
- ISO 14122-3:2016 Permanent means of Access to Machinery – Part 3: Stairs, Stepladders and Guardrails
- ISO 14122-4:2016 Permanent means of Access to Machinery – Part 4: Fixed Ladders

4.1.6 Hydraulic Systems

Hydraulic systems shall be designed according to ISO 4413. Machines, installations, or utilities with hydraulic system > 100 gallons (378 Liter) shall be equipped with a functionality to shut down the hydraulic system in case of fire. Therefore, an interlocking of the hydraulic pump is necessary, e.g. with the fire alarm system of the building, a flow sensor of the sprinkler system, a heat detection sensor or a flame detection camera. The shutdown installation shall be designed according to MHN 611 060.

- ISO 4413:2010 Hydraulic Fluid Power – General Rules and Safety Requirements for Systems and their Components
- MHN 611 060:2023 Managing Hydraulic Systems in Case of Fire

4.1.7 Pneumatic Systems

Pneumatic systems shall be designed according to ISO 4414.

- ISO 4414:2010 Pneumatic Fluid Power – General Rules and Safety Requirements for Systems and their Components

4.1.8 Robots, Robotic Devices and Cobots

Robots, robotic devices and cobots shall be designed according to ISO 10218-1, ISO 10218-2 and/or ISO/TS 15066. Additionally, the standards MHN 350 090, MHN 350 110 and/or MHN 850 500 shall be followed.

- ISO 10218-1:2011 Robots and robotic Devices – Safety Devices for industrial Robots – Part 1: Robots
- ISO 10218-2:2011 Robots and robotic Devices – Safety Devices for industrial Robots – Part 2: Robot Systems and Integration
- ISO/TS 15066:2016 Robots and robotic Devices – Collaborative Robots
- MHN 350 090:2016 Robotics End of Arm Tooling Standard
- MHN 350 110:2020 Cobots
- MHN 850 500:2022 AMLT Robots

4.1.9 Coil Expanding Shafts

For expanding shafts, the ventilation valve shall be designed in such a way that there are no shearing points, especially when the shafts are handled manually, e.g. by milling out the actuation point.

4.2 Electrical Safety

The electrical equipment shall fulfill the local legal requirements for electrical machine safety and the requirements of IEC 60204-1 as a minimum.

- IEC 60204-1:2016 Safety of Machinery – Electrical Equipment of Machines – Part 1: General Requirements

Additionally, the electrical equipment incl. wiring etc. shall comply with the following requirements:

- electrical components, connections, wires, push buttons, light signals, etc. shall be marked clearly in accordance with IEC 60204-1,
- electrical conducting components shall be bonded and grounded,
- a central bonding-point shall be available,

- measurement reports for machines in accordance with EN 60204-1 shall be supplied, (e.g. for the continuity of the equipotential bonding, insulation resistance test, earth leakage current measurement),
- the mains voltage connection shall be implemented via separate supply terminals in the control cabinet,
- live parts must be covered to prevent accidental contact,
- electrical cabinets shall have sufficient space reserve (minimum 20%) for future expansions of the machinery,
- electrical cabinets and control-/distribution equipment shall be placed in such a way, that they are reachable for maintenance at all time,
- electrical components shall be suitable for the local environmental conditions, e.g. heat/cold, humidity, etc.,
- test reports for the functional test of the safety devices shall be delivered,
- all electrical maps, parts lists, and spare part lists shall be delivered in electronic form, e.g. via pdf-file. Electrical maps shall be submitted in advance for review and approval.
- cables shall be dimensioned according to the respective voltages and currents,
- the parameterization of the automation components shall be documented or handed over in electronic form,
- the PLC program is to be handed over in source code including all necessary software licenses to MANN+HUMMEL,
- faults shall be visualized in plain text,
- cyber security requirements shall be met,
- each machine or system shall be equipped with at least one PLC and one operating device,
- recipes shall be saved on a removable storage medium,
- safe condition of the system shall also be guaranteed in the event of a voltage dip/failure (e.g., fire hazard).

4.3 Health Prevention

4.3.1 Hazardous Substances

Hazardous substances shall be reduced to a minimum. Where possible, they should be replaced by less hazardous substances or technical measures should be taken into account to reduce health risks (e.g. closed systems).
The supplier shall specify the hazardous substances supplied that are used as operating materials such as greases, oils, coolants, etc. or that may be generated or released during the use of the machine, system or device, e.g. dust, steam, smoke. Safety data sheets (SDS) must be supplied in local language and English for all associated chemicals.
The application of substances according to the following classifications is prohibited:

- carcinogenic, mutagenic, or toxic to reproduction (CMR),

- Persistent Organic Pollutants (POP) according to the Stockholm Convention
- Mercury and Mercury containing products according to Minamata Convention

Exceptions are possible only in justified individual cases with a deviation permit from MANN+HUMMEL.

4.3.2 Noise Level

Noise Level shall be limited in accordance with the state of the art through appropriate concepts, technical equipment, and component selection or, if possible, encapsulated at the point of origin.
If the noise level is nevertheless above the local limit value, this shall be indicated.
The supplier shall predict the noise level for the operator's intended workplace.

4.3.3 Radiation

The supplier shall provide information if hazardous radiation may be generated or released when using the machine, installation or utility, e.g. radioactivity, laser, UV, infrared, etc.. Radiation shall be limited in accordance with the state of the art through appropriate concepts, technical equipment, and component selection or, if possible, encapsulated at the point of origin.

4.3.4 Ergonomic Requirements

The maximum weight for frequent handling of machine parts, goods, etc. shall not exceed **10 kg**.
For regular handling, the weight shall not exceed **15 kg**.
Weights over **20 kg** must not be lifted manually.
Auxiliary equipment, e.g. a lifting device, shall be provided here.

For assembly workstations, the height of the work surface should be adjustable according to the body height of the employees.
Operating elements shall be easily and safely accessible from the different workstations. Operating elements and signals shall be clearly identifiable (e.g. by means of labeling) to avoid the risk of confusion.
Signs and notes on machines and components shall be easily recognizable and legible at all times, e.g. font size, no yellow stickers on a yellow background, etc..

4.4 Efficient use of Resources

4.4.1 Energy Efficiency

When laying out and designing the machines, installations, or utilities the supplier shall take into account an energy-efficient overall concept that is aligned with the state of the art. Components and peripheral devices that are not required shall be connected so that they can be switched off automatically.
Engines (high runner) shall be installed in a minimum according to IEC 60034-30-1 and the following overview:

- ≤ 0,12 kw > 0,75 kW: minimum energy efficiency class IE2,
- ≤ 0,75 kw > 75k W: minimum energy efficiency class IE3,

- ≤ 75 kw > 1000 kW: minimum energy efficiency class IE4.

Exceptions are possible for engines which have only a low running time in consultation with MANN+HUMMEL. Furthermore, energy efficiency class IE5 according to IEC/TS 60034-30-2 should be considered for engines with high energy consumption as well as a high running time. For these engines a decision made together with MANN+HUMMEL.

- IEC/TS 60034-30-1:2014 Rotating electrical Machines - Part 30-1: Efficiency Classes of line operated AC Motors (IE-Code)
- IEC/TS 60034-30-2:2016 Rotating electrical Machines – Part 30-2: Efficiency Classes of variable speed AC Motors (IE-Code)

During the design of the machine, installation, or utility the most energy efficient solution should be defined together with the client. On top of that the machine, installation or utility should be commissioned with the right parameters that allow the operation of the machine, installation, or utility with the lowest energy demand as possible.

The following topics might have a significant impact on the overall energy consumption of a machine, installation or utility:

Drive trains:
Drives that have more than 10 kW of installed nominal power should always match to the highest local efficiency class (e.g., IEC 60034-2-1) but shall fulfill the minimum efficiency call that is mentioned above. Additionally, motors >10kW should be controlled by a frequency converter (variable speed drive – or so called VSD) to ensure the most energy efficient operation of these motors. The installation of a VSD can be ignored if there is a proof that the motor will work > 90% of the operation time with > 90% of the installed nominal power, this so called “endurance runners” can be installed without VSD. The VSD shall be integrated in the overall machine, installation, or utility in the most effective way to control the power of the motor according to the relevant parameters and ensure the smooth operation of the machine, installation or utility. A VSD installation for motors is also obsolete if there is a solution for a direct servo driven solution.

This requirement is affective for all type of applications e.g.,

- general liquid / hydraulic pump drives
- fan drives in HVAC, exhaust systems, ovens, etc.
- compressor drives
- chiller and cooling tower drives
- injection/ blow molding machine drives
- general machine drive trains
- granulate dryers
- vacuum pumps
- stamping press drive trains

Use of compressed Air:
In terms of the installation of compressed air devices, e.g. actuators, blowers, nozzles etc. these kinds of devices should be completely avoided, if possible, in new machines,

installations or utilities. The aim is to avoid compressed air overall. Instead of compressed air it should be checked if direct driven actuators, roots blowers and other low energy demanding equipment can be used to fulfill the job. Compressed air use for blow parts is restricted. If the suppliers' solution requires compressed air blowing this needs to be reported, discussed, and finally approved by MANN+HUMMEL.

Each machine, installation or utility still supplied with compressed air needs to be connected with an own automatic solenoid shut down valve for compressed air. This valve should be connected to the machine, installation, or utility control. Compressed air should then automatically shut down when the machine, installation or utility is in standby or off.

Process control:
Machines, installations or utilities shall have a process control. This should allow the automatic control of the overall machine, installation or utility (or single parts of these) to be set into idle mode whenever the machine, installation or utility is not in operation. Machines, installations or utilities should not operate with the same power when there is no production ongoing. The machine, installation or utility need to be designed in that way, that a standby of high-energy consuming parts are able to be set to standby in non-operation times. Problems that could be caused by a standby should be already overcome during the design of the machine.
Where applicable a PID control or a more advanced process control should be used to make sure the machine is operated in the most efficient way and all setpoint parameters are reached. This is not only valid for machines but also for installations and utilities.

General Topics:
All energy flows into as well as the energy transformation within the machine, installation or utility should be visualized during the design and built process. This overview should be shared with MANN+HUMMEL so there is still the possibility to improve the overall energy use and the efficiency of the system by optimizing parts etc. All methods and technologies to recover energy should be included in the design. The waste of energy (direct/indirect) should be reduced to the minimum. Energy recovery is a potential method to increase the efficiency of the machine, installation or utility. If the energy is recovered inside the machine, installation or utility or if it is recovered and then delivered to other Machines installations or utilities doesn´t make any different here. Targets could be:

- as low exhaust gas temperatures as possible
- as low outside wall temperatures as possible
- as low pressure as possible
- installation of heat exchangers
- installation of proper insulation
- connection of buffer vessels
- as low installed power of drives as possible
- reduce operation temperature as low as possible
- reduce water/air volume flows as much as possible
- any other energy reduction/efficiency target

In addition, energy efficiency and the economical use of energy are a matter of course for MANN+HUMMEL. When selecting machines and systems, energy efficiency is a selection and decision criterion for MANN+HUMMEL, which our suppliers shall take into account when selecting components.

4.4.2 Compressors

Compressor system should run at the lowest pressure that is possible and ensures the smooth operation of all connected systems. The compressor setup should match to the demand of air. Oversizing of compressors/compressor stations should be avoided. Compressor systems should have at least one frequency driven (VSD) compressor to avoid load/no-load jumps of fix speed compressors. An air vessel according to the air production/demand should be integrated into the system to harmonize pressure and avoid pressure drops/peaks. The compressed air station should be equipped with a flow meter to meter the generated air flow. This meter needs to fulfill at least the Modbus RTU or MBus communication.
Compressor stations with more than one installed compressor should have a control system in place, a so-called air compressor sequencer. This control system makes sure the right compressor is used to generate the air demand at the lowest energy level.

4.4.3 Water Efficiency

The supplier shall take a water-saving concept into account when designing the machines, installations, or utilities. This includes water-saving technologies and closed water circuits, e.g. for cooling systems. The proposal shall clearly describe kinds of measures have been implemented and/or which technical solutions have been installed in order to reach a low water consumption.

4.5 Chemical Restrictions

4.5.1 PFAS Restriction

The application of per- and polyfluoroalkyl substances (PFAS) in production and facility installations like firefighting installations is prohibited. Exceptions are possible only in justified individual cases with a deviation permit from MANN+HUMMEL.

4.5.2 Refrigerants Restriction

The Supplier shall specify which refrigerants (F-Gases) are applied in machines, installations or utilities, including the filling quantity.
The application of refrigerants (F-Gases) with the following properties is prohibited:

- Ozone Depletion Potential (ODP) > 0
- Global Warming Potential (GWP) > 750
  for applications in the European Union: GWP > 150

Exceptions are possible only in justified individual cases with a deviation permit from MANN+HUMMEL.

4.6 Pollution Prevention

4.6.1 Retention Devices of hydraulic Liquids

Machines, installations, or utilities with hydraulic system shall be designed according to MHN 611 060. This MHN specifies the design of hydraulic systems and its retention pans.

- MHN 611 060:2023 Managing Hydraulic Systems in Case of Fire

4.6.2 Retention Devices for applied Chemicals

Hazardous substances shall be used in such a way that releases/spillages can be easily detected, collected and removed immediately. Therefore, the chemical containments shall be placed on suitable retention devices. The type of retention device depends on the type of chemicals, the sprinkler concept installed and the material of the chemical container.

FIRE PROTECTION STANDARDS

Retention Device Matrix for production areas

Flammable Chemical (H225/H226) or Polyol / Isocyanate	Sprinkler installed ?	Material of chemical container	Material of retention device[1, 2, 3, 4]	Capacity of retention device[4]	Picture
Yes	No	Plastic	Fire Protection Trough with closed metal side walls and integrated flame arrester (e.g. Minimax)	140%	
Yes	No	Metal	metal	140% preferred, 100% minimum	
Yes	Yes	Plastic	metal cover with 3 side walls and with metal front door (top cover is optional)	140% preferred, 100% minimum	
Yes	Yes	Metal	metal	140% preferred, 100% minimum	
No	Yes	Plastic	metal (preferred) or plastic	volume of the largest chemical container	
No	Yes	Metal	metal (preferred) or plastic	volume of the largest chemical container	
No	No	Plastic	metal	volume of the largest chemical container	
No	No	Metal	metal (preferred) or plastic	volume of the largest chemical container	
Yes	w/o relevance	Hazardous goods container (ASF)	no sec. containment needed, drip tray recommended	no specific requirement	
No	w/o relevance	Hazardous goods container (ASF)	no sec. containment needed, drip tray recommended	no specific requirement	

Footnotes

1. Instructions of the Safety Data Sheet must be observed, i.e., plastic devices are mandatory if the substance is corrosive to metals e.g., acids, alkalis.
2. Exceptions are possible, if corresponding retentions devices are not offered by local dealers.
3. preferred: new or relocated installations shall be equipped with metal retention devices.
4. Independent of MANN+HUMMEL requirements, compliance with applicable local regulatory requirements is mandatory. In the event of any contradictions, local legal requirements must be followed first and additionally.

1 MANN+HUMMEL Retention Device Matrix for production areas Fire protection standards

Figure 1: Retention concepts for production areas

4.6.3 Requirements for stationary Tanks

The proposal of the suppliers shall clearly describe kinds of measures have been implemented and/or which technical solutions have been installed in order to prevent leakage and environmental pollution.

Underground Storage Tanks (UST)
The installation and use of USTs for environmentally critical substances is only permitted for double skin UST, equipped with a leak detection system. Leaks in one of the skins trigger a visual and acoustic alarm. This regulation also applies to

underground pipelines. The leak detection system shall comply with the requirements of the European Standard EN 13160, class 1. Other local standards are acceptable if the manufacturer confirms that the same safety level is realized. USTs shall be equipped with a Sacrificial Anode Cathodic Protection (SACP) to prevent/minimize damage from corrosion.

Aboveground Storage Tanks (AST)
ASTs need a protection system that reliably prevents leakage and environmental pollution. Possible protection concepts for ASTs are retention devices or double skin tank systems with technical leakage control.

Collision Protection
To minimize the risk of collision, the installation of ASTs / pipelines near traffic routes (indoor or outdoor) shall be avoided. ASTs / pipelines / pipeline bridges that are adjacent to a traffic route are protected with a suitable barrier to prevent damages by any vehicles, PITs or trucks.

4.6.4 Air Emission

The supplier shall provide information if hazardous air emissions may be generated or released during the use of the machine, installation, or utility. The air emissions shall be limited by suitable concepts in accordance with the state of the art so that the limit values specified in the relevant local regulations or international standards are not exceeded.

Preconditions for monitoring (e.g., measuring points) have to be provided according to the applicable local requirements, standards and methodologies. These measuring points shall be accessible in a safe way, e.g., by platforms, ladders, etc. (please refer chapter 4.1.4).

4.7 Prevention of Fire and Explosion

The supplier shall identify and evaluate the machines, installations, or utilities with regard to potentially explosive atmospheres according to the following regulations

- in USA: NFPA 70, NEC 500 and NEC 505
- in all other countries: ATEX-Directive 2014/34/EU

The identified risks shall be taken into account in the safety concept of the machine, installation or utility, e.g. with regard to electrical installations, explosion pressure venting technologies, bonding, grounding, labelling and extinguishing concepts.

4.8 Carbon Footprint

Suppliers of machines, installations or utilities are obliged to calculate the carbon footprint of the supplied equipment based on a Life Cycle Analysis (LCA) in accordance with the Greenhouse Gas Protocol and ISO 14067.
The calculated Carbon Footprint for the manufacture of the supplied equipment (cradle to gate) shall be provided free of charge on demand.

- ISO 14067:2018 Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification

5 Referenced and applicable documents

All referred documents, standards and norms are mentioned in chapter 4.

6 History / participating departments

Changes to previous issue	Initial version		
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7 Supplementary sheets

MHN 690 000 Supp.1 General HSE requirements for machines, technical installations and utilities

8 Appendix

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