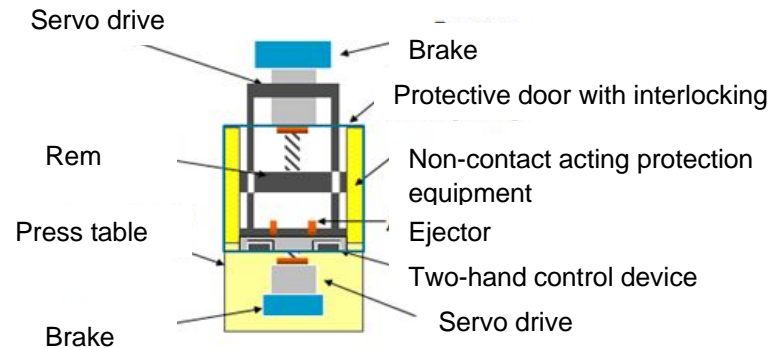




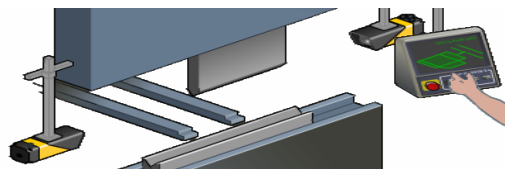
Protective measures during manual loading:

- Safe tool
- Protective shield or protective door
Only if the rem stands safely and is maintained in its position, it may be possible to open the protective shield or the protective door.
- Two-hand control device with fixed placement (type III C according to ISO 13851)
- Non-contact acting protection equipment (type IV according to IEC 6149-1)



In general: If a gating of the safety system respectively an acceptance of the control command is realized during the opening stroke, a pendulum stroke must be avoided (change of the direction outside normal operating conditions). The safety distance has to be determined before the startup by a follow-up movement.

Moving protective device according to EN 12622

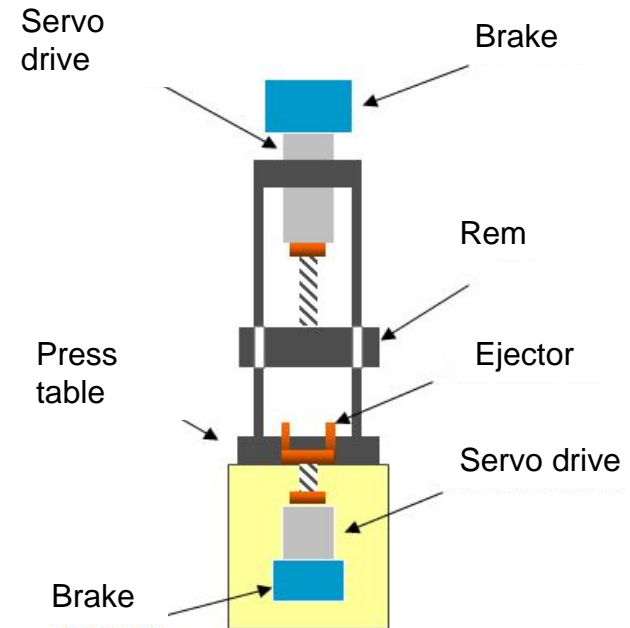


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Servo presses



Servo presses are mechanical presses which have a power transmission without mechanical clutch. At this kind of presses the mechanical clutch is replaced by the power transmission of a servo drive (electric motor with control device). If a safe switch-off (stop) of the servo drive is realized the pestle is kept in position by means of a safety-related brake.

Servo presses have to meet all corresponding requirements of DIN EN 692 „Mechanical presses – safety“.

Automatic drive with active guard locking:

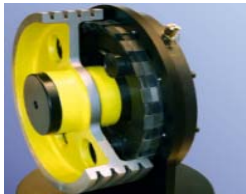
If a servo press is exclusively used as an automat, so the function of a safe stop of the drive has at least to meet the requirements of PL= d, category 3 according ISO 13849-1.

Manual drive:

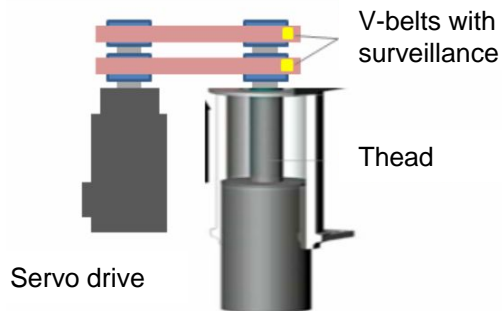
If a press is used as a manual loading machine, so the function of a safe stop of the drive has at least to meet the requirements of PL= e, category 4 according to ISO 13849-1. Hand protection measures have to meet the requirements of EN 692 (mechanical presses), EN 693 (hydraulic presses) or EN 12622 (sink folding press)

Brakes:

External mechanical brakes have to act directly to the pestle. If this is not the case, additional measures have to be taken.

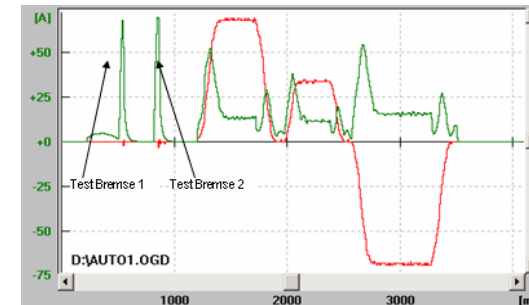


Example: Brake at the drive and transmission of the mechanical energy to the rem by means of v-belts. Realisation: The v-belts have to be realized in a redundant and cyclic way according to PL= d (ISO 13849-1).



Test of braking effect:

In order to test the braking effect brake tests are necessary. In the case of manual loading: before the first stroke and every further hour. In the case of automates: before opening the protective device (for ex. protective shield) if the machine has been operated more than 8 hours in this operation mode as well as in the case of a change of an operation mode.



Additional tests before the first startup

- Cut-off of the voltage supply if the pestle moves down! (simulates a voltage drop in the worst-case)
- The dynamic of the drives has to be tested (for ex. wrong reference value in case of reduced speed)

Protective measures during the set-up:

- Push-button switching device without fixed placement only combined with *safe reduced speed* ($\leq 10 \text{ mm/s}$ in category 3 or PL= d).
- Two-hand control device with fixed placement (at least type II A according to ISO 13851)

