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General Specifications for mold tools of ACCOMPLAST GmbH

Purpose:

With these general requirements a smooth startup of new manufactured tools shall be ensured. This general tool requirement defines:

- General standards and methods of ACCOMPLAST GmbH (hereinafter referred to as ACCOMPLAST)
- General design standards
- Machine specifics
- Tool specifics
- Temperature control system
- Scope of delivery

Validity:

These general requirements are valid for all injection mold tools, regardless whether manufactured by ACCOMPLAST or external cooperation partners.

General standards and methods

- Content of the tool offer should be: tool size, number of cavities, demolding concept of undercuts, execution of the gating, application guarantee, delivery time and costs of the **complete tool production**.
- The constructive design of the tool is subject to the experience and responsibility of the tool maker and will not be approved by ACCOMPLAST (for major faults, ACCOMPLAST reserves the right to request an adjustment) Nonetheless, these requirements have to be respected.
- The agreed delivery date (for FOT) is the date of delivery at ACCOMPLAST.
- In case of non-compliance with the agreed delivery date, ACCOMPLAST reserves the right to charge any further costs incurred.
- With submission of the offer or with order confirmation the tool maker **automatically guarantees the feasibility** (open point or points which put a risk on the feasibility must be mentioned in the offer).
- For serial tools a minimum output of 1,000,000 shots must be guaranteed.
- After receipt of order the toolmaker will make a DFM for coordinating possible problems and the initial concept.
- At every new project start, the toolmaker has to create a mold flow analysis to recognize possible problems in an early stage, to solve them and to inform the customer and/ or ACCOMPLAST.
- Before construction start the toolmaker creates a 3D-file with a color-coded parting line, ejector marks and injection point of the tool for consultation with the customer and/ or ACCOMPLAST (an example can be found in the annex).
- The ordered tool must be able to produce plastic parts according to drawings or customer approval (the number of correction loops is insignificant).
- For the first delivery and also for deliveries after correction loops the tool must always be in a maintained and operational condition.
- At delivery (new tools and after correction loops) a detailed list of the executed work steps must be visible on the delivery note.
- The delivery and the pick-up of the tools for correction loops fall under the responsibility of the toolmaker. The toolmaker thus bears the costs for the transports and must consider them in the calculation for offers.
- The final release of the tool only takes place after a final sampling at ACCOMPLAST or after consultation with ACCOMPLAST.
- If the tool maker cannot clear the defects in general or not in a timely manner, ACCOMPLAST or a third party may perform the defect rectification. The expenditure involved in the rectification will be invoiced to the tool maker.
- The complete creation of the tool and the release of the tool must be completed within 3 correction loops. The period of time should not take longer than 3 calendar weeks per correction loop. If the 3 correction loops are not enough to reach the release of the tool, consequently causing increasing costs for sampling and measurement, ACCOMPLAST reserves the right to charge these additional costs to the tool maker.
- After finishing the tool and release of the part, 3D data, drawing and part list must be send to ACCOMPLAST, the date must have the same status like the current tool status.

General design standards

- Venting must be provided in every possible area without getting more flash (parting line venting directly at the cavity, venting in the ejector, if possible, placing of moving venting cores etc.).
- If not otherwise agreed, every tool must have a hot runner (minimum a hot nozzle) in order to minimize sprue material.
- Sprue must be designed in a way that it does not break during demolding and does not produce plastic debris (in case of part removal via handling, sprue should be located beneath the part). In addition, the sprue system must be designed in a way that material in the sprue system does not sustain any damage caused by abrupt flow transition points or sharp edges.
- The cold plug must be caught by a suitable blind channel.
- Coatings must be used in a way that the tool can achieve the required output quantity and ensure the required part quality.
- Ejecting of the parts must be ensured without supporting material and with the lowest possible ejector forces (if necessary request draft angles).
- If possible hot work steel should be used (optional future coating possible).
- In case of areas with a high risk of breakage it is by all means necessary to use steel with a high stress level (for example Divar from Uddeholm). These areas should be designed as changeable inserts.
- Areas that are subject to heavy wear and tear or have a high risk of damage must always be designed as inserts or changeable cores.
- Movements in and on the tool must always run defined and controlled.
- Inclined ejector solutions must be avoided due to risk of mold removal problems. Generally, mechanical sliders are to be preferred.
- One of the 4 guide pillars should be of a different diameter or the positioning of the pillars should make wrong assembling impossible.
- Interchangeable inserts and cores should be changeable at the machine (or as agreed).
- Interchangeable inserts/ cassettes must be marked and coded in such a way that it is not possible to mount it in a wrong way (Poka Yoke). Numbers of the changeable insert will be communicated with the order.

Machine specifics

- When placing the order, the injection molding machine size for future serial production is defined (taken from the offer).
- The hot runner's sprue bush or input bush have to be designed R 0 (flat).
- A trouble-free installation in the injection molding machine must be guaranteed (jutting out of sensors, cylinders, cooling connections etc. on the mold mounting plate is not allowed).
- Mounting of the injection mold tool on the injection molding machine as follows:
    - according to Arburg data sheet for injection molding machines
    - overlapping mold mounting plate with clamp (perform overlap only in one axis)
    - fixing holes according to Arburg hole pattern
    - ejector connection M12 (from machine size 470 Arburg M16) in ejector plate → according to data sheet injection molding machines

Tool specifics

- The use of standard parts like 2-step ejector, ejector pins, guide pillars, guide bushes, latch locks and ball catches is imperative.
- If it is necessary to use an ejector with a Z undercut, it is mandatory to implement a tube based on wear.
- In case of steel on relatively moving mutual tool parts the tool maker must consider material pairings of different materials or with different surfaces or surface hardness values. With this fretting corrosion and abrasion points can be prevented.
- All forces (X, Y and Z) and surface pressures that arise must be taken into account in the mold design.
- Screws and threads must be metric (unless specified otherwise).
- If a calendar clock is requested, calendar clocks of company Opitz must be used (without height adjustment), which should have a year insert that is changeable without special disassembling of the tool.
- A continuous numbering of the plates is mandatory.
- The ACCOMPLAST tool number must be undetachably engraved in both mold mounting plates (milling / engraving).
- Mold inserts, die plates and cavity areas resp. must be hardened (min. 52± 2HRC).
- If feasible, cavity identification is to be provided.
- Welding in the tool (repair or changes) is only permitted when agreed.
- Sliders are generally designed with shoulder and appropriate fixation.
- Slider guides must be made of hardened steel.
- All guides and pressure wedges/ pressure plates must be provided with grease grooves.
- For better spotting, the slides or pressure wedges must have pressure plates.
- Sliders positioned on top (in installation position) have to be designed with springs or other fixation to secure correct localization.
- Ejector package must be guided with pillars and ejector plate return pins.
- Pillar guided systems must have steel or spherical guides.
- One of the four guiding pillars must have a smaller dimension (not another position) in order to prevent a wrong mounting of the tool.
- When slider and ejector are under risk of collision an end switch (company Schmersal) and a safety pin positioned under the slider must be constructed.
- When using pneumatic or hydraulic actuators respectively the monitoring of the front and back position is necessary. Monitoring should take place directly at the sliders (type of sensors to be agreed).
- The cables used must be selected to suit the ambient conditions (temperature, oil-resistance...).
- When using hydraulic core pullers the connectors must be constructed R1/4" (tool side) to M16x1,5 with inner seal cone (tube side). The required connectors for the sensors can be taken from the annex.
- Center lining shall be placed on the injection side (according to data sheet; from machine size 320 Arburg upwards on both tool ends).
- The ejector package/ set has to be covered to prevent the gates from being trapped.
- Tools with a hot runner system must have hot runner connectors by Harting company
    - **6 pole:** pin insert HAN 6E 09330062601 6 pole srew connection
      Socket housing high level design 19300060296 2xM25
    - **16 pole:** pin insert HAN 16E 09330162601 16 pole screw connection
      Socket housing high level design 1930160271 2xM25
    - **24 pol:** pin insert HAN 24E 09330242601 24 pole screw connection
      Socket housing high level design 19300240272 2xM32
- For tools with a hot runner system, the tool must be delivered **without** a connected socket, but the hot runner socket should be screwed (the hot runner socket is connected and tested by ACCOMPLAST, but the heating and sensor cables must be labeled in a way it is possible to trace which cable connects to which nozzle).
- For tools with more than one nozzle, the hot runner must be designed as a **hot side** (example can be requested).
- The injection gates of the tool must be designed as changeable inserts (same applies to hot runner gates directly on the part)
- When needle valve nozzles are used, the threads in the tool shall be ¼ inch.
- The filling of the cavities must be balanced for at least 98%.
- The usage of silicone-containing or teflon-containing sprays to improve demolding is not allowed (also not allowed for samplings).
- The following greases are allowed to use: Lusin LUB PZO 152, interflon FIN Grease MP 2/3 + Teflon, interflon FIN Grease HTG (high temperature grease), SYN-setral-INT300, TCE-GREASE300, TCE-GREASE800.
- A dummy for pressure and temperature sensor must be provided and discussed in the design phase.
- Mandatory for all mold tools:
    - global transportation securing device for mold tools
    - threaded hole for eye bolt screws for each single parting plane
    - mounting of lifting brackets for balanced lifting (for the entire tool and for each tool half in installation position)
    - possibility of securing pre tightened systems (when risk of mold tool damage possible)
    - feet for safe standing/ storing of the tool without damaging of switches, cables or connecting pointer
    - sharp edges and flash which arise during the manufacturing of the tool and are not needed for the parts design or function, must be removed to minimize the risk of injury

Temperature control system

- The used tempering medium must be specified (water, heat transfer oil, heating with heating cartridge). Water has priority as tempering medium.
- The tempering system must be constructed in a way that the temperature necessary for the molding process can be achieved.
- In areas that are difficult to cool (e.g. cores...) special materials with improved heat conductivity must be used.
- A good tempering system for the mold tool is important. Each tempering cycle has to provide adequate size of flow rate (min. 4-5 l/ min).
- The tool maker creates a tempering plan and labels the inlets and outlets of the tempering connections for each mold tool.
- For tool temperatures below 90°C the system DME must be used for tempering connections (threads in tool R1/4" and NW 6mm; if not enough space is available inside the tool, M10x1 can be used).
- For tool temperatures above 90°C a screw-mountable system made of stainless steel must be used for tempering connections (threads in tool R1/4" for tool side, M14x1,5 with inner seal cone for tube side; no sinking, backing device necessary).
- Cooling line stoppers for temperatures over 90°C must be built of stainless steel.
- Drawings of tempering connections will be supplied (see annex).
- Plugs for the cooling lines must be screwed. If this is not possible because of lack of space, a consultation with ACCOMPLAST is necessary.
- Tempering connections must not be sunk into the plate, only if the ordered machine size for the tool requires it.
- Electrical heated mold tools must be compatible with Hasco (or agreed otherwise (PSG)).
- Heat insulating plates must be of 6mm minimum on both sides. The tool must be completely isolated when the tool temperature is higher than 120°C.
- For tools that can be tempered above 90°C the hot runner must be insulated.

Scope of delivery

- Injection molding tool as ordered.
- Lifting lugs for transportation are part of the delivery.
- Tool drawings in 2D (DWG/ DXF and PDF) and 3D dataset (Step record 2.14. or Parasolid), iges circle axes of the runner and cooling lines as well as the parts list (Excel, PDF) of the tool are part of the delivery and have to be supplied (the documentation of the coating must be included in the parts list). The tool design must consist of the following main parts: injection side, ejection side, ejection unit, slider unit and hot runner system.
- The electrodes used for manufacturing the tool become property of ACCOMPLAST.
- Each tool must be waxed before delivery and transport **(no oil permitted)**.