

JCI Global Injection Mold Tool Standards

Johnson Controls Managed Tooling

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

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JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: INTRODUCTION

SECTION # I

DATE: July 17, 2012

Johnson Controls Global Injection Mold Tooling is committed to providing the highest quality built molds in a timely and cost effective matter. These tools must be structurally and mechanically sound as well as being highly capable of providing a quality part with a stable process.

These are the minimum expectations of our customers. In today's marketplace, nothing less is acceptable. We are committed to working as partners with our tool suppliers to meet and exceed these expectations.

The standards on the following pages are intended to enhance this partnership by clarifying expectations regarding standard practices to be used when designing and building Johnson Controls Global injection molds.

All corresponding construction views and notes are to be considered minimum requirements and must be used in conjunction with generally accepted design and build practices. All dimensions should reflect between inches and metric.

Please note that these standards are meant to be a starting point for mold design and construction. It is not possible, with this , to capture all of the possible conditions that exist in various tooling situations. Therefore, the content of these documents are NOT intended to eliminate the need for sound engineering judgment. It is our expectation that molds produced for Johnson Controls Global Tooling function correctly, are robust in nature, follow JCI purchasing documents etc. It is our further expectation that parts run automatically, and that parts, and runners, can be ejected from the mold by normal ejection or robotic means when specified. Any substantial deviation from the intent of these tooling standards should be reviewed and approved the JCI Tool Engineer.

Johnson Controls Global Tooling Quality Expectations

Continuous improvement is the underlying philosophy at JCI, which assures the delivery of defect-free, competitive products and services on time, and enhances our customer's success in a dynamic global market. All tools delivered to JCI will be tore down and an evaluation will be completed. An electronic report will be generated outlining all items that do not conform to Johnson Controls Global Tooling Standards. All non conforming items must be fixed.

Dimensional Specification Requirements

All tools must be built in Metric, for North America . Europe and Asia , and their native language. Verify press specifications (English Ton or Metric Ton) for the region.

Except eyebolts - NA requires English .

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: INTRODUCTION CONTINUED

SECTION # I

DATE: Aug 13, 2012

Revision Request

These standards will be reviewed annually by the Johnson Controls Global Injection Mold Tooling Standard Team.

Revisions recommendations are encouraged and should be forwarded to Mike Sneller. Section X contains the form required for submission, suggestions, as well as instructions for submitting these suggestions. All request need to be in by November 1st, and reviewed with the Advance Manufacturing Engineers from EU, Asia and NA for approval. (As to any changes will be affected globally).

STANDARDS MEDIA & RELIABILITY

The Johnson Controls Global Injection Mold Standards are available in two ways. For our external suppliers (those without direct access to the JCI intranet), the standards are made available on CD. The second method of accessing these standards is via the JCI intranet. Open your selected web browser to the JCI Portal home page (<http://my.johnsoncontrols.com/portal/site/ag/>). Select "Organization" "Departments", "Engineering Internet sites", "Tooling", "Tooling Standards" and select "Injection Molds" from the menu.

All tooling related files created by the tool shop are to be filed with Ontrax in North America .

Printing copies of these standards is not encouraged. Print copies are unofficial and should not be considered to contain the most up to date information.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **II MOLD BASE INFORMATION**

SECTION # **II**

VIEWS **A-T**

FILE:

DATE: May 1, 2014

This section outlines the basic construction expectations of the **MOLD BASE** details and features.

Specific views shown on the following pages are:

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JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **SURFACE SPECS**

SECTION # **II**

VIEW # **A**

FILE:

DATE: Dec 1, 2011

SURFACES:

Cavity:

- * If graining is required, the tool supplier is responsible for a fluid test.
- * EDM (Electrical Discharge Machining) or cutting other than HSC (High Speed Cutting), must be careful not to stress the underlying steel in the cavity that may affect the uniformity of the textured surfaces.
- ALL EDM & cutter marks need to be removed

Core:

- * If not otherwise agreed, HSC milling is preferred. The step should be approximately 0.5mm , but actual dimension of the step is dependent on the part geometry.
- * Polishing is only required for functional demold.
 - *Ribs are to be polished in the line of draw for demolding
 - *Dog house / attachment features of all kinds and shapes that are in solid. or require inserts, or require action. Are required to be polished in the line of draw for demolding.
 - * All EDM & cutter marks must be removed , that affect the part from demolding.
 - *The tool supplier is responsible for the part to demold properly and not cause any quality issues.

Cavity & Core:

- * Welding is only allowed after a Tool Engineer approval. In case of welding in a grained area the welding material should be the same as the master steel. Tool maker stays responsible for all the following consequences, even after JCI approval.
- * Surface nitrid (or other spec'd) is only allowed after JCI Tool Engineer approval. even for guiding systems.

Mold Surface Finish	Typical JCI Application	Notes
400	General Surface finish (including most areas to be textured)	Contact texture source for proper texture surface preparation
600	Vertical part surfaces less than 15 degrees	
SPL-SPE #1 (Diamond Polish)	"Mirror Finish" Lens Optics	Polishing source should be considered

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TOOL STEELS**

SECTION # **II**

VIEW # **B**

FILE:

DATE: June 15, 2012

Steel Quality - Overview

ASSAB	AISI / SAE-USA	Germany / DIN	(HB) HARDNESS	(HRC) HARDNESS
DF-3	O1	1.2510	HB 190	HRC 56-60
VANADIS 4			HB 235	HRC 56-58
718S	P20 MODIFIED / 4130	1.2311 / 1.2738	HB 290-330	HRC 28-32
718HH	P20 MODIFIED	1.2738 H	HB 330 -370	HRC 34-38
S-136	420ESR	1.2083 ESR	HB 215	HRC 45-54
MM40				HRC 40
8407	PREMIUM H 13	1.2343 ESR	HB 185	HRC 48-52
	4140	1.1730	HB 190	HRC 28
AMPCO	AMPCO	AMPCO - M 4	HB 286	

* The Coefficient of thermal expansion for all Steel , Harden Steels , Cooper & Aluminum. Must be taken into consideration when designing / building all tools. This is very important and must be reviewed with the JCI Tool Engineer.

* The differences can cause damage / un-even wear to all components if not calculated properly which can affect - Hot Runner Systems, Actions (Slides / Lifters etc), Ejector plates / pins, etc.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TYPICAL MOLD CONSTRUCTION MATERIALS**

SECTION # **II**

VIEW # **C**

FILE:

DATE: June 15, 2012

Ref. Sec. II, View B

Tool Material	HB Hardness Range	HRC Hardness Range	Typical JCI Application	Notes
IMPAX SUPREME / 718S / P20 /4130/ 1.2311/1.2738	290-330	28-32	Cavity & Core for low to medium volume parts, with un-filled resins	Cut into solid or used as inserts
718HH / P20 MODIFIED /1.2738H	330 - 370	34-38	Cavity & Core for medium to High volume parts, with un-filled resins	Cut into solid or used as inserts
ORVAR SUPREME / 8407 / Prem H 13 / 1.2343 ESR	185	44-46 48-52	Cavity & Core for high volume parts and some filled resins. - High amount of part shutoff.	Warp / moves during heat treat
S7 (NA only)		44-58	Cavity& Core insert material for small to medium size high volume parts. - High amount of part shutoff	Texturing sources do not prefer this material
S-136 / 420 ESR / 1.2083 ESR	215	45-54	Lens Optics (52-54) / - Vac metalized parts / - PVC parts Nylon materials- parts	Lens usually require SPI-SPE#1 surface finish or EDM finish in some cases
4140 / 1.1730	190	28-33	Mold base for inserted cavity sets	
Porcerax PM35 (NA only)		35 (treatable to 55Rc)	Porous cavity / core inserts for venting	1/2",5/8",3/4". Should be EDM for porosity. Inserts to be slotted and vented to
MOLDMAX HH / MM40		40	High heat areas with none or little water	the inserts when ever feasible, cooling lines as close as
VANADIS 4	235	56-58	Tube pinch	Powered metal
AMPCO / AMPCO 845 / AMPCO - M4	286		NOT Typical - Special Consideration ONLY High heat area of mold	May need stainless inserted for shut off areas. Shut off areas do not hold up.
ARNE / DF-3 / 01 / 1.2510	190	56-60		
Only)		30-35	Core Pins	
(NA Only)		50-55	Core Pins	
			Large Prototype parts	
QC Aluminum	167		Prototype inserts	Not readily weld able

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JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **MOLD SURFACE TREATMENTS**

SECTION # **II**

VIEW # **D**

FILE:

DATE: Aug 6, 2012

Surface Treatment	Hardness / Additional material	Typical JCI Application	Notes
Titanium Nitride	2300 Vickers / 1-5 micron	Ejector pins & slides of VAO metalized parts. - Textured ejector pins. - Aesthetlo parts w/tools > 100' F /38' C	If any pins are titanium nitride, all pins have to be titanium nitride and the ejector box on the tool should be stamped " Do Not Grease these pins"
Dicronite	No Change	Lubrication without grease	
Chrome plate	.001 to .005" .025 to .127mm	Corrosion protection / increase surface wear	Requires removal before engineering changes and added back on.
Armaloy	1020 /1100 Vickers .0001 to .0002" .0025 to .005mm	Caustic / Corrosive plastic materials without 420SS	Requires removal before engineering changes and added back on.
Armor Clad	70 Rc / 190 HB .0002" .005mm	Coating ejector pins for galling problems	Removable it sent back to the manufacture is Applied at 200'F / 93' C
Ni -on (Melco NA Only)	38-60 Rc / 185 HB .0002" .005mm	Non stick coating commonly used on speaker grille tools	
Tribal Coat	38-60 Rc / 185 HB .0002" .005mm	Non stick coating commonly used on speaker grille tools	
Brand : Hotec Type: Sipolox	900- 1200 Vickers .002 mm	Non stick coating commonly used on speaker grille tools	

*** Important Note:**

Some of these treatments are not available in EU or Asia, but have comparable alternatives, All Countries will be required to use a high quality supplier, to meet the hardness range required for there specific application. This must be approved by the JCI Tool Engineer.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: MOLD BASE TYPICAL FEATURES

SECTION # II

VIEW # E-1

FILE:

DATE: May 1, 2014

- * Plates / Blocks to typically be the equivalent of (ref. Sec II, View C)
when cavity / core details are cut into solid.
(alternate cav/core material to be spec'd by the Tool Engineer)
- * All visible class "A" surfaces are to use a certified steel from approved supplier.
- * All locks are to be cut into the solid to provide adequate alignment and protect for injection pressures. (Center line & parting line locks Do NOT). Example the lock height minimum is 50 % of highest point of the product. (May not be required on all tools pending product design)
- * Base size & KO pattern are to meet specs for the targeted machine .
- * Corners of all the plates are to be chamfered. 3.0 mm
- * Cover clamp plate & Ejector clamp plate are to be parallel within 0.1 mm.
Check diagonally in two directions.
- * Capture plates / Wire channel covers are to be 12.0 mm thick.
- * Capture plates / Wire channel covers are to be flush to the clamp plate surface
-0.1 to -0.3 mm
- * For Mag platens only, all sensor locations , must have cover plates over every opening as required - Review manufacturing and press specifications.
- * Clamp slots are to be installed on all tools regardless of magnetic platen utilization.
Always refer to press specifications for pattern.
- * Electrical boxes and connectors must be placed on top of mold (or high as possible) to avoid electric disturbance or damage. These must be protected.
 - #1 - Location Option- Top Of Mold -close to Non op side.
 - #2 - Location Option - Non op side close to the top of mold.
- * The use of standard parts is mandatory (Hasco, Strack- Norma, DME, Meusburger for Europe and DME , PCS, Progressive for the North America parts).
- * The use of self made standard components is not allowed If a part design dictates a non standard purchased component JCI tool engineer approval will be required, spare components will also be required if requested. IE non standard ejector sleeves etc.

Important Note : Always review manufacturing and press specifications with the JCI Tool

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **MOLD BASE TYPICAL FEATURES**

SECTION # **II**

VIEW # **E-2**

FILE:

DATE: May 1,2014

* All protrusions (i.e.. Limit switches , cylinders, connectors) are to have guards , stand offs blocks, legs or over size clamp plates for protection during handling (moving, tipping, etc.)

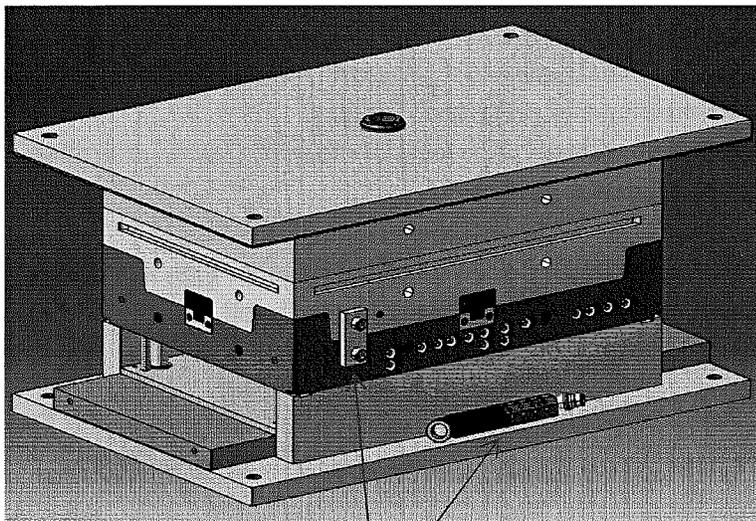
* Stand offs & legs are to be included and reviewed with the processing site or Tool Eng.

** Tool should stand level with Top of Mold in the up right position

*** When using round stand offs / legs. See chart below **Diameter Size** required to **Machine Tonnage. Thread size** for attachment.

Diameters Size	Thread /SHCS Size	Machine Tonnage
37- 50 mm	12-16 mm	500 T >
75 - 87 mm	20 mm	500 -1200 T
100 mm	20 mm	1200 T <

* When using over size clamp plates, verify the press specifications.



Over size clamp plates protects all protrusions,
Example - Water manifolds , shipping straps , etc.

Important Note : Always review manufacturing and press specifications with the JCI Tool

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **MOLD BASE TYPICAL FEATURES**

SECTION # **II**

VIEW # **E-3**

FILE:

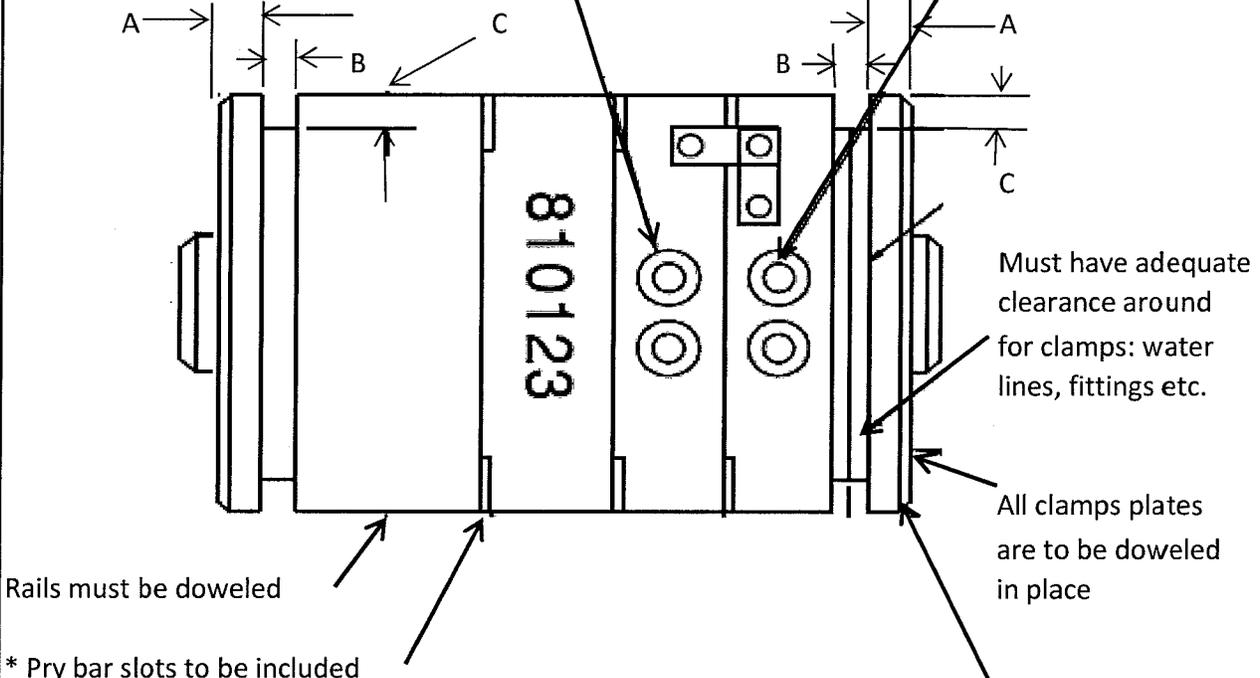
DATE: Jan.17, 2014

*** EU uses oversize clamp plates, Always review press specs and with a Tool Engineer.**

(Water , Air, N2, etc)
6 mm per side minimum

All connections / fittings are to be recessed so they are flush with the outside of the base.

* Parrallism of the plates are important
0.00mm +/- 0.03 mm



* Pry bar slots to be included
between each plate to the ejector block
25 mm X 25 mm X 5 mm
deep where possible

Plate edges.
Require a 2 mm Min
Chamfer on the outer edges
Clamp Plates,
Require a 3 mm
Chamfer on the outer edges

*** Clamp Slots are required on ALL four sides**

US	Metric	A NA	A - EU Mag Pltn	B - minimum		C - minimum	
				NA	EU	NA	EU
< 500 T	< 550 T	30 mm	30 mm	30 mm	30 mm	20 mm	20 mm
≥ 500 T	≥ 550 T	35 mm	40 mm	30 mm	30 mm	25 mm	25 mm
≥ 800T	≥ 880T	64 mm	50 mm				

Any deviations from these dimensions to be approved by the Tool Engineer
Dimension 'A' on molds for Visor Molding is not standard, reference Tool Engineer.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **INSULATION PLATE**

SECTION # **II**

VIEW # **F**

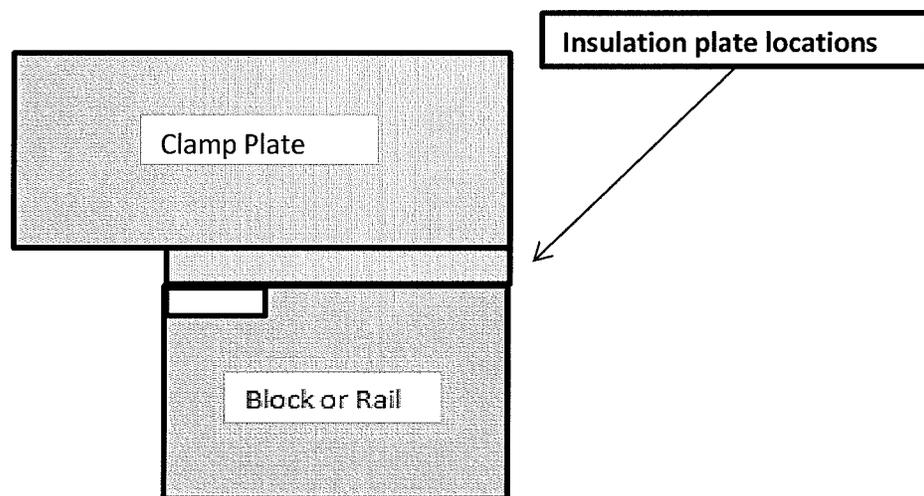
FILE:

DATE: July 23, 2012

Insulation Plate:

If the tool temperatures during continuous production meet or exceed 131°F / 55°C. An embedded insulation plates are required on both sides Injection and Ejector side.

Holes for the tools assembly must be accessible.



Important Notes:

* During tool designs, include the manifold supplier. Heat transfer interface, stack heights, clearances and pre- loads.

* Materials - Required with all materials - Except PP and TPO.

* The Insulation plates are not required on all tools.
This must be reviewed and approved by a JCI Tool Engineer.

* The insulation plates are used to prevent heat transfer to the platen.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **MOLD BASE TOOL LABELING & IDENTIFICATION**

SECTION # **II**

VIEW # **G -1**

FILE:

DATE: Nov. 1, 2013

* All water , air and hydraulic connections are to be identified by stamping a 6 mm high letters in the base next to the fitting.
(A smaller size stamp can be used on smaller tools, But a larger size is better. These must be approved by a JCI Tool Engineer.)

* Information plaques required for the following:

- * Tool info (- can be stamped)
- * Cylinder / tool action sequence
- * Hydraulic schematics - Located on Operator Side
- * Hydraulic systems to have maximum pressure rating engraved on the Operator Side
- * Pneumatic schematics (gas assist, valve gates, CAP, etc.)
- * Electrical schematics (any / all wiring) - Located on the Operator Side
- * Water schematics (any / all water) - Located on the Operator Side.
- * Porcerax in the tool. - Plaque required - see Sec. II, View Q.
- * Warning plaques for all possible failure modes, (i.e. Ejector pins under slide critical tool sequence, etc)

- * OEM PROPERTY OF TAG & ASSET TAG.
Are required on all tools, the detail information required on these tags must follow the OEMs requirements. These will be provided by the JCI Tool Engineer.

All plaques are to be recessed & cannot be over clamp slots, access holes, etc.

(Note: Plaques are not required to be recessed with over extending clamp plates)

Information Plaque - "This tool was built with Metric components"

All Plaques - Must be in there Native language for the country this tool is running in.

Important Note : Always review manufacturing and press specifications with the JCI Tool Engineering for details and approvals.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

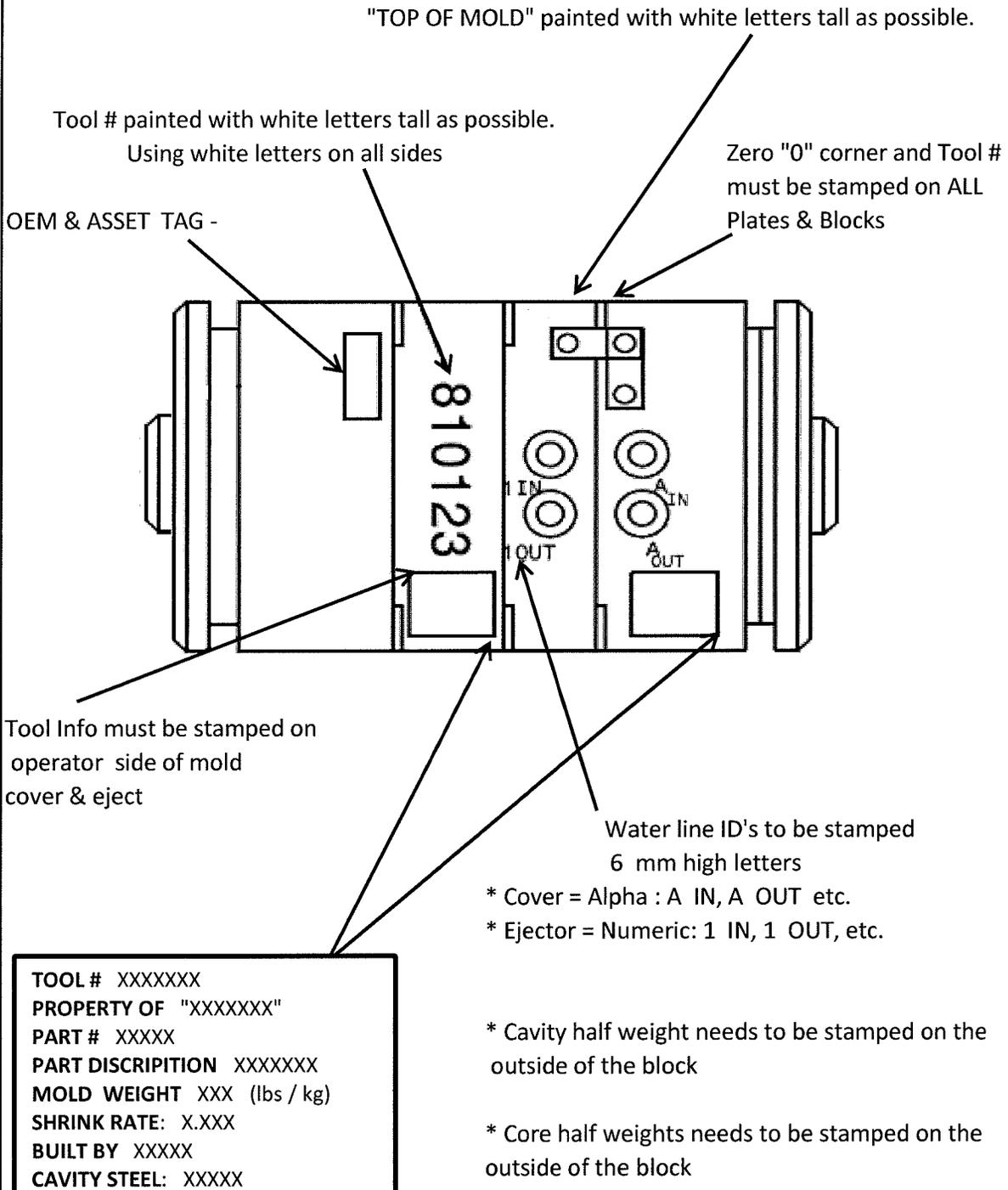
TITLE: **MOLD BASE TOOL LABELING & IDENTIFICATION**

SECTION # **II**

VIEW # **G-2**

FILE:

DATE: Nov. 1,2013



All Plaques - Must be in there Native language for the country this tool is running in.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **SUPPORT PILLARS**

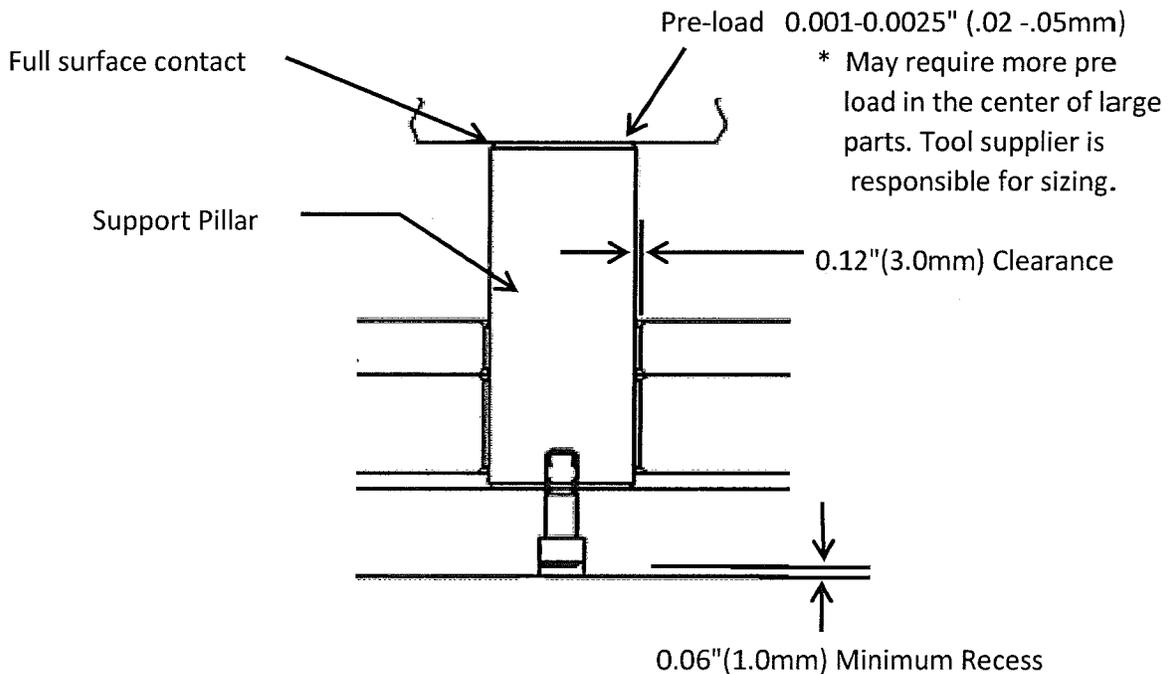
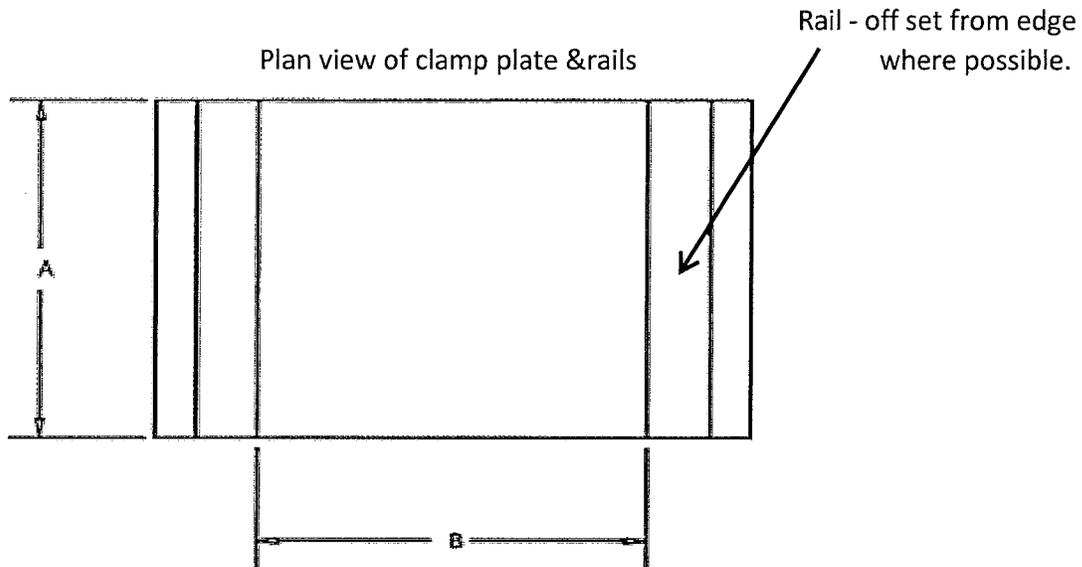
SECTION # **II**

VIEW # **H**

FILE:

DATE: July 17, 2012

- * Pre-load always needs approval from a Tool Engineer
- * The amount and spacing of the support pillars must be adequate to keep the plates from deflecting under shot pressure.
- * Pre-load spec based on steel spec of support pillar, and tool size
- * Support pillar area to be $> 10\%$ of $A \times B$.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

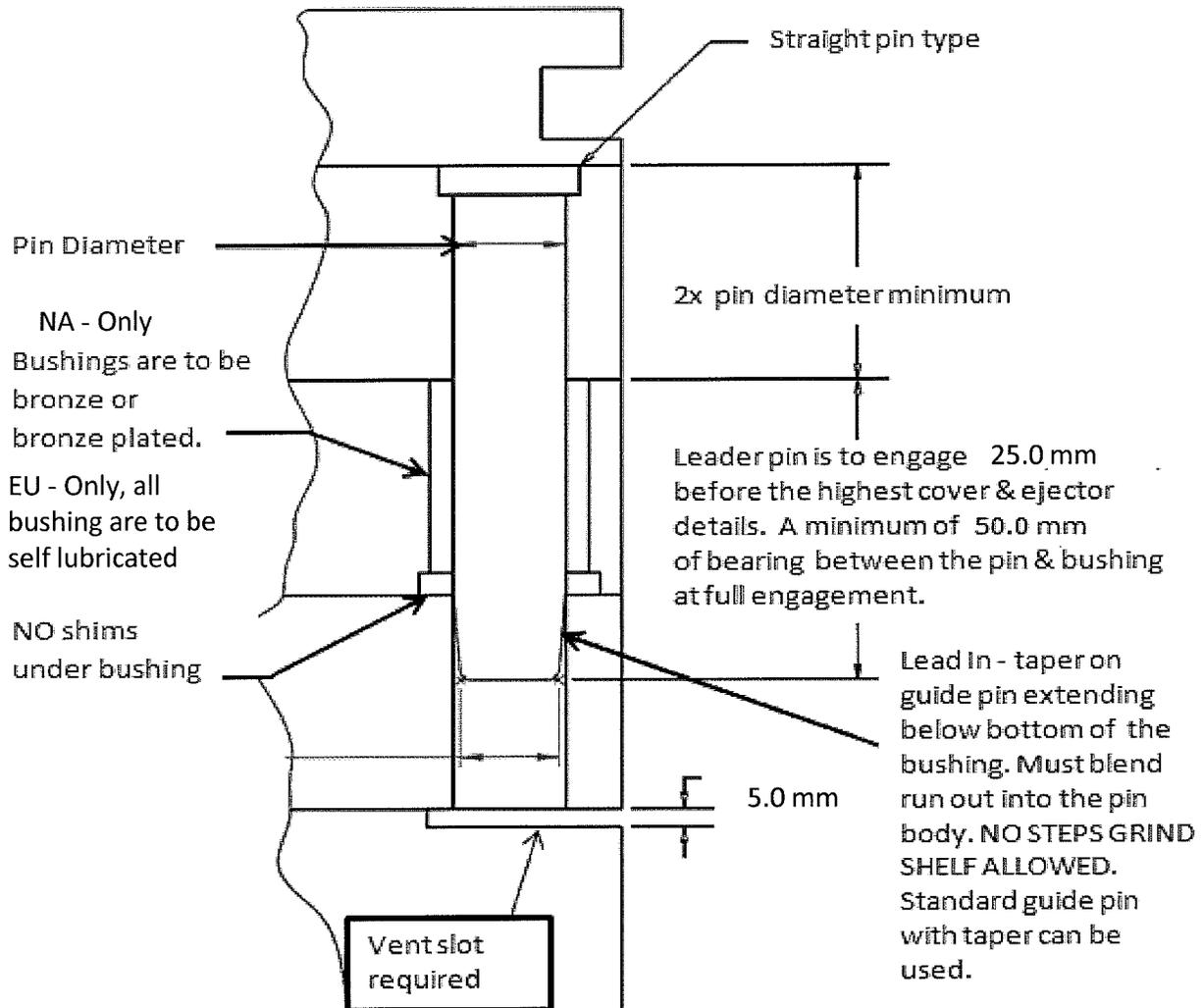
TITLE: LEADER PIN & BUSHING

SECTION # II

VIEW # I

FILE:

DATE: Nov. 1,2013



- * All bushing & pins are to be standard (DME / Hasco etc.)
- * Bushings can be shoulder style (mounted from the back) or straight with snap rings or screws to retain the bushings (mounted from the front).
- * "Zero Corner" pins & bushing are to be off set.
- * > 500 US/ 550 Metric press - molds will have 50 mm diameter leader pins.
- * < 500 US/ 550 Metric press - molds will have standard DME or equivalent leader pins sizes.
- * Tools with tool temperatures $\geq 131^{\circ}\text{F}$ or 55°C will always require guide bars.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:

GUIDE BARS

SECTION # **II**

VIEW # **J-1**

FILE:

DATE: Nov. 1,2013

Guiding Bars:

Guiding bars are required - if running in a press of 800 Ton and above with tool temperatures \geq 131°F or 55°C. and above.

Guiding bars and plates need pre-guiding. Guiding bars are required to be in the center of the tool, (Sec II View J-2) to allow for the difference in thermal expansions of the mold plates caused by the different mold plate temperatures.

Guide bars are required on all tools that run in presses 2000 Ton and above. regardless of temperature.

In case of handling disturbance, (Hoist ring / Eye bolt at the top of mold) the top guiding block can be eliminated. Must be approved by the JCI Tool Engineer.

Tool Shops must use standard components.

Machine pockets opposite of the guide bar with out steps, to insure there no additional wearing caused to the plates

Guide bars are always on one side.
(Correct locations - see Sec II View J-2)

Self lubricated bronze is mandatory for all guiding plates in EU Only.

The width dimension of the guide / slider are important and are required on the tool. This must be approved by the JCI Tool Engineer.

* NOTE: Verify Robot clearance / open day light in the press for part removal. - This must be reviewed and verified with Plant & JCI Tool Engineer. (This stays the Tool Suppliers responsibility)

* NOTE: NOT required on all tools. Only when higher process temperatures are required driven by different type of materials.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

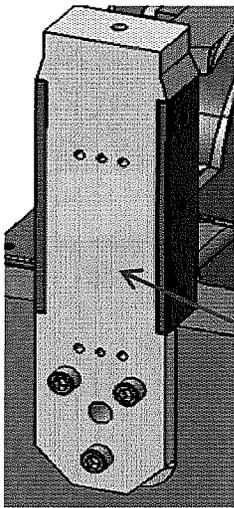
TITLE: **GUIDE BAR - Design & Location**

SECTION # **II**

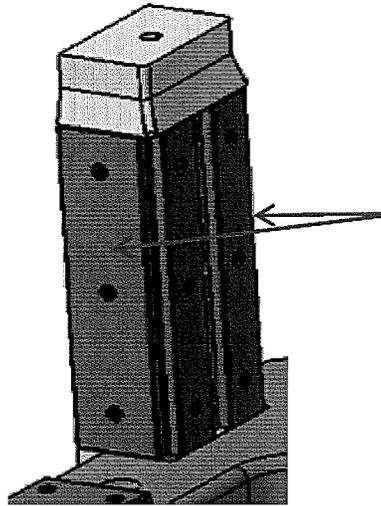
VIEW # **J-2**

FILE:

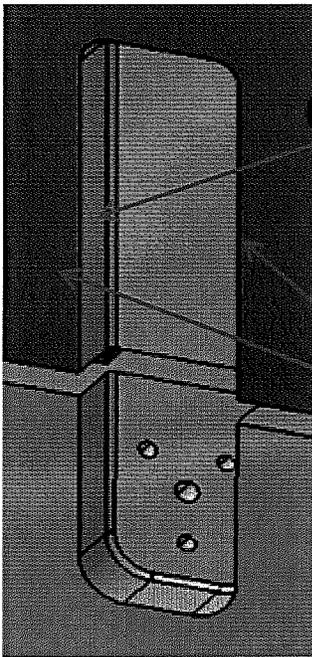
DATE: July 23, 2012



Inductive harden

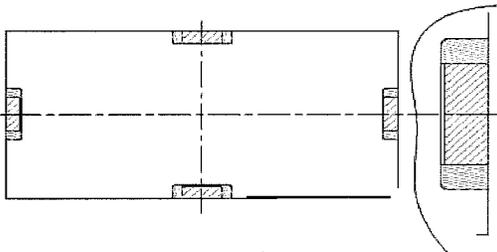
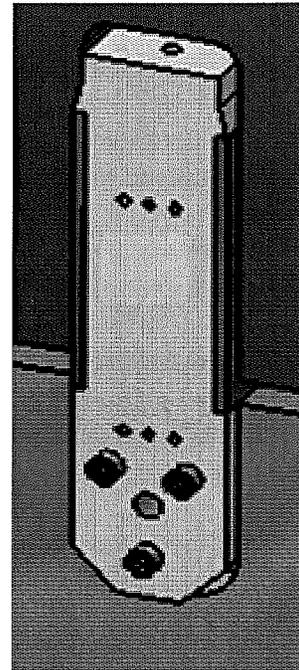


Bronze wear plates

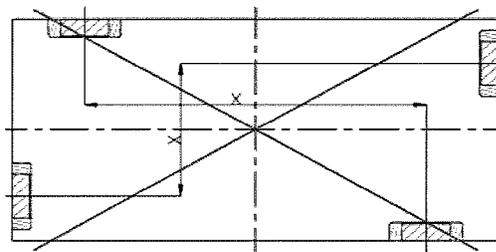


Machine pockets with out steps, to insure there no additional wearing caused to the plates

Gibs locations if required.



CORRECT Locations of the guides.



WRONG locations of the guides

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: SAFETY STRAPS

SECTION # II

VIEW # K-1

FILE:

DATE: Nov. 1,2013

* Safety straps are to be located on two sides - opposite corners of the mold, mounted on the "operator" and "non operator" sides.

* For Safety Strap recommended sizes - (ref.Sec II View K-2)

* ALL safety straps must have the TOOL ID # stamped on it. (Sec II View K-2)

* Safety Straps - must be straight in line with opening of the mold with two fasteners- NOT diagonally or rotated in any way for screw alignment.

* All safety straps must have a SAFE storage position / location, on the stationary half, NOT to interfere with "OPENING & CLOSING" of the tool. or any clamping, hoses, fittings, connectors, etc. (ref - Sec II View K-2)

* Mold weights greater than 5,000 lbs or 2500 kg Will require safety straps on all four corners of the mold. - "operator" and "non operator" sides.

* The straps must NOT interfere with any clamping, hoses, fittings, connectors, etc.

* All Safety straps must be recessed, When there is no oversize clamp plates or protection around the tool. If for any reason they can not, there must be an approval by the JCI Tool Engineer.

* For hot runner systems, safety straps are to be included between Cover Cavity plate and manifold system(hot half rails) to allow for in press maintenance.

* Straps are to be painted RED.

- Straps to be painted RED for all locations NOT restraining spring pressure.

- Straps to be painted RED for all locations where spring pressure is restrained.

- one slotted hole in the strap is required for the pressured plates tools , otherwise true diameter holes are required for None pressured plates.

THIS REQUIRES AN INFORMATION PLAQUE INFORMING OF THE SPRING PRESSURES.

- Straps to be painted WHITE used across split lines on the manifold systems.

** LYNCH pins for locking - Sizing needs to be reviewed and approved by the JCI Tool Engineer. The size ranges vary between countries.(ref. Sec II View K-2)

Important Note : Always review manufacturing and press specifications with the JCI Tool Engineering for details and approvals.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

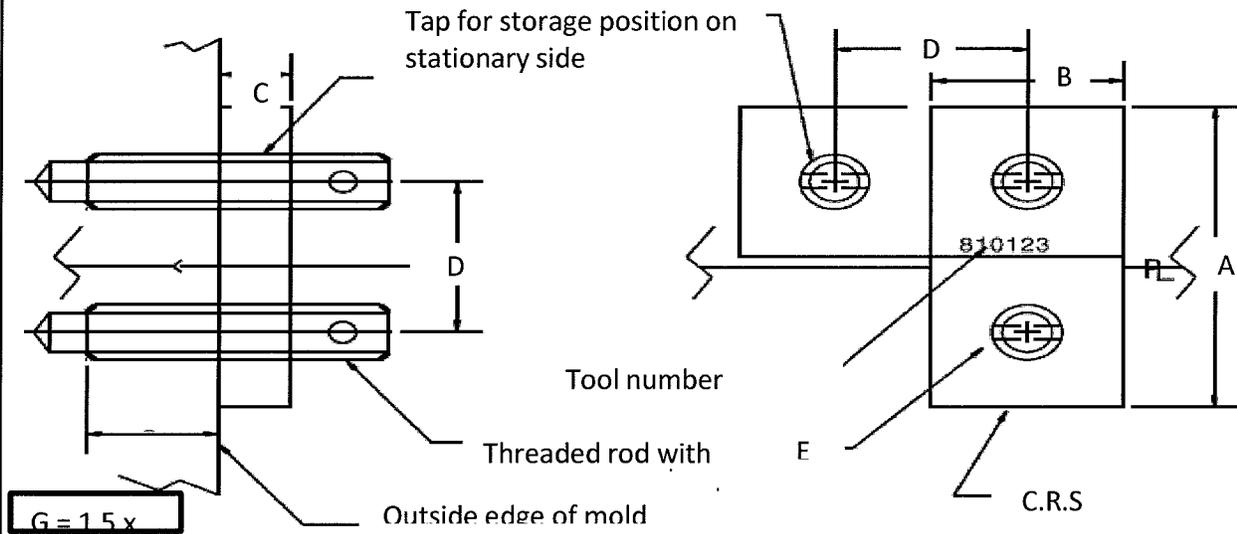
TITLE: **SAFETY STRAPS**

SECTION # **II**

VIEW # **K-2**

FILE:

DATE: Nov. 1, 2013



MOLD WEIGHTS	Ref Sizes	A	B	C	D	E-Rod
1,500 lbs / 800 kg	M10	50 mm	30 mm	10 mm	30 mm	M10
5,000 lbs / 2500 kg	M16	80 mm	50 mm	15 mm	50 mm	M16
20,000 lbs / 10000 kg	M20	140 mm	60 mm	20 mm	80 mm	M20
39,000 lbs / 18000 kg	M24	140 mm	80 mm	30 mm	80 mm	M24

Lynch Pins - Zinc with Yellow Chromate

Nominal Dimensions

A Pin Diameter	B Shank Length	C Head Height	D Head Width	E Capture Length	F Ring Width	G Wire Diameter
3/16	1-1/4	1/2	11/32	1	1-1/8	.109
3/16	1-9/16	1/2	11/32	1-5/16	1-7/16	.133
1/4	1-3/4	1/2	11/32	1-5/16	1-7/16	.133
5/16	1-3/4	1/2	13/32	1-3/8	1-1/2	.133
7/16	1-3/4	9/16	1/2	1-3/8	1-1/2	.133
7/16	1-15/16	9/16	1/2	1-5/8	1-7/8	.133
7/16	1-15/16	19/32	1/2	1-1/2	1-21/32	.193

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: EYE BOLTS & EYE BOLT HOLES

SECTION # II

VIEW # L-1

FILE:

DATE: April 14, 2014

* Eyebolts must be located so the tool can be lifted and loaded into a press with one eyebolt . - Exceptions for larger tools - Needs a Tool Engineer approval.

* (4) Eyebolts holes on the cover and ejector block / plates, clamp plates, ejector plates. On all tools sized for 250 ton US / 275 metric ton or larger, for splitting and rolling the tool.

* Eyebolt holes on both halves on all (4) sides of the mold thru the center of gravity so the mold hangs straight (within 5 degrees).

* Eyebolts holes must be ID stamped for eyebolt size.

* Threaded handling holes to be provide on all plates - ejector, spacer & clamp / details - rails , slides & inserts > 50 lbs / 30 kg.

* Include adequate number of eyebolt holes for easy handling, flipping, etc. locations are at outer 4 corners.

* Threads must be taped to full depth. (IMPORTANT SAFETY ISSUE).
(ref chart Sec II, View L2)

* All eyebolts holes must meet the RUD - starpoint (PINK) eyebolt hole specifications.

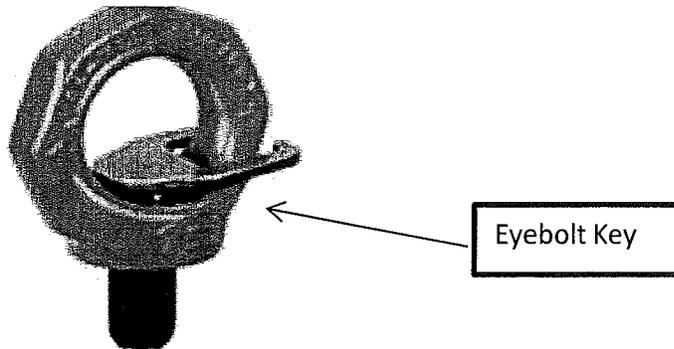
* If eyebolt holes are in rails, they must be plugged (NOT THRU) so the tip of the eyebolt cannot interfere with the ejector plate.

* Eyebolt holes must be located so the rings and chains DO NOT interfere with water lines hoses, hydraulic lines, electrical, etc.

* All plant requirements for manufacturing / native country will be provide by the JCI Tool Engineer. (English for NA and Metric for EU & Asia).

** Starpoint (RUD) Pink eyebolts must be provided on the "Top of Mold" on all tools.
(Available Globally)

** Engrave tool number into the EYEBOLT KEY, -NOT into the eyebolt itself.



**** NOTE: Metric sizes are for EU & Asia plants & English are for NA plants. ****

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

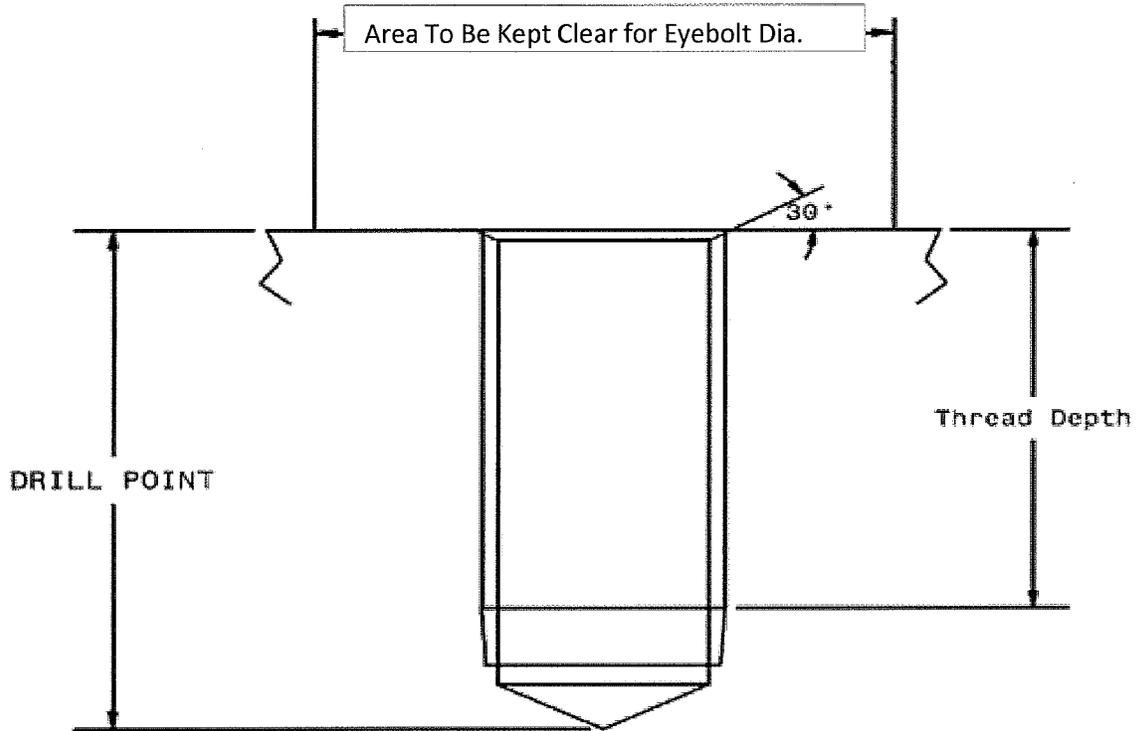
TITLE: **EYE BOLTS & EYE BOLT HOLES**

SECTION # **II**

VIEW # **L-2**

FILE:

DATE: Mar 16, 2012



EYE BOLT HOLES SIZES LISTED ON THIS SHEET ARE FOR STEEL TOOLS ONLY !!

Eye Bolt size	THREAD	Rating for STRAIGHT LIFT		THREAD DEPTH	DRILL POINT
		Max Mold Weight lbs	Max Mold Weight kg		
20 mm	1.5	5,020	2300		
24 mm	3	7,050	3200	48 mm	60 mm
36 mm	4.25	15,430	7000	72 mm	90 mm
48 mm	6	24,640	12000	78 mm	90 mm
	NC				
3/4"	10	5,070	2300	1.5"	2.0"
1"	8	7,050	3200	2.0"	2.5"
1-1/2"	6	15,430	7000	3.0"	3.75"
2"	4-1/2	24,640	12000	3.25"	3.75"

**** NOTE: Metric sizes are for EU & Asia plants & English are for NA plants.**

*** Refer to country safety requirements ***

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:

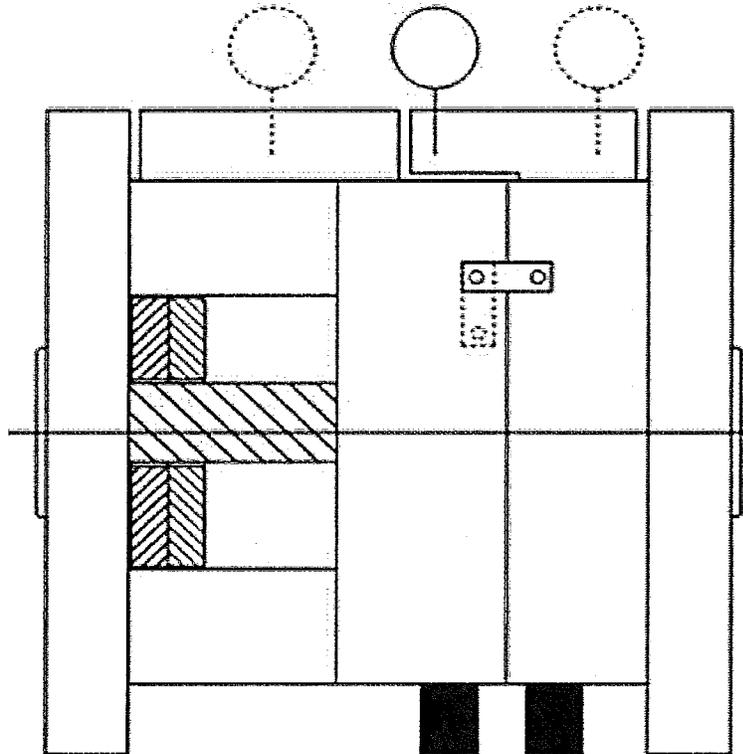
LIFT BARS

SECTION # II

VIEW # M

FILE:

DATE: Nov. 1, 2013



- * Lift bars - Adds additional lift points for picking the tool up in halves.
- * Lift bars - Are required when you CAN NOT have a center lift point.
- * Required on tools with external mountings - interfering with eyebolt locations , slide actions, electric boxes, water, hydraulic, etc.
- * Design - It must be a locking design for weight. - This design must allow the tool to open and close freely. - Most importantly the tool vendor must supply a design / calibrated to support the weight of the tool.
- * This is NOT required on all tool designs.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **LOCATING RINGS and LOCATIONS**

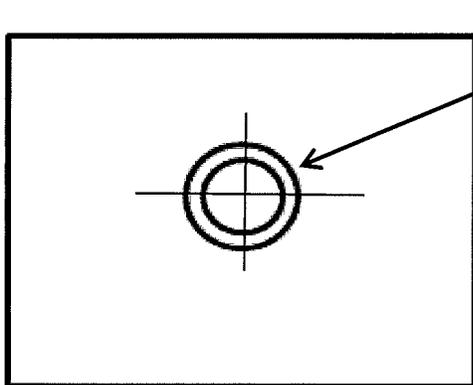
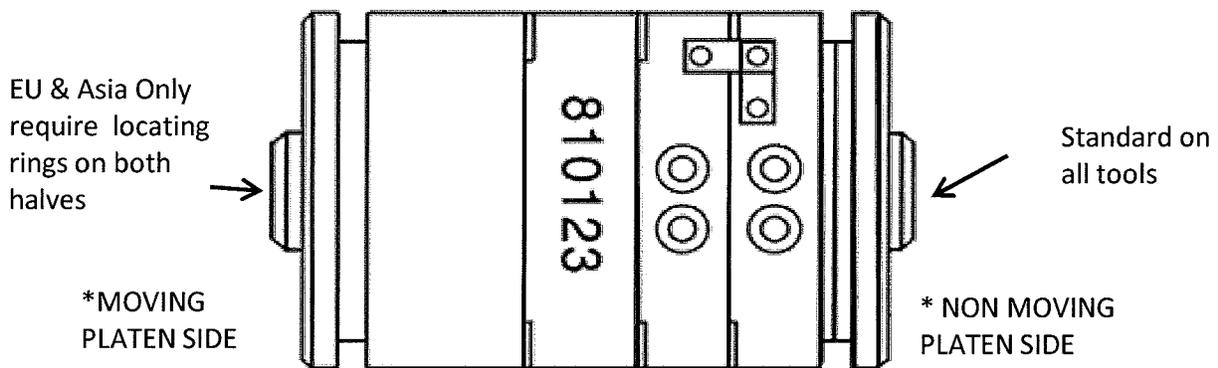
SECTION # **II**

VIEW # **N**

FILE:

DATE: Jan. 17,2014

- * Locating rings are standard components from DME or other preferred suppliers.
- * Locating rings - Flange style are an option . The flange should be flush with the back surface of the block / plate if used. (Not required for EU)
- * Locating rings are located at the center of the block / plate (Off set spru see -Sec II View O).
- * Locating rings are for locating the tool to the press, the alignment is very important. (Barrel & knock out patterns).
- * Number of locating rings required, This needs to be reviewed with the JCI Tool Engineer. (Native countries vary).
 - ** NA only requires (1) locating ring on the cavity side or Non moving platen side of the press.
 - ** EU & Asia requires (2) locating rings, 1 on both halves. Moving & Non moving platens
- * NOTE: Ref all Plant & Press specs for the proper LOCATING RING SIZE, The JCI Tool Engineer will supply this information.



Locating Ring location on Center line of tool.

NA ONLY Note: Locating rings must be 6.0 mm recessed into the block, attached with a min 10 mm socket head cap screw, with a 20 mm engagement height . The attachment screw size increases with tonnage- 12.5 mm for ≥ 1000 Ton
 Size Diameter = 3.990" or 4.990" (Ref DME 6521)
 ≥ 500 Ton and above will require 4/5" reverse able locating ring.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **OFF SET SPRUES**

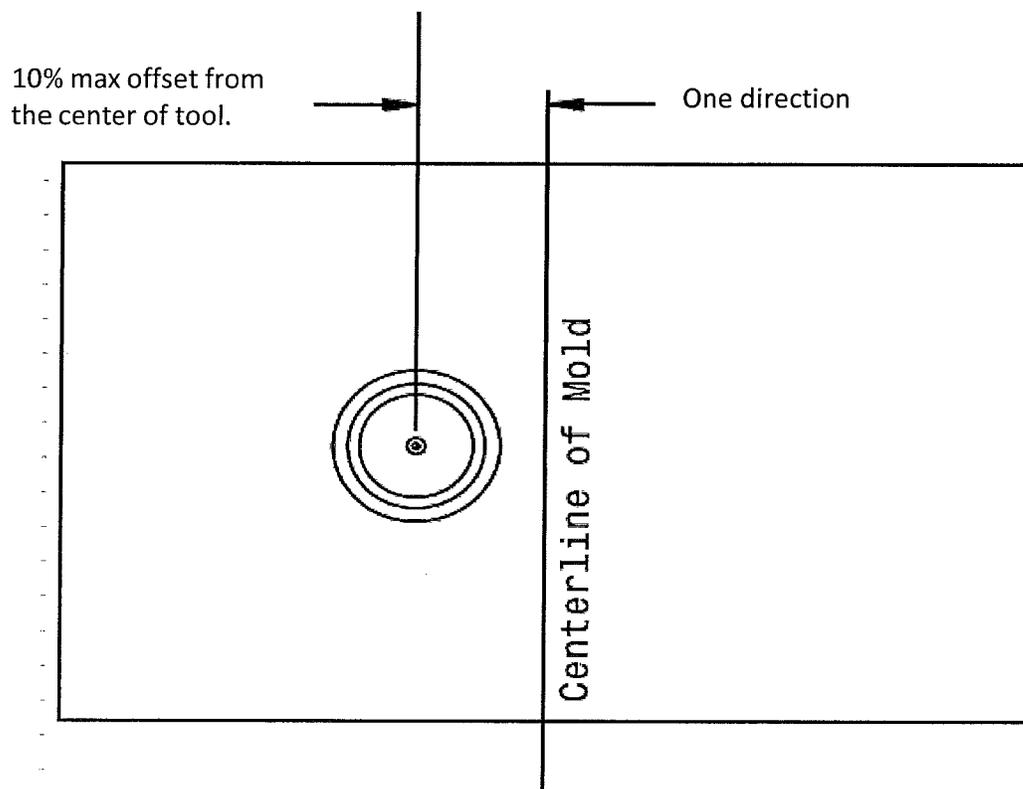
SECTION # **II**

VIEW # **O**

FILE:

DATE: Nov. 1, 2013

- * All sprues NOT located on centerline of the tool must be reviewed and approved by the JCI Tool Engineer.
- * Offset of the Sprue, can not exceed the maximum of 10% of length from the center of the tool.
- * Knock out patterns for ejection will need to be reviewed to ensure good balance within the guide ejection pins.
- * Knock out patterns - Needs to line up and match the offset. (possible Hydraulic ejection will be required).
- * Guide pins and return pins keep symmetrical around the center line of the press, not the mold. Whenever possible. (Ejection actions will need to be reviewed to ensure a good balance).

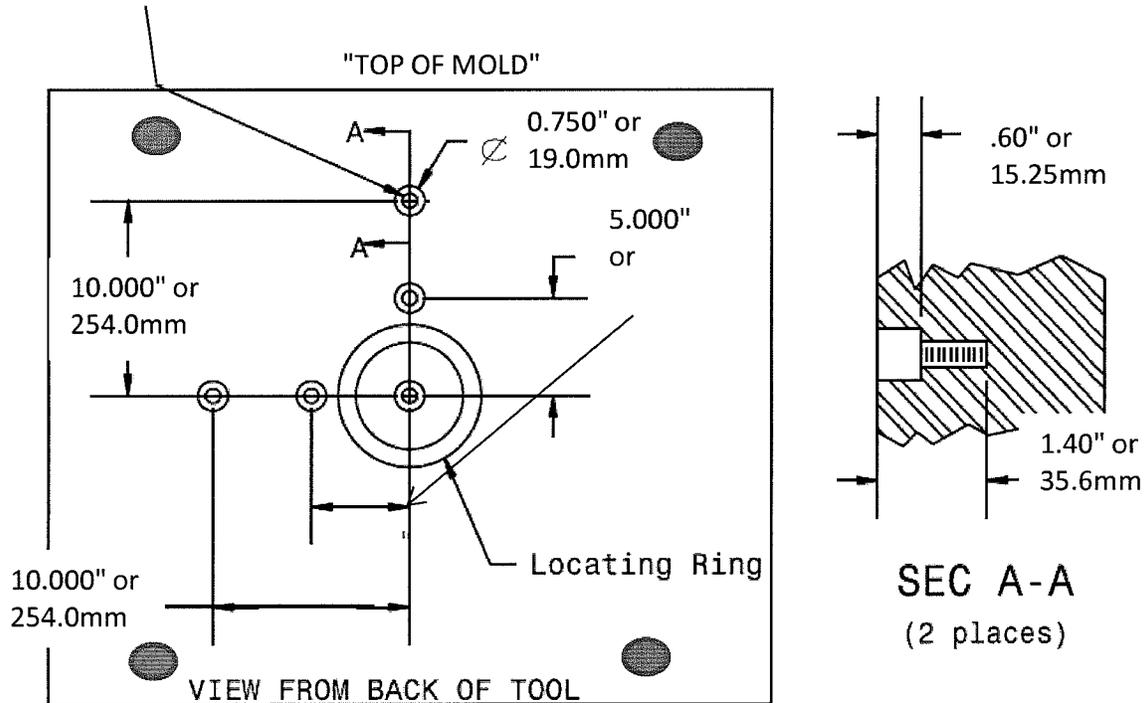


JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: POSITIVE LOCATION HOLES NA ONLY			
SECTION # II	VIEW # P-1	FILE:	DATE: Mar 16, 2012

- * Below specifications are standard lock sizes. (Used in NA, NOT in EU)
- * There are 4 available locations that are best suited for the tool.
- (Always review Press Specs)
- ** Below specifications are for 150T (US) thru 550T (US)
- ** Always review press specifications with the plant and JCI Tool Engineer.
- ** All Press / Tonnage sizes and specifications may vary .
- *  Include (4)handling holes , sized to support entire tool on tools 250Ton (US) and greater. (2) handling holes required on tools under 250 Ton (US)
- * When location holes and locks are used, Example- 2 shot , pick in place. (Used in NA)
- * NOTE: Not all tools require the locations holes and locks.

Drill and tap for a 5/16"-18 / 8.0mm cap screw



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: POSITIVE LOCATION LOCK BUTTON NA ONLY

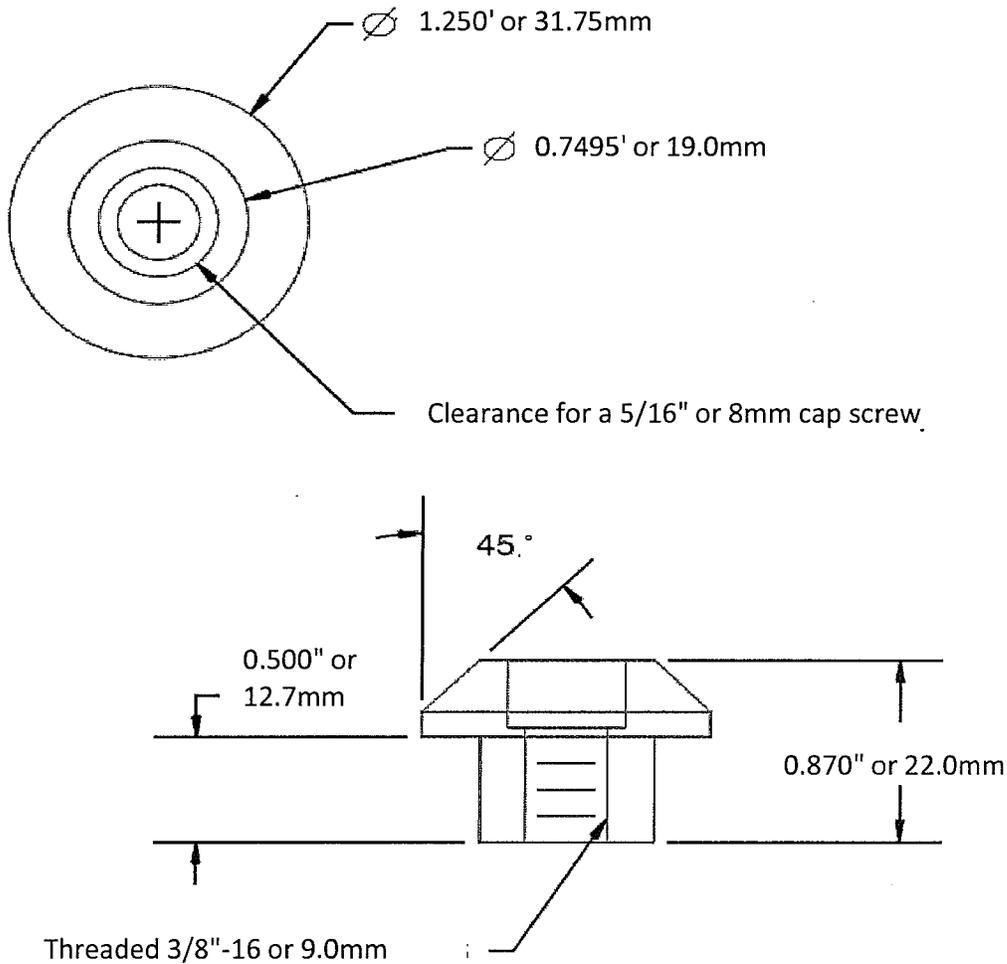
SECTION # II

VIEW # P-2

FILE:

DATE: Mar 16, 2012

- * Below specifications are standard lock sizes. (Used in NA, NOT in EU)
- * Always review press specifications with the plant and JCI Tool Engineer.
 - *All Press / Tonnage sizes and specifications may vary .
- * Standard components through DME.
- * When location holes and locks are used, Example- 2 shot , pick in place. (Used in NA)
- * NOTE: Not all tools require the locations holes and locks.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **PORCERAX INERTS TAG - EXAMPLE**

SECTION # **II**

VIEW # **Q**

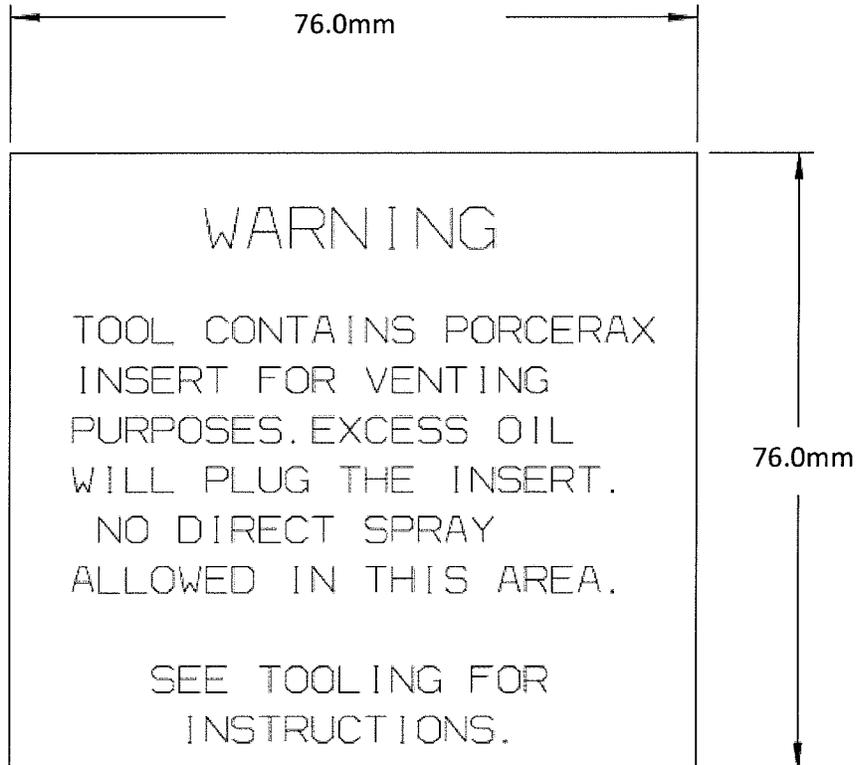
FILE:

DATE: Nov. 1,2013

" FOR REFERANCE ONLY"

* A RED tag with WHITE letters must be placed on every tool containing PORCERAX inserts.

* The use of procerx insert needs to be approved by JCI Tool Engineer.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:

PORCERAX - WATER & VENTING

SECTION # **II**

VIEW # **R**

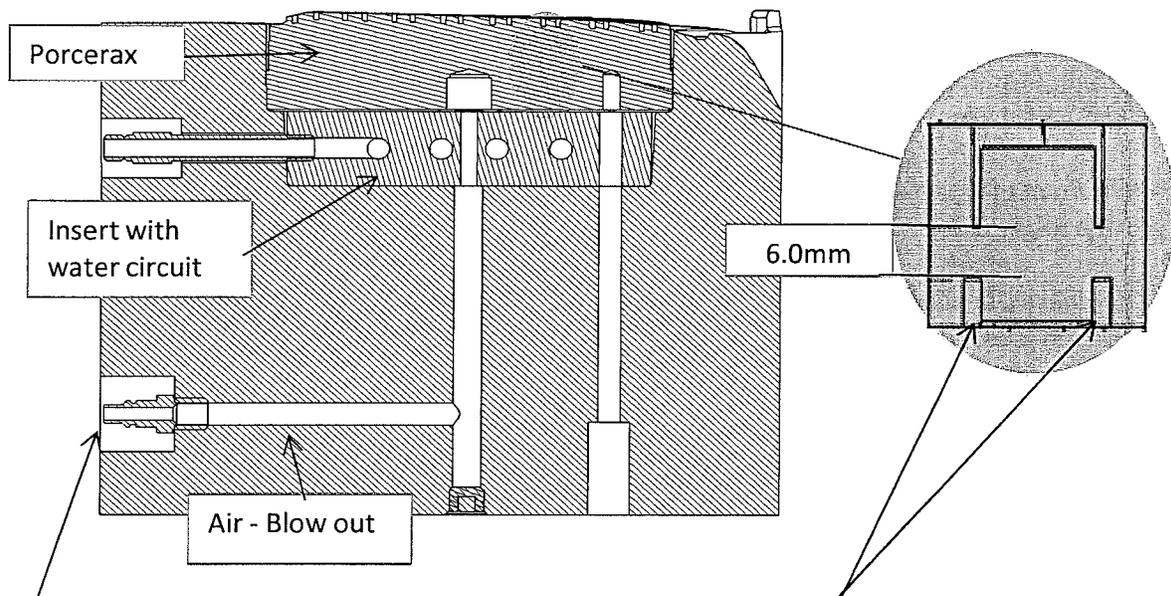
FILE:

DATE: May. 1,2014

* All PORCERAX insert are to have "BLOW OUT" holes with air fittings that run to the outside of the mold. Must be identified.

* Must have a water circuit insert below Porcerax insert. - speaker grilles as an Example.

* The use of procerax insert needs to be approved by JCI Tool Engineer.



* NOTE: - All fittings are to plant specifications.
AIR Fitting : ARO 2608 or equivalent

* Must have channels machined into the back of the insert to with in 6 mm of vent area. Inserts must maintain there structural integrity.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **CENTER LINE / PARTING LINE LOCKS**

SECTION # **II**

VIEW # **S**

FILE:

DATE: Nov. 1,2013

* All locks must be purchased components from PCS, DME, Progressive, Hasco, Meusburger, Strack Norma.

* 2 piece locks are preferred when possible.

* Location - Placed at the outside center lines of the tool.

* Ensure that the locks are to the right specification for the proper tool size.

* *Install Notes: In case of 2 piece locks are used. Otherwise follow supplier specifications.

1) Install male half to fit tightly in its pocket.

2) Machine female pocket width .010" or 0.25mm small. (.005" or .1mm per side)

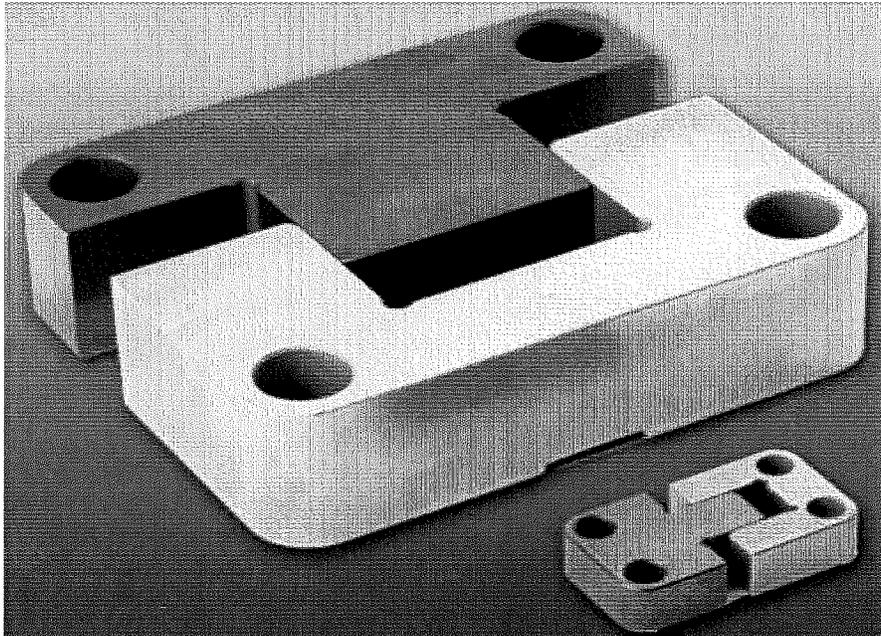
3) Grind outside of female gibs to fit the pocket size.

4) Measure the three blocks. The pocket width should be equal the sum of the three blocks to meet supplier specifications.

5) Blocks must be flush, or sub flush to edge of the mold steel.

*A minimum of 2 parting line interlocks are required to protect minimum shut off angles and to provide alignment of cover and ejector.

**NOTE - These DO NOT take the place of standard locks cut into solid tool steel for alignment and injection pressure requirements.*



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **EJECTOR HOUSING OPENING COVER**

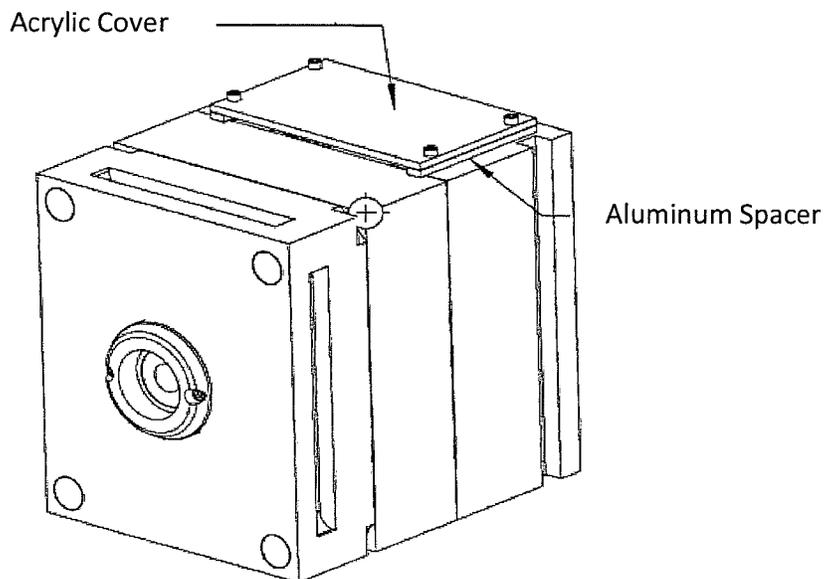
SECTION # **II**

VIEW # **T**

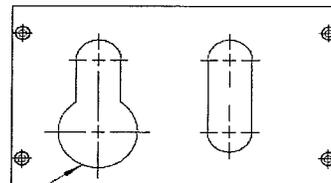
FILE:

DATE: Nov. 1, 2013

- * When an open end of the box faces the "TOP OF MOLD", a cover is required. This will keep dirt and other objects from falling into the ejectors.
- * With hydraulic ejection, A metal mesh cage material can be used to keep objects out of the ejector plates.
- * Cover requirements are:
 - 1) a .250" or 6.0mm thick acrylic cover.
 - 2) Spacer between the acrylic cover and the rails will require a .250" or 6.0mm thick aluminum plates. This is to prevent rubbing between the ejectors plates and cover.
 - 3) Equal Clearances are required as needed for water pipes, connectors, limit switches. (Not to be excessive to allow anything to fall in)
 - 4) Top & bottom of the cover must overlap onto the steel.
 - 5) Spring washers behind the screw head to prevent the screws from backing out.
 - 6) NO OTHER WASHERS ARE ALLOWED TO BE USED.



Slots may be needed for water pipes, fittings, transducer, etc.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **III CAVITY AND CORE CONSTRUCTION**

SECTION # **III**

VIEWS **A-F**

FILE:

DATE: May 24, 2012

This section outlines the basic construction expectations of **CAVITY** and **CORE** details and features.

Specific views shown on the following pages are:

A-1) TYPICAL FEATURES - NOTES	37
A-2) TYPICAL FEATURES - VIEWS	38
B) CAVITY / CORE LABELING AND IDENTIFICATION ..	39
C) TYPICAL CAVITY / CORE FEATURES - Section view .	40
D) WEDGE / PARTING LINE INSERTS	41
E) VENT REQUIREMENTS / PRESSURE PLATES	42
F) VENT DEPTH CHART	43

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:

TYPICAL FEATURES - NOTES

SECTION # III

VIEW # A-1

FILE:

DATE: Nov. 12, 2013

- Cavity/Core material to be specified by Tool Engineer. Ref. Section II, View C
- Vent as required to minimize air back pressure during fill (especially end of fill). Starting with minimum of 20% of part to be vented. Additional vents may be required to be opened up to insure part quality and meet cycle time. (Ref Sec III, Views E & F)
- Threaded handling holes to be provided in all details weighing more than 50 .lbs (30kg).
- Tool to be stress relieved after roughing. ***All vendors are required and to ensure all blocks are stressed relieved before finish cut. All stress relieved procedures are to be reviewed and approved by the JCI tooling engineer.***
- All welding must be approved by a JCI Tool Engineer BEFORE any welding is done. All welding must be documented (including weld map, temperatures used for color matching and rod type used) & provided to the Tooling Engineer before texture and with tool drawing package.
- * Internal shutoff features to be relieved and vented whenever possible.
- * Shutoff around leader pins, return pins and cavity perimeter. Shutoff area to be >20% of A X B.
Note: Take into account when using Pressure pads
- * Finished Cavity & Core detail features to be held with in +/- .0025" / .06 mm or 15% of commercial molding tolerance of the material specified, whichever is less. This applies only to features that are dimensioned on the part print and do not have tolerances attached. For dimensions with tolerances; the tool is allowed 25% of the tolerance in the drawing. Unless other wise specified. NOTE : When graining is required - the wall stock should be offset to meet the nominal wall stock call out on the print.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TYPICAL FEATURES - VIEWS**

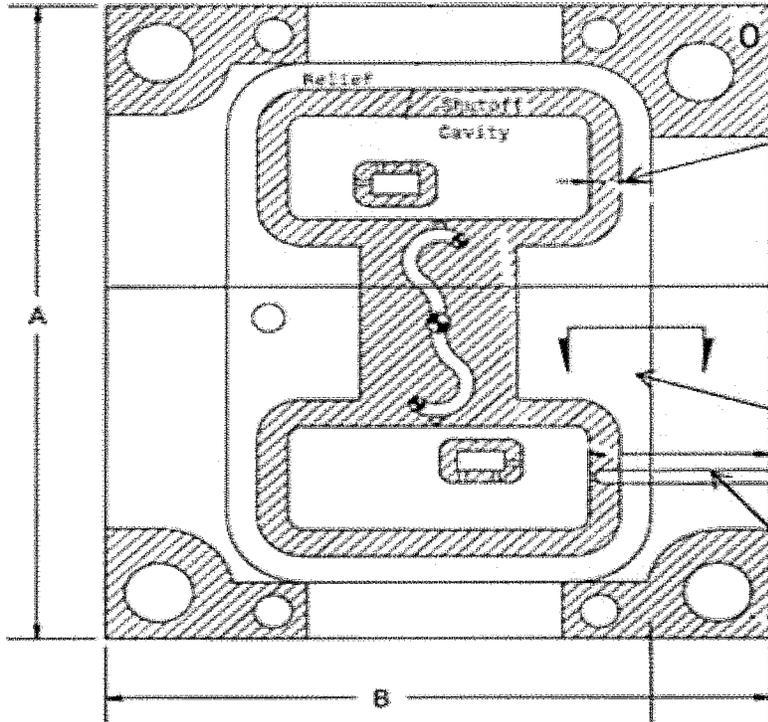
SECTION # **III**

VIEW # **A-2**

FILE:

DATE: Nov. 12, 2013

Internal shutoff features to be relieved and vented whenever possible.



Shutoff areas around the cavities are to be ,
 15 mm - presses <90 Ton US / 100 Metric Ton).
 25.0 mm presses 90 T US / 100Metric Ton to 500 US Ton / 550 Metric Ton),
 37.5 mm presses > 500 US Ton / 550 Metric Ton.

Relieve other areas .25 - .75 mm.

75.0 mm Min from the edge of mold to cavity detail. Actual requirements may vary. Depending tool size. Always vent to atmosphere. -

Shutoff around leader pins, return pins and cavity perimeter. Shutoff area to be >20% of A X B. Note: Take into account when using Pressure pads

- * EU - Always require vents plates
- * NA - Pressure / (Vent plates maybe required) Global programs are required pending tool size and the approval of the JCI Tool Engineer.
- * Venting information reference (Sec III, view E & F)

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **CAVITY / CORE LABELING & IDENTIFICATION - PLAN**

SECTION # **III**

VIEW # **B**

FILE:

DATE: Nov. 12, 2013

When using a date stamp it must be approved by the Tooling Engineer, Plant and OEM.

Approved types are:

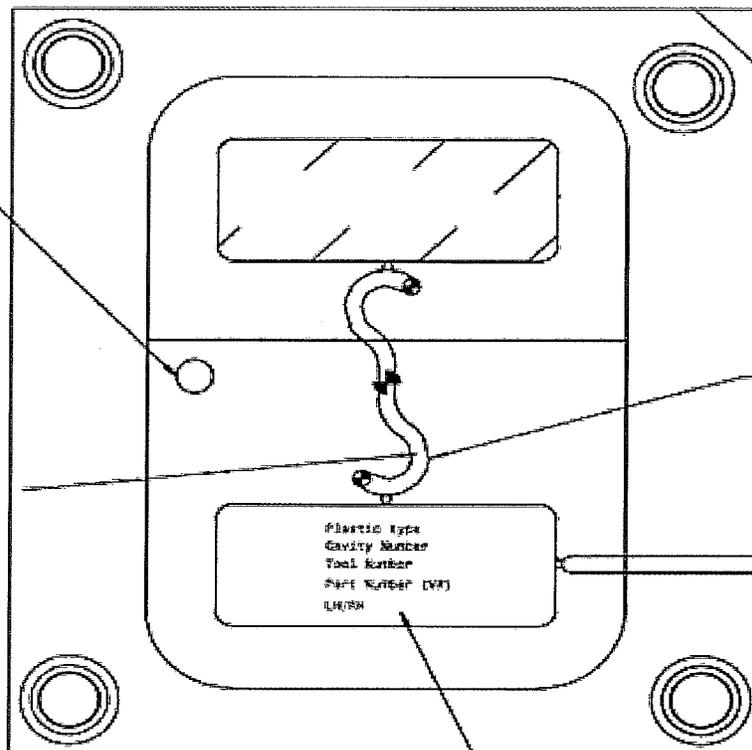
Cumsa Double Date Stamp

Date Calendar scribed or EDM'd

Off set leader pin and stamp 0/0 on outside corner of all plates.

Stamp location of X,Y,Z datum hole in steel (also work lines)

Stamp or engrave material recycle code in runner.



Stamp zone, valve gate and drop numbers into runner or in steel near drop if there is no runner.

At Tool Engineer request, stamp all inserted details with:

- Tool #
- Cavity #
- Steel type
- Steel Hardness
- Built by:

This information to be added per design and in a customer approved location. Must be on no-show surface of each cavity using method approved by Tooling Engineer. Must be visible after sub-assembly operations are completed.

- * Plastic type
- * Cavity number
- * Tool number
- * Part number (V#)
- * LH / RH

Faces of ejector pins with pressure transducers behind them to be center punched for identification (unless pin is on a visible or functional surface, then review with Tooling Engineer).

All Plaques - Must be in there Native language for the country this tool is running in.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

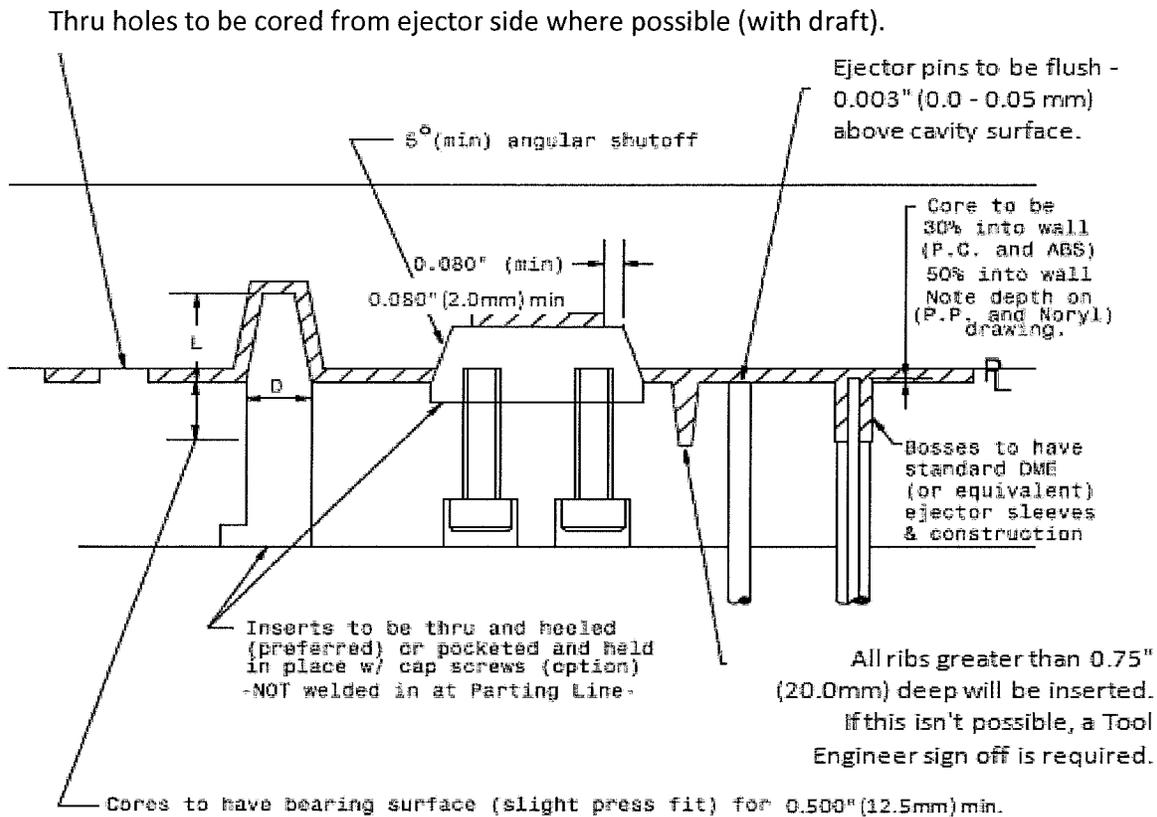
TITLE: **TYPICAL CAVITY / CORE FEATURES - Section view**

SECTION # **III**

VIEW # **C**

FILE:

DATE: Nov. 12, 2013



- Maximum standing steel height to width ratio is 3:1 . Anything greater requires Tool Engineer approval.
- Ratios greater than 2:1 will be inserted where possible.
- * Shut off angles < 5 degrees must be approved by a JCI Tool Engineer.
- Do not media blast ribs and deep draw areas during texture process.
- No knife edge steel conditions are allowed without Tool Engineer approval. If knife edge steel conditions are required then they must be inserted with a spare insert provided.
- A minimum of 2 parting line interlocks are required to protect minimum shut off angles and to provide alignment of cover and ejector.
- Inserts and plates to be stamped for identification and orientation to assist with correct assembly of the tool.
- Vent and relieve internal shutoffs where possible.
- Pin and sleeve combinations must be readily available. If custom or long lead time combinations are required then Tool Engineer approval is required and a spare set provided with the tool.
- * Inserts must be relieved (Relief = 1/3 of the Depth of an insert)
- * Add water for cooling when the size of insert allows. Plum separate from water manifold.
- The Tool Engineer will specify the type of steel used for inserts.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

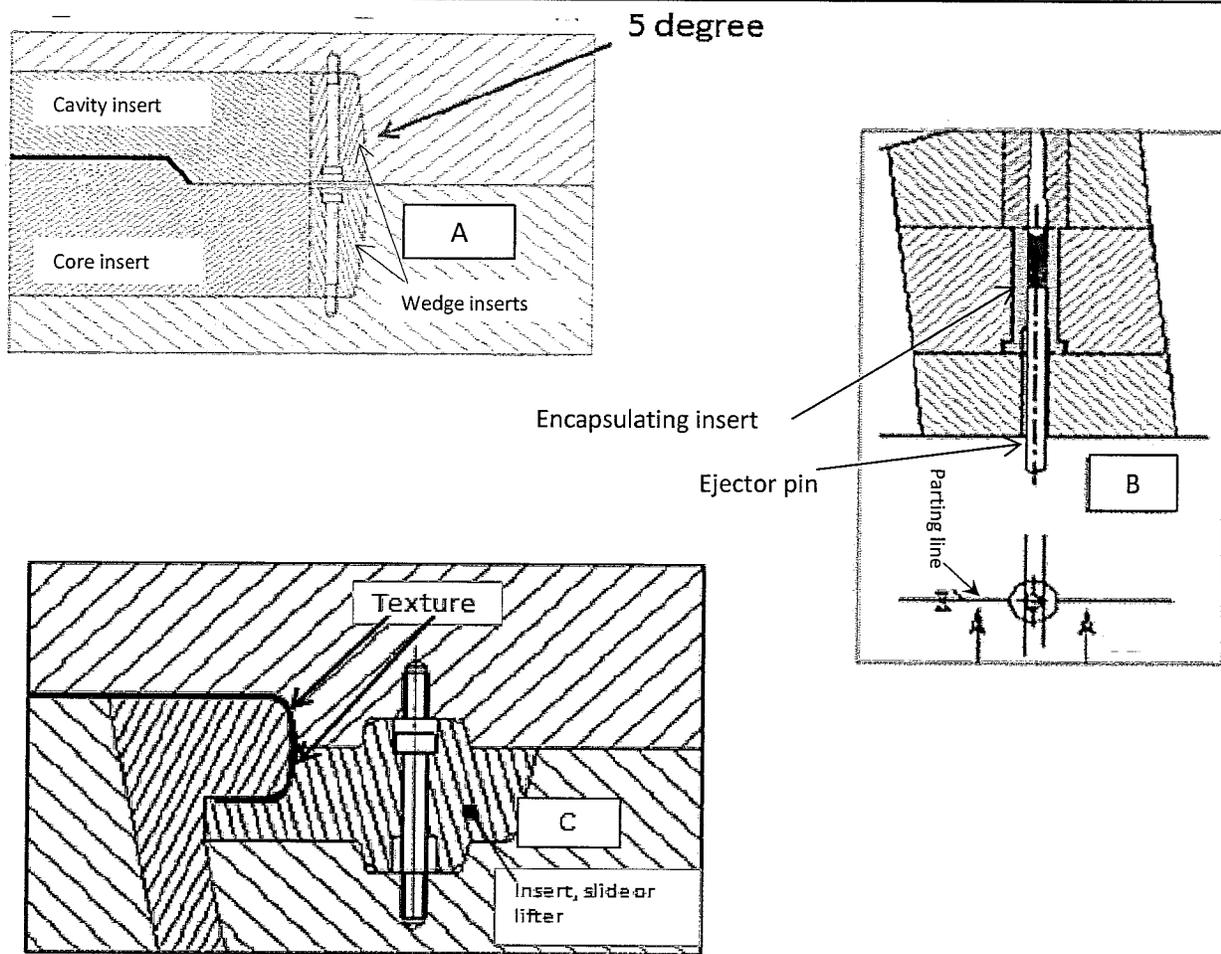
TITLE: **WEDGE INSERTS AND TEXTURE SPLIT LINES**

SECTION # **III**

VIEW # **D**

FILE:

DATE: Nov. 12, 2013



Pattern graining across a parting line

A - To allow ease of assembly and disassembly, large inserts should have wedge inserts on opposing sides with 5° of draft. Each insert will have threaded holes in the top to assist in removal. The intersecting corners of the wedge inserts will have a radius relief.

B - When an ejector pin is bisected by two inserts, it is a requirement that there be a bushing style insert encapsulating the ejector pin.

C - When texture is required to crossover a parting line with seamless grain and without mismatch then an insert that can mount to both the cavity and the core will be used for matching purposes. This method must also be used if a core side lifter or slide is textured.

C-2, Inserts for other applications like - paint, lens etc. maybe required.

* Add water for cooling when the size of insert allows. Plum seprate from water manifold.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: VENT REQUIREMENTS AND PRESSURE PLATES

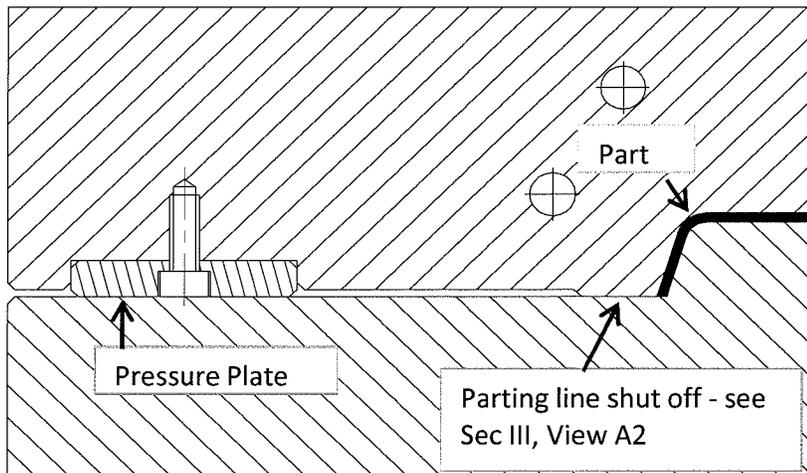
SECTION # III

VIEW # E

FILE:

DATE: July 23, 2012

In order to allow gases to escape the cavity without causing burn or requiring slow injection speeds, the parting line and all other areas of the tool must be properly vented. To help accomplish this it is required to have hardened and adjustable pressure plates, mounted on the parting line, that will protect it from excessive clamp force and ensure adequate venting along the tool parting line. The total area of the pressure plates must be equal or higher than the shutoff area.

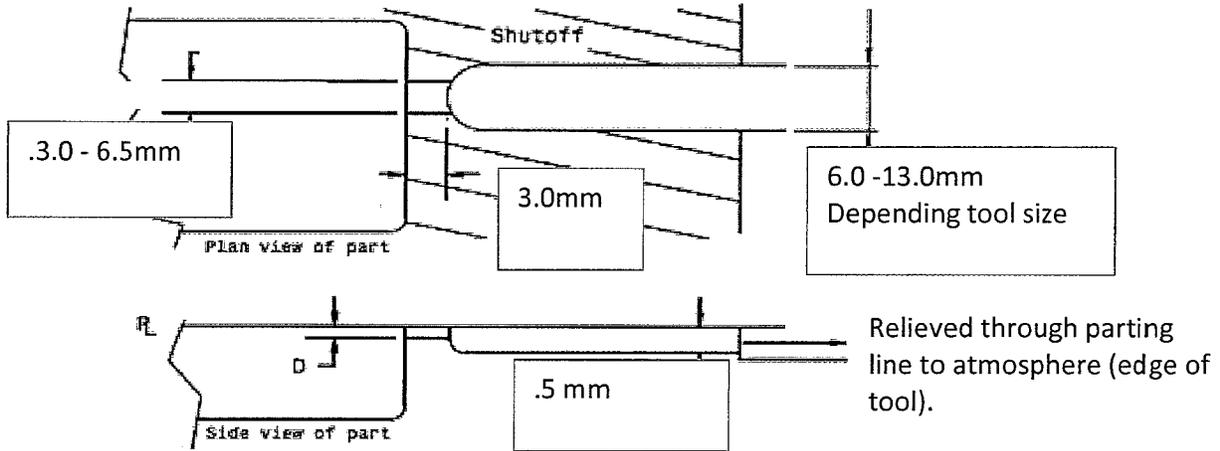


- * EU - Always require vents plates
- * NA - Pressure / (Vent plates maybe required) Global programs are required pending tool size and the approval of the JCI Tool Engineer.
- * Venting information reference (Sec III, view E & F)

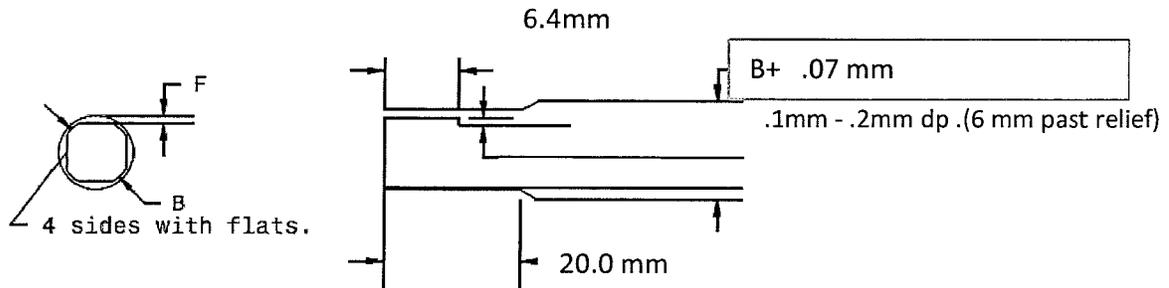
JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **VENT DEPTH CHART**
 SECTION # **III** VIEW # **F** FILE: DATE: Nov. 12, 2013

PARTING LINE VENT



EJECTOR PIN VENT



VENT DIMENSIONS (ENGLISH)		
Material	D	F
ACETAL	0.0005	0.0005
ABS	0.0015	0.0015
NYLON	0.0005	0.0005
PC	0.0015	0.0015
PP	0.0005	0.0005
PPO	0.0020	0.0020
PS	0.0010	0.0010
PC/ABS	0.0015	0.0015

VENT DIMENSIONS (METRIC)		
Material	D	F
ACETAL	0.01	0.01
ABS	0.04	0.04
NYLON	0.01	0.01
PC	0.04	0.04
PP	0.01	0.01
PPO	0.05	0.05
PS	0.03	0.03
PC/ABS	0.04	0.04

- * Material manufacture specifications for vents need to be reviewed and approved.
- Vents to be placed 50.0mm on center around the entire perimeter of the part. Additional vents maybe required to be opened up to insure part quality and meet cycle time.
- Vents to be placed at the end of fill.
- Must be opened to standard depth when mounted in machine under clamp pressure.
- All vents must be open to the atmosphere.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **IV INJECTION SYSTEM**

SECTION # **IV**

VIEWS **A-L**

FILE:

DATE: May 24, 2012

This section outlines the basic construction expectations of the **MATERIAL DELIVERY** process from the machine nozzle to the cavity.

Specific views shown on the following pages are:

A) Overview	45
B1) Cold Sprue Bushing and Locating Ring - EU and Asia	46
B2) Cold Sprue Bushing and Locating Ring - N. America	47
C) Runners	48
D) Default Runner Diameter Chart	49
E) Trapezoid Runner	50
F) Subgates	51
G) Jump Gates	52
H) Cashew and Winkles	53
I) Hot Sprue - N. America	54
J -1) Typical Hot Manifold System - NOTES	55
J-2) Typical Hot Manifold System - DESIGN NOTES	56
K) Electrical Schematic for 2 or More Drops (N. America)	57
L) Valve Gate Connectors	58

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: OVERVIEW

SECTION # IV

VIEW # A

FILE:

DATE: Jan. 17, 2014

Injection 1:

- * The injection concept must consider the position of weld lines, customer requirements, dimensional tolerance of parts and the injection process in order to meet the raw material manufacturers shrink rates, the melt pressure and flow lengths so they do not vary more than 25%. The values are to be proved using mold flow analysis.
- * The gate type should be based on successfully implemented concepts. No sink marks, dull or glossy areas on the "A" surface are allowed. Supplier must propose alternate systems when no proven system is available.
- * Gates can not be on the class "A" surface,
- * The gate can not be visible on the product in its final assembly position.
- * All gates must degate clean. There will be no hand trimming of gates.
- * The use of torpedo style drops are to be avoided. (See note below for any deviation)
- * The runner system shall not have any sharp corners or dead zones.
- * Cold runners shall incorporate a sufficient cross section to avoid pressure drops. Take the injection pressure in to account for required molding pressures needed to make an acceptable part.
- * Max system fill pressure allowed for molding a part is 18 kpsi / 1241 bar.
- * Cold runners need to be kept as short as possible.
- * Injection gates need a sufficient cross section to ensure a melt flow for holding pressure as long as required for an acceptable part. (Amorphous materials minimum is 4 seconds, crystalline material minimum is 6 seconds).
- * Total volume of the hot runner channels = (part volume +sprues)X 0.8
- * Hot runner pressure drop must allow for quick color change.
- * Hot runner flow balance must allow for constant flow of material through the mold.
- * The residence time of the material in the hot runner system cannot negatively affect the material.
- * For sequenced valve gated drops, with hydraulics, flow valves maybe required to insure there is no pressure loss. That would affect the quality of a part.
- * **Any deviations that will affect tooling or the product , requires a JCI Tool Engineers approval.**

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

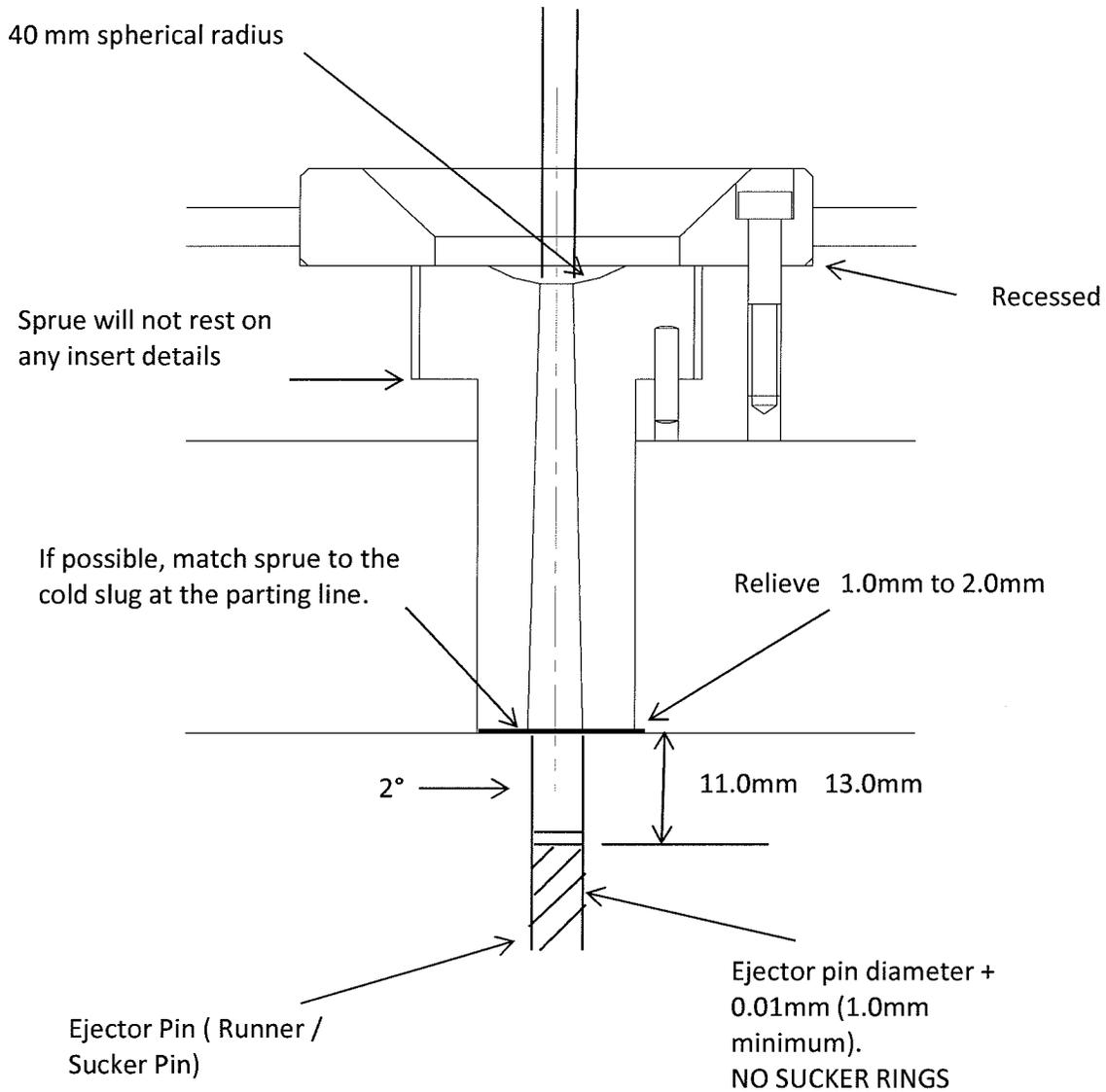
TITLE: COLD SPRUE BUSHING AND LOCATING RING - EU AND ASIA

SECTION # IV

VIEW # B-1

FILE:

DATE: July 23, 2012



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

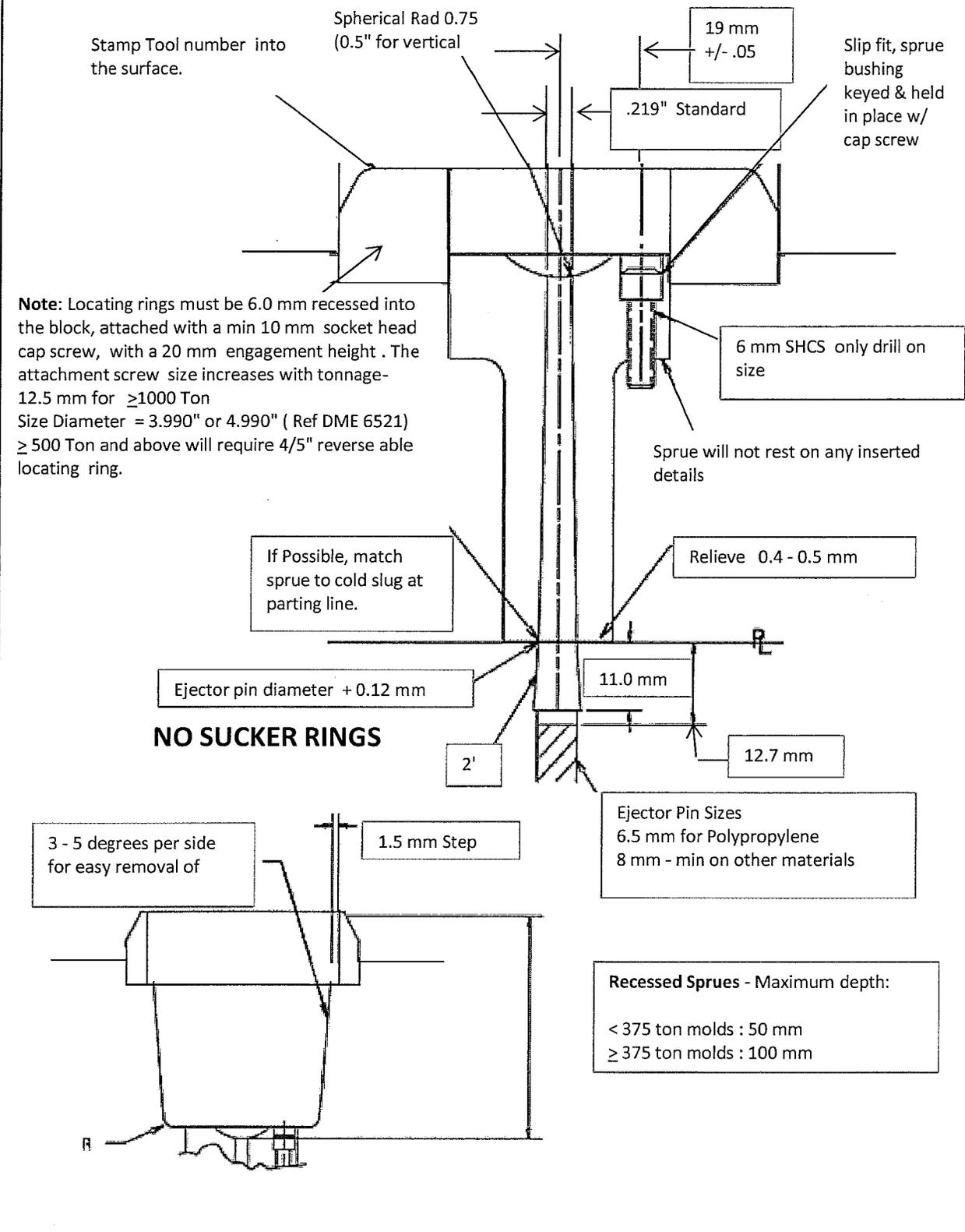
TITLE: **COLD SPRUE BUSHING AND LOCATING RING - N. AMERICA**

SECTION # **IV**

VIEW # **B2**

FILE:

DATE: Dec. 1, 2013



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:

RUNNERS

SECTION # **IV**

VIEW # **C**

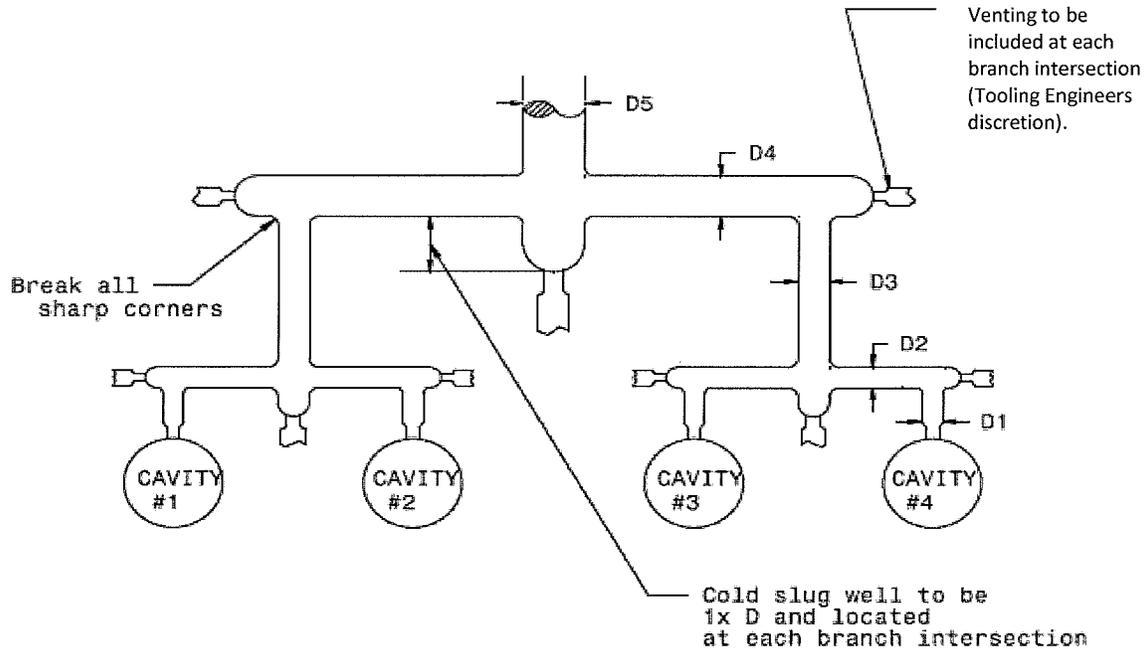
FILE:

DATE: Mar 16, 2012

RUNNERS: NATURALLY BALANCED RUNNER SYSTEM

- To be full round whenever possible
- Flow distances, volumes & pressure loss to each cavity to be equal (naturally balanced runner system)

Consider pressure drops in cold runners.



- If cavities are not identical or mirror images, moldflow must be done to size runners and gates
- Any 90 degree turn should have a runner diameter increase of 20% coming from the cavity to the sprue (any "T" should have 40% increase)
- Include runner shut offs that mold LH and RH parts in the same shot.
- Include runner shut offs on all family tools.
- * No cutter marks in the runners

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **DEFAULT RUNNER DIAMETER CHART**

SECTION # **IV**

VIEW # **D**

FILE:

DATE: Dec. 1, 2013

* Runner diameter at the gate to be defined by the tool engineer or based on Mold Flow analysis (Preferred).

*If this information is unavailable - the following chart can be used to provide default minimum diameter (at gate):

* This information doesn't include the manifold system. (Mold Flow needed)

DEFAULT RUNNER DIAMETER @ GATE

RESIN	LENGTH FROM NOZZEL TIP TO GATE	
	75 mm	150 mm
ABS	6 mm	10 mm
ACETAL	6 mm	10 mm
NYLON 33% GF	3 mm	5 mm
NYLON ST-408	5 mm	6 mm
PC-GE141	10 mm	12 mm
PP	5 mm	6 mm
PPO	5 mm	10 mm
PS	3 mm	6 mm
PC-ABS	8 mm	10 mm

Mold Flow Simulation according to the raw material specifications when required.

- The reference clamping force = "the part projected surface "X" max 98% melt pressure"

Maximum reference values for cavity Mold Flow calculation:

MATERIAL	PROCESS PRESSURE	FLOW LENGTH
* PP	300 Bar / 4500psi	300 mm
* PP TV	300 Bar / 4500psi	250 mm
* ABS	500 Bar / 7500psi	200 mm
* PA	450 Bar / 6500psi	250 mm
* PA GF	550 Bar / 8200psi	250 mm
* PC / ABS	600 Bar / 9000psi	150 - 200 mm

- Values by 2.5mm wall thickness

- Mold flow calculation include welding lines & warp analyze.

- Pay special attention to pressures, flow length, position of injection points and position of weld lines.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TRAPEZOID RUNNER**

SECTION # **IV**

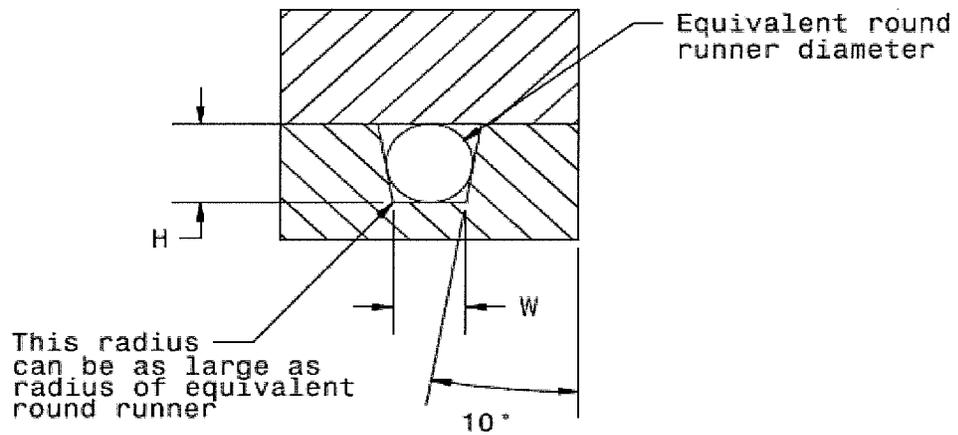
VIEW # **E**

FILE:

DATE: Dec. 1, 2013

OPTIONAL TRAPEZOIDAL RUNNER

* NOT TO BE USED WITHOUT TOOL ENGINEER APPROVAL.



* To be cut in ejector half (unless otherwise approved by Tool Engineer)

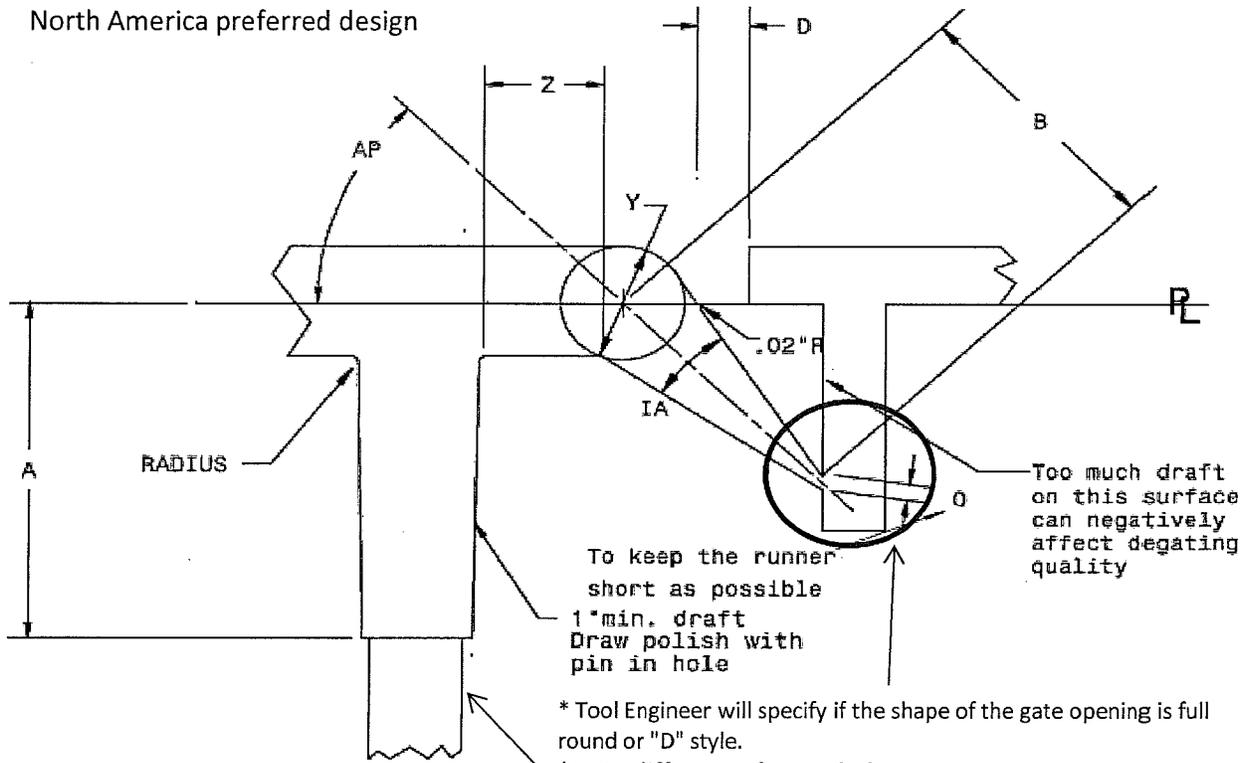
* To be sized per inscribed circle equivalent to desired full round runner

Equivalent round runner	Metric	
	H	W
5.00	5.00	4.00
6.00	6.00	4.50
8.00	8.00	6.50
10.00	10.00	8.00

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: SUBGATES			
SECTION # IV	VIEW # F	FILE:	DATE: Mar, 17, 2014

North America preferred design



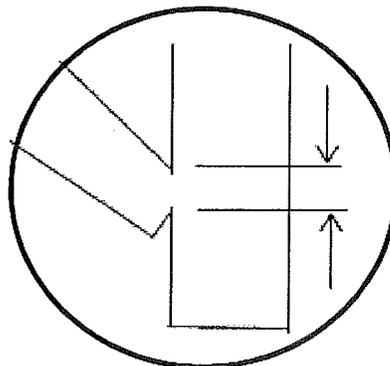
STANDARD SUBGATE NOTE

- IA = 15 -25° Use upper range for poor flowing mate
- AP Minimum is 38° 45° is preferred
- O > 1.25mm specified by Tool Engineer
- D > 3 mm)
- A = B + 6 mm
- Z = 6 mm - 13 mm
- Polypropylene approximately 6 mm
- Polycarbonate approximately 13 mm

* Tool Engineer will specify if the shape of the gate opening is full round or "D" style.
***Note difference for EU below.**

- * Sucker pin type - reference page (Sec VI, View N, page 74.)
- * Sucker pin style must be approved by the JCI tool engineer.

EU preferred- "D" style subgate
Use with Global programs



Gate size must have the JCI tool engineers approval.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: JUMP GATES

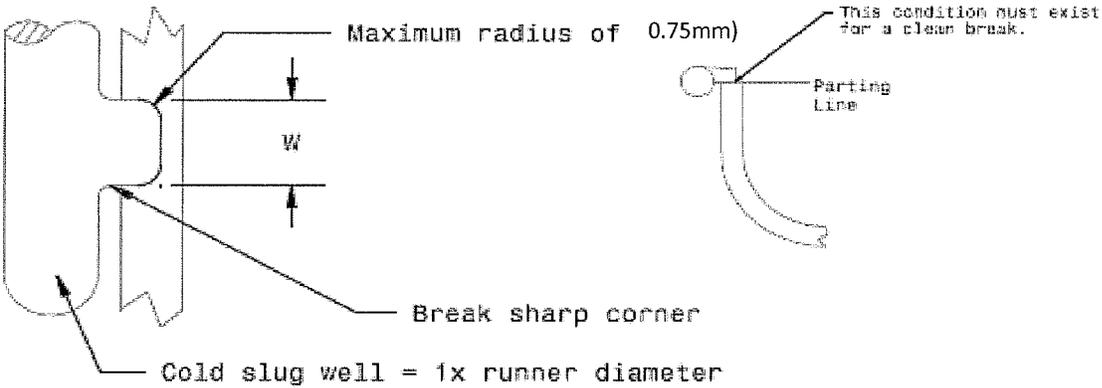
SECTION # IV

VIEW # G

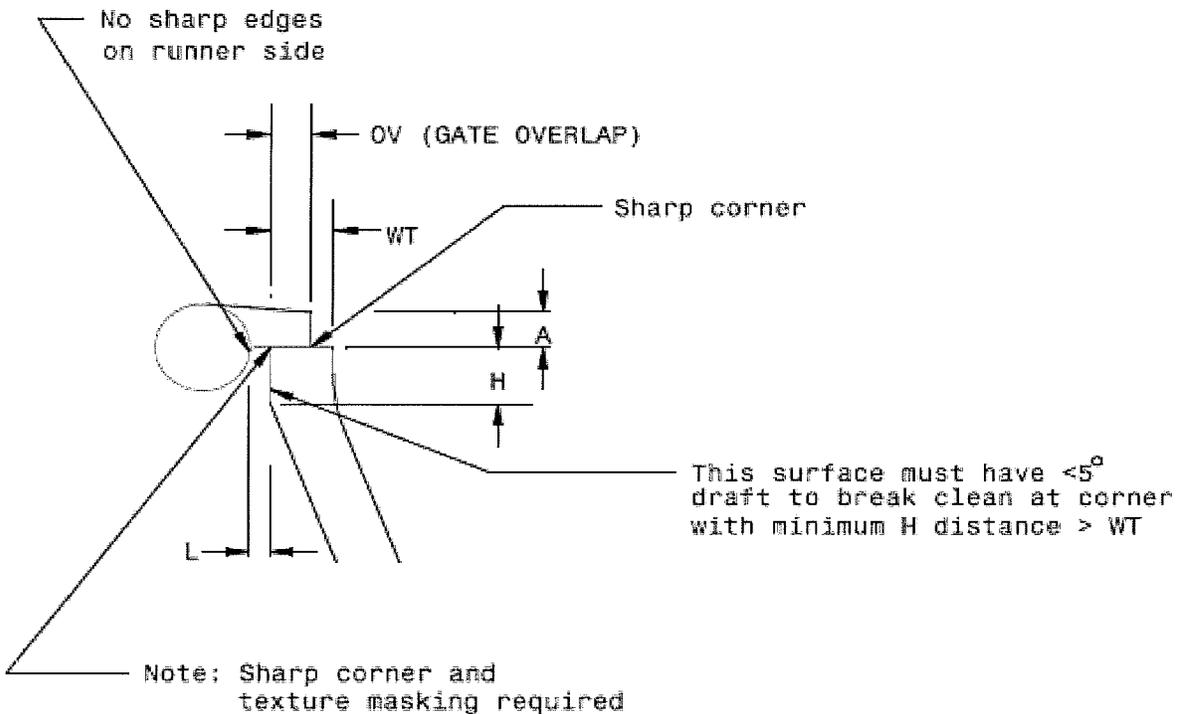
FILE:

DATE: Dec. 1, 2013

* Only with the JCI tool engineer approval



- L = 0.75-1.50mm
- W = 100% - 150% of WT (wall thickness)
- A = 125% of OV
- OV = 70-100% of WT for visible, aesthetic parts
50-100% of WT for non-visible parts
(larger OV = better aesthetics)



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

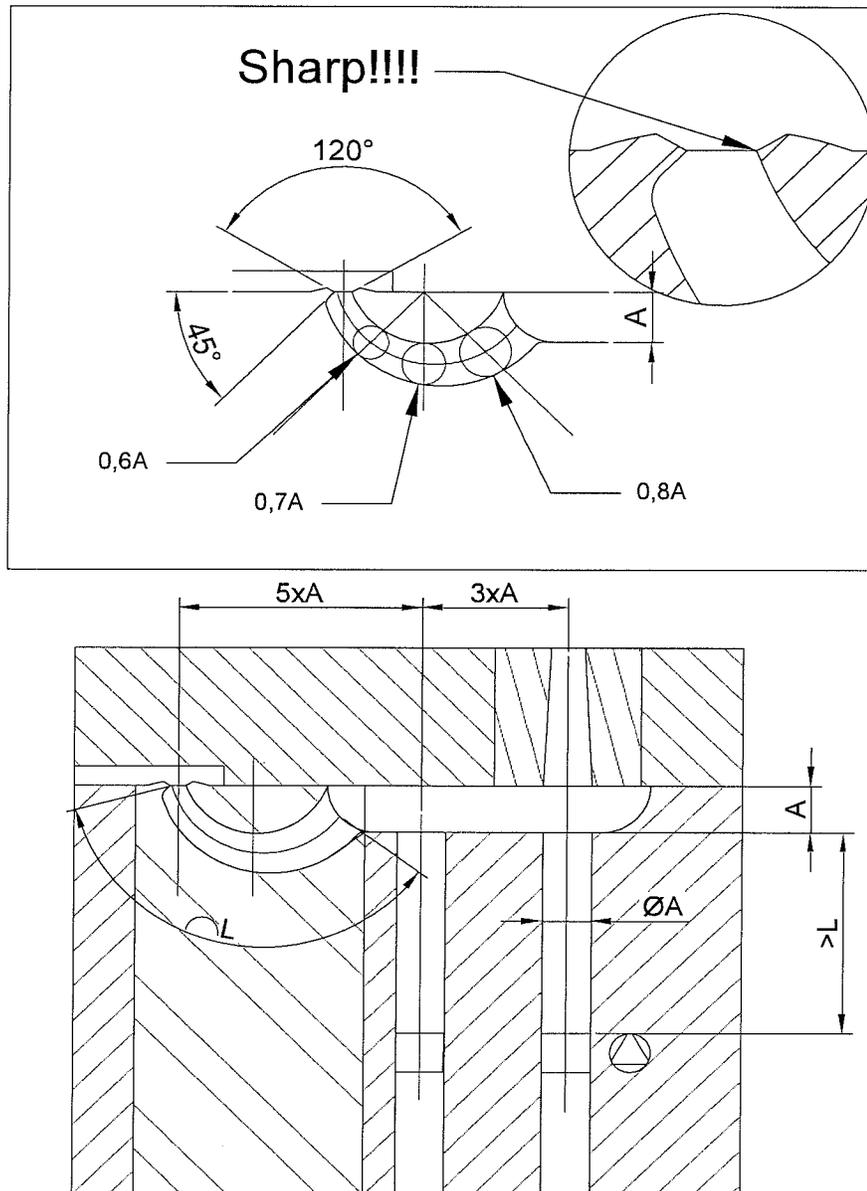
TITLE: **CASHEW AND WINKLE GATES**

SECTION # **IV**

VIEW # **H**

FILE:

DATE: Mar 15, 2014



- Using a delayed ejection system to start runner eject before part eject may be necessary to ensure proper degating without deforming the part.
- Add ejector pins close to gate see above to minimize deflection. For a single cavity, gate should be balanced with an additional slug.
- * Ejector pin / sucker pin $L = >L + 6 \text{ mm}$.
- Purchased cashew gate Split inserts are acceptable with JCI Tooling Engineer approval.
- Gate must be polished to a minimum finish approximating a 300 - 320 stone.
- Cashew / Winkle gates require a sharp cutting point to avoid pull marks.
- Gate to be inserted with split construction and recessed in to the part approximately 25% of wall stock.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **HOT SPRUE (North America ONLY)**

SECTION # **IV**

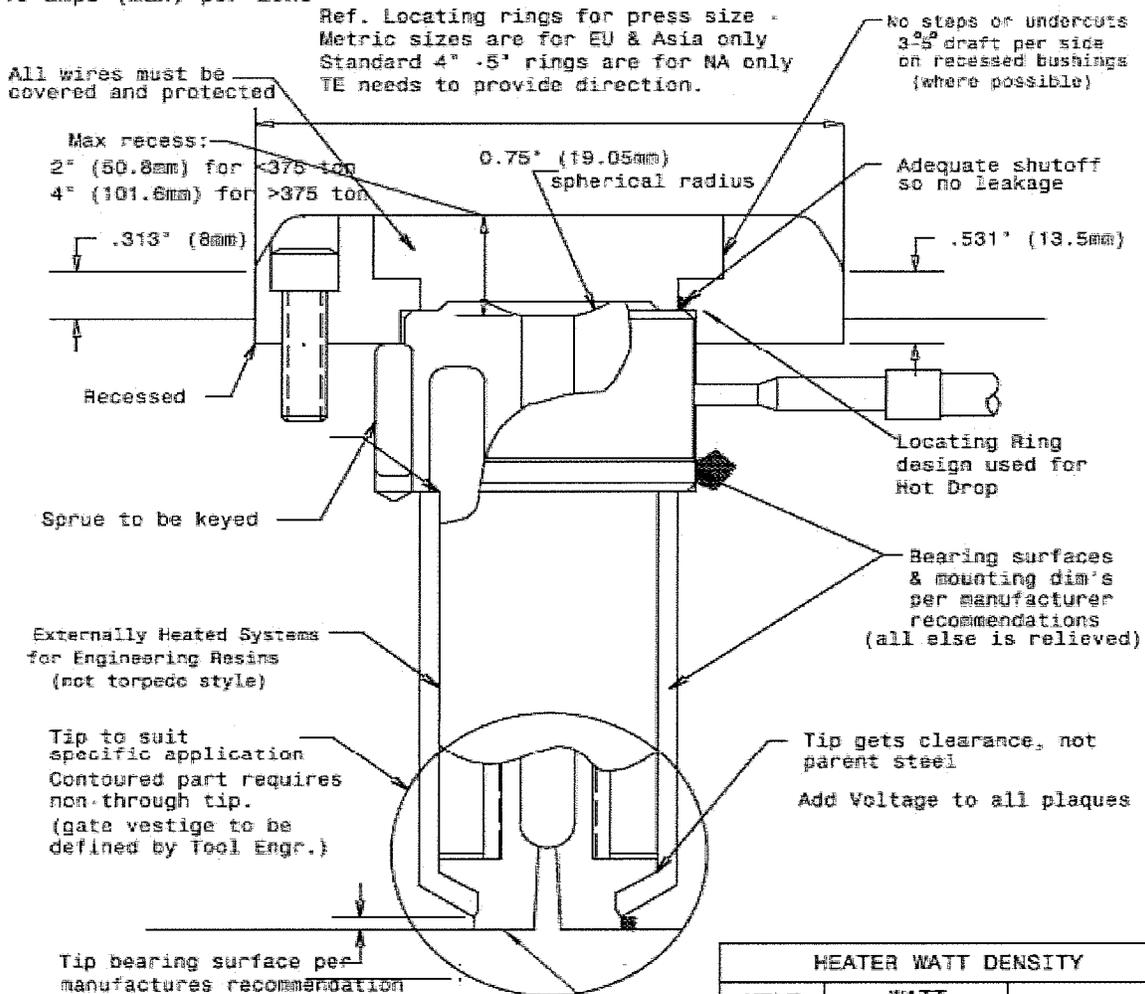
VIEW # **I**

FILE:

DATE: Mar 22, 2012

* Europe doesn't require a locating ring along with different wattage requirements, Refer to the JCI Tool Engineer in EU & ASIA. When working in these Regions.

One thermocouple required for each heater, one heater per zone
10 amps (max) per zone



All hot halves must have leader pins at least .50" (12.7mm) longer than the longest drop for protection.

Use Manufacturing recommends on design and assembly / install for all Hot drops & runners systems

HEATER WATT DENSITY		
MELT TEMP. (DEG F)	WATT DENSITY (Watts/in.)	MATL.
400-450	34	PS
450-500	36	ABS, PP
500-550	38	PPO
550-600	40	PC, NYLON
600-650	42	
650-700	44	PFC, PMMA

Watt density per zone = Heater wattage / Cubic inches of plastic to be heated

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TYPICAL HOT MANIFOLD SYSTEM - NOTES**

SECTION # **IV**

VIEW # **J-1**

FILE:

DATE: Dec. 1, 2013

- * **Important to always follow manifold suppliers specification.**
- * Heater elements to extend 2" beyond drop and sprue
- * Channel size and orifice bore diameter (Mold Flow).
- * Color changes - After following color change procedures at press side, the color change only should take an estimated 8- 10 shots.
- * External heated systems required of engineering resins.
- * Some Regions are limited to their electric power. Manifold suppliers will be required to build units that comply with those requirements. This must be reviewed with the manufacturing site and JCI Tool Engineer.
- * Flow distances, volumes & pressure loss to each drop tip to be equal (naturally balanced). (Mold Flow)
- * Manifold to have handling holes for any components greater than 50 lbs / 30 kg
- * Drops will require to have its own thermocouple (one heater per zone), when Engineered resins are being used. Review with Tool Engineer.
- * Cut wire channels as wide as possible.
- * Use Anti seize lube on all manifold bolts.
- * Zone #s are to be stamped in the manifold & plates for identification.
- * Stamp ID information - drop number, -valve gate number, into the runner also, - hydraulic lines (if required), - cooling lines, - watt density required,
- * See manufacturing recommendations on design and assembly / install for ALL hot drops & runner systems.
- * All corners contoured - No sharp corners or hang ups
- * Bearing surfaces and relief - are per the manufactures recommendations.
- * Locating rings - Ref, press specs at the manufacturing site, review with JCI Tool Engineer. (Metric sizes are for EU & ASIA only) (Standard 4"-5" rings are of NA only)
- * Valve gate cooling requirements - Important to follow the suppliers specifications. Fittings need to meet the press specification of the manufacturing site.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: TYPICAL HOT MANIFOLD SYSTEM - DESIGN NOTES

SECTION # IV

VIEW # J-2

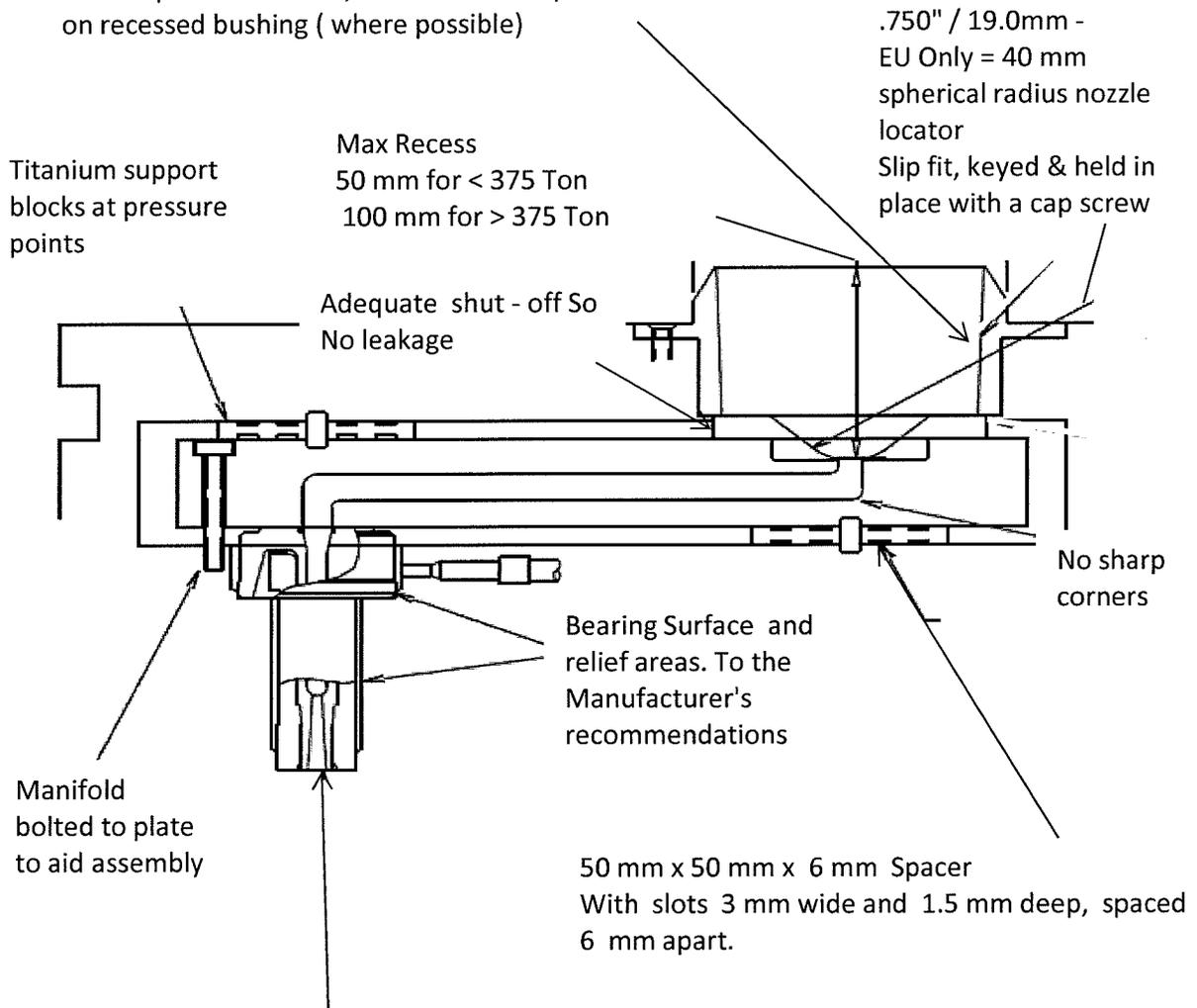
FILE:

DATE: Dec. 1, 2013

*** Important Note: Always refer to the manifold suppliers specifications.**

All locating rings for press size -
 -Metric sizes for EU & ASIA only
 -Standard size 4"-5" for NA only

- No steps or undercuts, - 3' - 5' of draft per side
 on recessed bushing (where possible)



Nozzle tip, lands, and hidden vestige feature to suit specific application. Actual vestige will be impacted by material, fillers, cooling and process. Therefore mold flows are important. Vestige requirements must be signed off and to be specified by the JCI Tool Engineer.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **ELECTRICAL SCHEMATIC FOR 2 OR MORE DROPS N. AMERICA ONLY**

SECTION # **IV**

VIEW # **K**

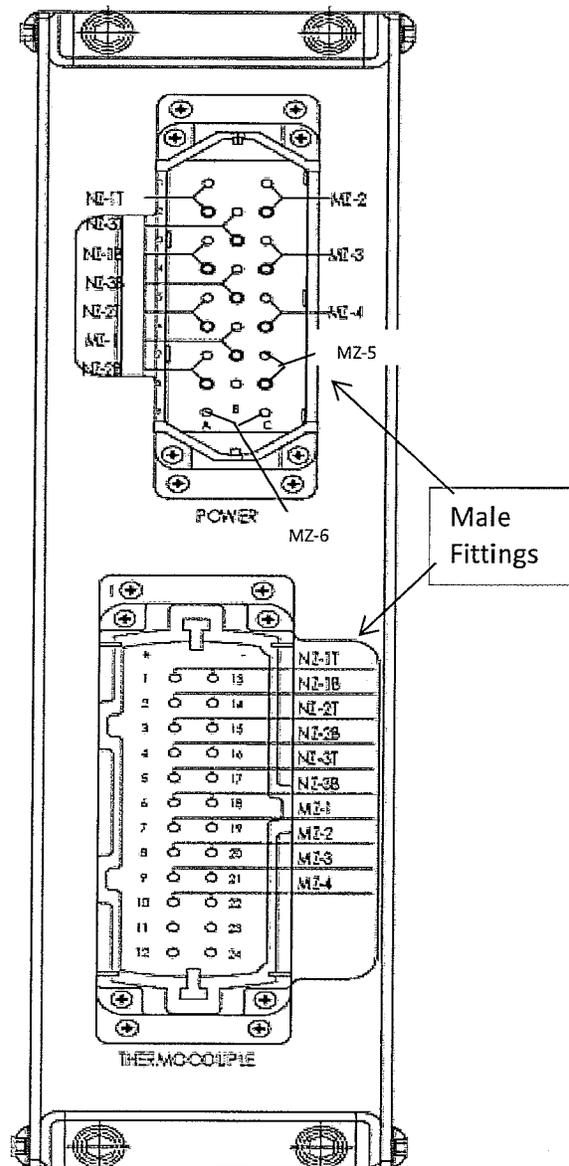
FILE:

DATE: July 26, 2012

- * Note - Hot runner system must be electrically tested before shipment of the tool to ensure proper wiring and sensing.
- * Note - Water connector fittings must not be located in proximity to electrical connections to avoid possibility of injury or damage.
- * All manifolds designs require Tool Engineer approval and alignment with the molding site, injection molding press specifications.
- * Aluminum Schematic plate is required for all hot sprues and manifolds. This must be recessed & staked or screwed adjacent to system connections. Plate size can vary but MUST be legible.
- * All connections must be recessed or protected by mold base.

Controller Zone	Zone	Pin Connector
1	NZ - 1T	ROW A 1-2
2	NZ -1B	ROW A 3-4
3	NZ - 2T	ROW A 5-6
4	NZ - 2B	ROW A 7-8
5	NZ - 3T	ROW B 2-3
6	NZ - 3B	ROW B 4-5
XXXX	Zone	Pin Connector
7	MZ -1	ROW B 6-7
8	MZ-2	ROW C 1-2
9	MZ-3	ROW C 3-4
10	MZ-4	ROW C 5-6
11	MZ-5	ROW C 7-8
12	MZ-6	ROW 4 9-C9

Zone	T/C	Pin Connector
1	NZ - 1T	1-13
2	NZ -1B	2-14
3	NZ - 2T	3-15
4	NZ - 2B	4-16
5	NZ - 3T	5-17
6	NZ - 3B	6-18
XXXX	T/C	Pin Connector
7	T/C-1	7-19
8	T/C-2	8-20
9	T/C-3	9-21
10	T/C-4	10-22
11	T/C-5	11-23
12	T/C-6	12-24



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: VALVE GATE CONNECTORS

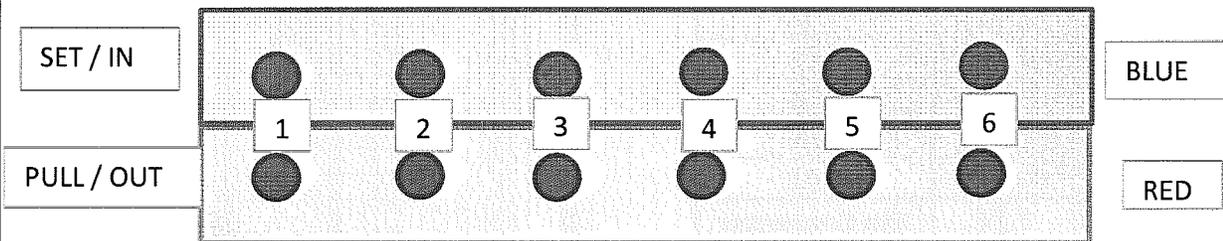
SECTION # IV

VIEW # L

FILE:

DATE: April 4,, 2014

- * Valve Gate suppliers are approved by the JCI tool engineer and manufacturing site representative.
- * Maximum pressure for the hydraulic cylinder to be used with any valve gate / hot runner system is 750 psi / 50 bar. This must follow the manufacturing plant and press specification. Any deviation that will have impact to the tool or manufacturing site will require a Managers sign off.
- * Hydraulic systems must have maximum pressure rating engraved on the outside of the tool.
- * Hydraulic pressure flow valves are required on each line to ensure there is no pressure drop between zones.
- * Recommended main fitting type is Parker 60 Series steel H1 -62 & H1-63.
- * Female - **OUT** and Male - **IN**.
- * High heat hoses are to be used on all connections.
- * Unused zones need to have the pins removed, or have plugs placed in them.
- * Consult chart below for connection layout on manifold or bracket.
- * Pneumatic notes, If pneumatic valve gates are required. you must have the JCI manufacturing sites / press specifications. That require Staubli connectors.
Staubli part number NO1030696, RMC, 6 zones



Example shown : Valve gate manifold, the number of zones will depend on the number of gates required to fill the part.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **PRESSURE TRANSDUCERS - (North America ONLY)**

SECTION # **V**

VIEWS **A-E**

FILE:

DATE: May 22, 2012

This section outlines the basic construction expectations of the **PRESSUE TRANSDUCER REQUIREMENTS FOR NA ONLY, PROCESS CAVITY PRESSURE MEASUREMENT.**

Specific views shown on the following pages are:

A) Pressure Transducer	60
B) Pressure Transducer - Continued	61
C)Pressure Transducer - Continued	62
D) Pressure Transducer - Continued	63
E) Pressure Transducer - Continued	64

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **PRESSURE TRANSDUCERS (NORTH AMERICA ONLY)**

SECTION # **V**

VIEW # **A**

FILE:

DATE: April. 10, 2014

• Pressure transducers are required in all tools that ship to North American molding sites, that use the E-Dart / RJG systems.

* All ejector plates will require the RJG wire channels to be machined in, regardless of the tool getting the RJG sensors or not. This will allow the plant to have an option in the future of adding in the sensors. Important to add a removal able plug is needed to make up the difference in height of ejector pin. If the sensor is NOT installed by the tool shop.

The following sheets outline standard installation specifications for pressure transducers.

- * Button mold pressure sensor
- * Transducer - Standard pin installation (> dia 3/4)
- * Transducer - Large pin installation (> dia 3/4)
- * Digital pressure transducer

Transducer locations are to be determined during the preliminary mold design review and are to be installed per the following guide lines.

1) Transducers to be installed in all tools that will be sourced to internal Johnson Controls mold facilities.

2) One transducer to be installed at/near gate in the direction of flow(if a part has multiple gates use the gate nearest the end of fill).

3) One transducer to be installed at or near the end of fill if the flow length is > 2.00" (50.0mm). On very large parts the end of the fill transducer should be 4.00" (100.0 mm) from the end of fill.

4) More transducers as necessary to debug or understand process (e.g. valve gates, big parts, multi-cavity, gas assist, etc). Additional transducers should be reviewed with the production s at tool design review.

- * One transducer per cavity at the end of fill for multiple cavity molds

- * One transducer at first cavity for begin of fill.

- * One transducer for every sequential controlled hot runner drop at beginning of fill inside part cavity of mold.

Example 1:

A 4 cavity mold that has a cold sprue feeding individual runners would require 5 pressure transducers.

Example 2:

A 2 cavity mold with 3 sequential hot drops per cavity would have 8 transducers. This would be 6 begin of fill and 2 end of fill total for combined cavities.

5) Installation and labeling to be completed per the following pages of this section.

6) Any tool with over two transducers must include cables and JIX junction boxes.

*** Any deviations that will affect tooling or the product , requires a JCI Tool Engineers approval.**

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **PRESSURE TRANSDUCERS (NORTH AMERICA ONLY)**

SECTION # **V**

VIEW # **B**

FILE:

DATE: Mar 22, 2012

Use and location of pressure transducer to be determined by Tool Engineer at Preliminary Mold Design Review. Type of transducer (analog / digital) to be labeled on RFQ.

Faces of ejector pins used to actuate transducers are to be center punched, while mold is disassembled, for identification.

- Single punch for gate pin location
- Double punch for end of fill location

Under no circumstances are transducer pins to be punch while assembled in mold

Transducer outputs (connectors) are to exit on the Top of Mold or Non-Operator Side.

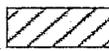
	MAX FORCE	DME ANALOG NUMBER	RJG ANALOG NUMBER	RJG DIGITAL NUMBER
SEE CHART BELOW FOR EJECTOR PIN SIZE - TRANSDUCER RECOMMENDATIONS	125 LBS	NOT AVAILABLE	T414-12 (12' CABLE) T414-24 (24' CABLE) T414-36 (36' CABLE) T414-48 (48' CABLE)	LS-B-127-125-12 LS-B-127-125-24 LS-B-127-125-36 LS-B-127-125-48
	500 LBS	BS-412C (12' OR 24' CABLE)	T412-12 (12' CABLE) T412-24 (24' CABLE) T412-36 (36' CABLE) T412-48 (48' CABLE)	LS-B-127-500-12 LS-B-127-500-24 LS-B-127-500-36 LS-B-127-500-48
	2000 LBS	BS-413C (12' OR 24' CABLE)	T413-12 (12' CABLE) T413-24 (24' CABLE) T413-36 (36' CABLE) T413-48 (48' CABLE)	LS-B-127-2000-12 LS-B-127-2000-24 LS-B-127-2000-36 LS-B-127-2000-48
	4000 LBS	NOT AVAILABLE	T445-12 (12' CABLE) T445-24 (24' CABLE) T445-36 (36' CABLE) T445-48 (48' CABLE)	LS-B-159-4000-12 LS-B-159-4000-24 LS-B-159-4000-36 LS-B-159-4000-48

		Pressure on Plastic			
		5000 PSI	10000 PSI	15000 PSI	20000 PSI
3/64					
3/64 OS					
1/16					
1/16 OS					
5/64					
5/64 OS					
3/32					
3/32 OS					
7/64					
7/64 OS					
1/8					
1/8 OS					
9/64					
5/32					
5/32 OS					
11/64					

		Pressure on Plastic			
		5000 PSI	10000 PSI	15000 PSI	20000 PSI
3/16					
3/16 OS					
13/64					
7/32					
7/32 OS					
15/64					
1/4					
1/4 OS					
9/32					
9/32 OS					
19/64					
5/16					
5/16 OS					
21/64					
11/32					
11/32 OS					

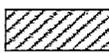
		Pressure on Plastic			
		5000 PSI	10000 PSI	15000 PSI	20000 PSI
23/64					
3/8					
3/8 OS					
13/32					
13/32 OS					
7/16					
7/16 OS					
15/32					
15/32 OS					
1/2					
1/2 OS					
9/16					
5/8					
11/16					
3/4					
7/8					
1					

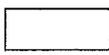
* USE DME BUTTON SENSOR EXTENSION CABLE (BSC 10) IF REQUIRED (10' LENGTH)

 No Application Available

 RJG T-414 / LS-B-127-125

 RJG T-412 / LS-B-127-500

 RJG T-413 / LS-B-127-2000

 RJG T-445 / LS-B-159-4000

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: PRESSURE TRANSDUCERS (NORTH AMERICA ONLY)

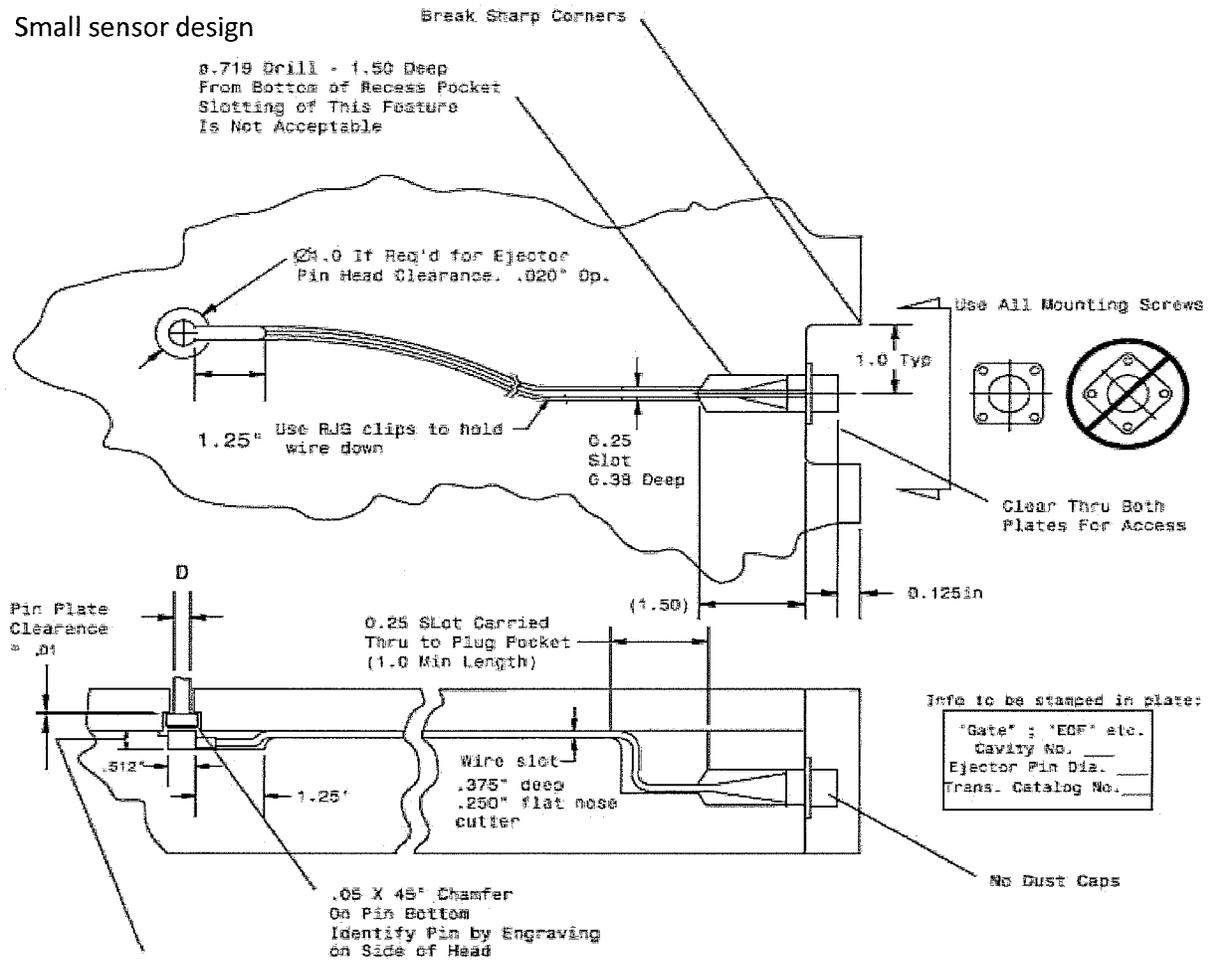
SECTION # V

VIEW # C

FILE:

DATE: Mar 22, 2012

Small sensor design



Transducer Pocket. Mill to thickness of transducer (Range .372" to .375")
Verify With Height Gage

- 0.01 - 0.015 Clearance around pin head c'bore for loose running fit.
- If pin is keyed, allow clearance for running fit.
- All Transducer outputs are to be on top of mold or on non-operator side.
- Do not label ejector pins on back of head on transducer pins, label on the side.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

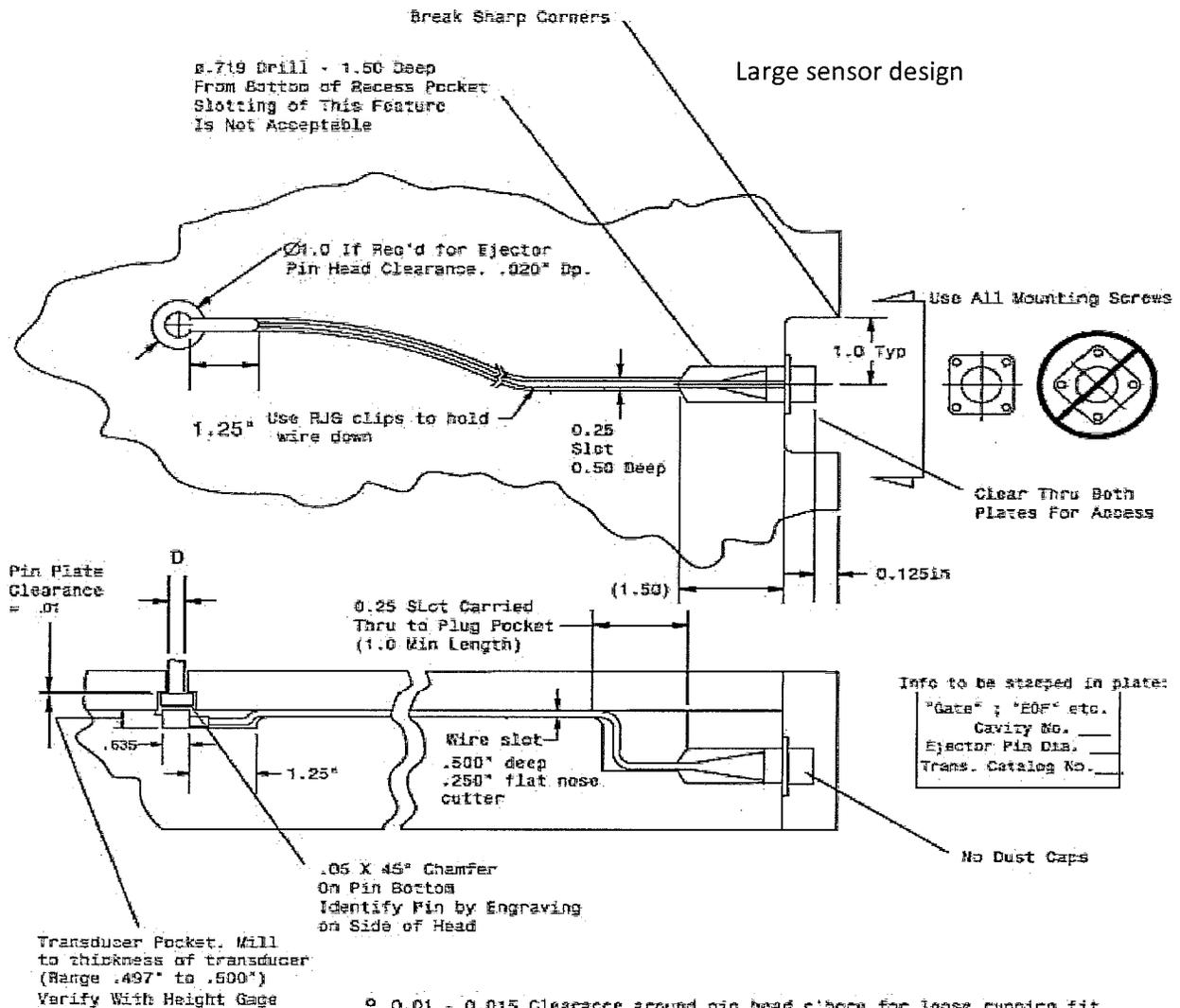
TITLE: PRESSURE TRANSDUCERS (NORTH AMERICA ONLY)

SECTION # V

VIEW # D

FILE:

DATE: Mar 22, 2012



- o 0.01 - 0.015 Clearance around pin head c' bore for loose running fit.
- o If pin is keyed, allow clearance for running fit.
- o All Transducer outputs are to be on top of mold or on non-operator side.
- o Do not label ejector pins on back of head on transducer pins, label on the side.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: PRESSURE TRANSDUCERS (NORTH AMERICA ONLY)

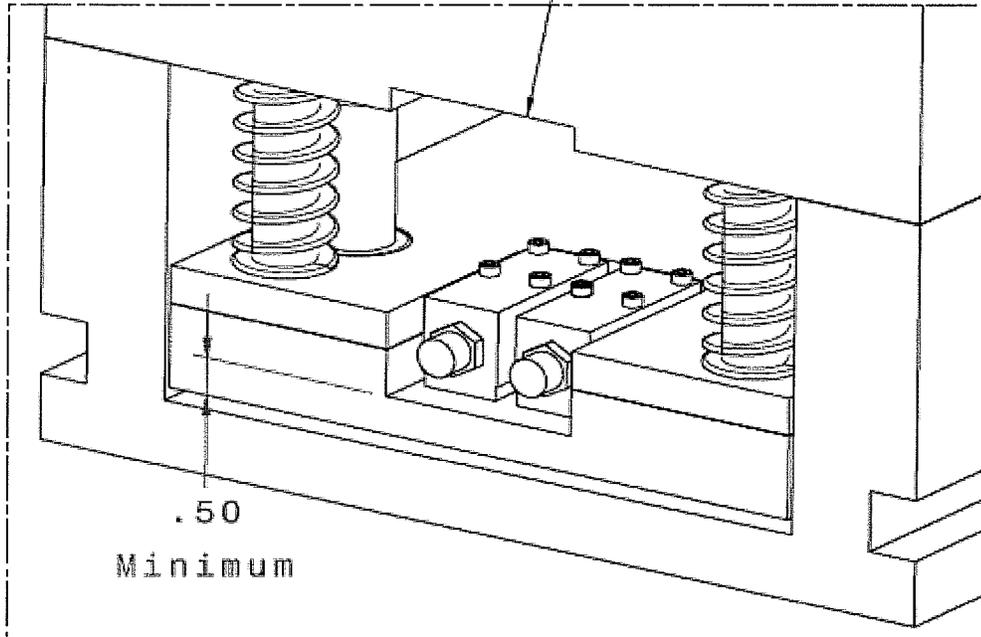
SECTION # V

VIEW # E

FILE:

DATE: Mar 22, 2012

Machine pocket in back of block
if required for clearance



- All digital transducers will be mounted as shown above. Any deviation from this method will require JCI Tooling Engineer and molding site approval.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: VI EJECTION

SECTION # VI

VIEWS A-T

FILE:

DATE: May 22, 2012

This section outlines the basic construction expectations of the **EJECTION** details and features.

Specific views shown on the following pages are:

A) LIMIT SWITCH LOCATIONS - FOR EJECTION	66
B-1) PULL BACKS AND KNOCK LOCATIONS	67
B-2) PULL BACK PUCK DESIGN	68
C) EJECTOR PINS	69
D) EJECTOR GUIDE PINS & BUSHINGS	70
E) EJECTION RETURN PINS & SPRINGS	71
F) SLEEVE AND DEEP DRAW EJECTION	72
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H) EJECTOR PIN KEYING METHOD	74
I) NON -SPRING RETURN EJECTION	75
J) HYDRAULIC EJECTION	76
K) HYDRAULIC EJECTION COUPLER	77
L) HYDRAULIC EJECTION CYLINDER	78
M) ROBOTIC REMOVAL - SUGGESTED FEATURES .	79
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P) DELAYED EJECTION -- 1 PLATE SYSTEM	82
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R) POSITIVE EJECTION RETURNS	
- PREFERED METHOD	84
S) SPRING LOADED RETURN PINS & TAPPED PULL BACKS	85
T) EJECTOR HOUSING OPENING COVER	86

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **LIMIT SWITCH LOCATIONS - FOR EJECTION**

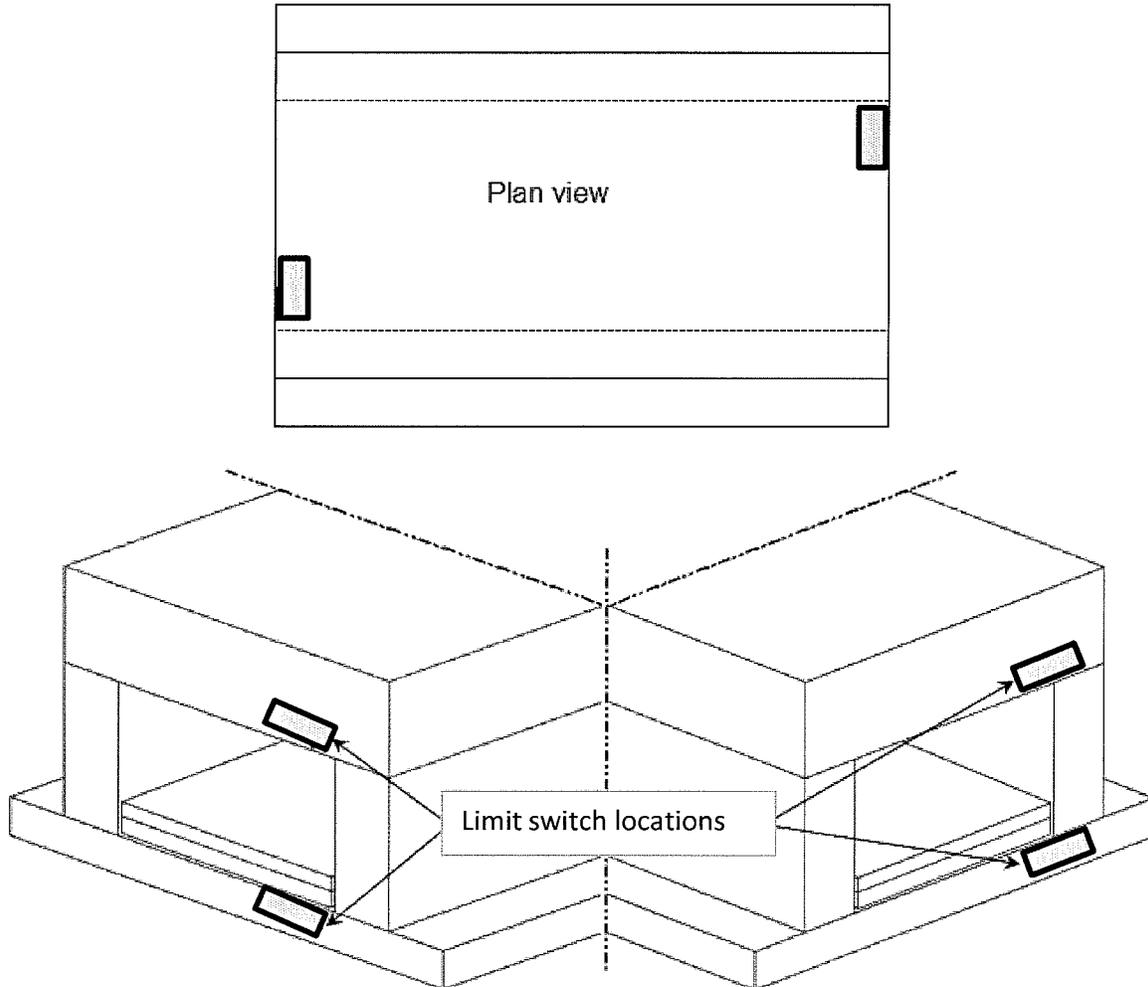
SECTION # **VI**

VIEW # **A**

FILE:

DATE: April 10, 2014

- * The ejector plates back position is always secured with diagonal placed limit switches. Use the production plant specifications for type and the need for front position detection.
- * All limits need to be adjustable for full ejection stroke and reduced ejection stroke.
- * All locations must be approved by the plant and JCI Tool Engineer.
- * Detection of the ejector plates in the forward and back position are important.
- * EU - Only requires 4 limit switches to detect the ejection plate position.
(2plcs per end)
- * Balluf (EU) or Allen Bradley 802T ALP (NA) limit switches are required.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **PULL BACKS AND KNOCK LOCATIONS**

SECTION # **VI**

VIEW # **B-1**

FILE:

DATE: June 15,2012

* All pull backs require pull back pucks (Sec. VI, View B-2), to ensure that we get the maximum stroke from the press , to eject the part off the tool cleanly.

* Number of pull backs required, this info will be provide by the JCI Tool Engineer. They vary between countries. See notes below for reference.

* Knock out patterns are vary important, verify plant / press specifications.

**Reference only - Knock out/ pull back bar diameter

(Verify press Spec)

1.0" / 25.0mm

1.75" / 45.0mm

2.0" / 50.0mm

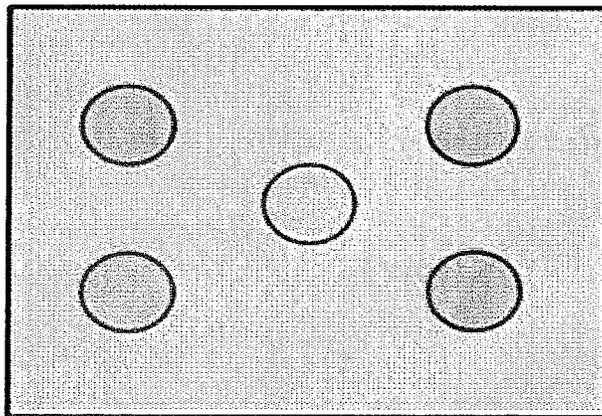
**Clamp plate clearance KNOCK OUT hole for the puck is +.200" or +5.0mm per side. (and for the knock out / pull back bars)



* Yellow Ref for EU & ASIA only - 1 center pull back location, with the additional (4) is possible.



* Blue Ref for NA only - 4 places for the pull backs are required.



EJECTOR SIDE / MOVING PLATTEN SIDE

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **PULL BACK PUCK DESIGN**

SECTION # **VI**

VIEW # **B-2**

FILE:

DATE: Jan.17,2014

* Machine Press sizes may vary for the puck requirements. (example - thread size for the pull back bars, diameter of the puck, thickness of the puck) Must verify press specifications.

*** Always verify press specifications**

* Puck sizing will be built to the requirements (Metric or Standard dimensions) of the Native country in which the tool will run.

** Metric dimensions for EU & ASIA

** Standard dimensions for NA

* Dimensional Notes:

** The puck must be recessed into the back of the ejector plate by 3 mm if using purchased pucks, But no modifications can be made to the purchase puck.

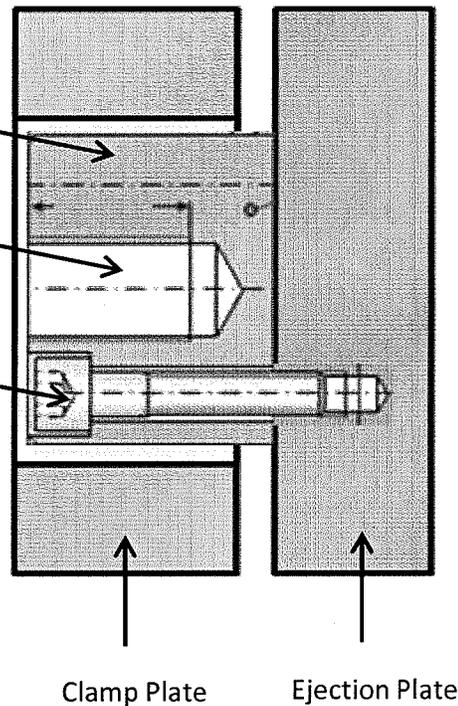
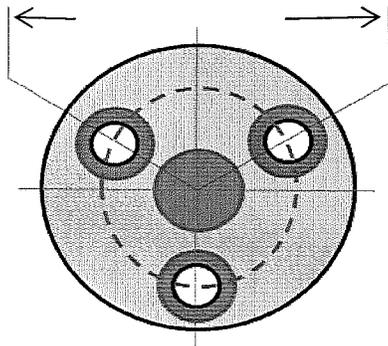
** There must be (3) socket head screws that secure the puck to the ejector plate.

** Clamp plate clearance KNOCK OUT hole for the puck is +5 mm per side. (and for the knock out / pull back bars)

Reference only
Knock out / pull back
bar diameter
(Verify press Spec)
1.0" / 25.0mm
1.75" / 45.0mm
2.0" / 50.0mm

Ejector PUCK
Threaded hole for Pull
back bars
Attachment screw (3)
places / securing the
puck to the ejector
plate

120° equally spaced attachment holes



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:

EJECTOR PINS

SECTION # **VI**

VIEW # **C**

FILE:

DATE: April 23, 2014

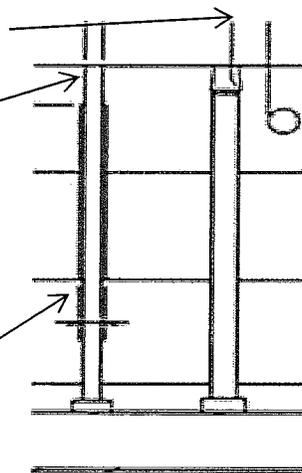
- * Use Only standard ejectors pins. - Example -DME , PCS, HASCO, LKM
- * All mold construction for - Lenses, Painted, Laminated, Vacuum metalized, or Chrome parts are to use a coated pin that doesn't require grease.
- ** The procedure for installation is to very lightly grease the pins.
- ** Stamp on the end of the ejector plate " Coated pins - Apply Grease Lightly"
- * In some cases , A titanium nitride (TiN) coating made be used (appears gold) . This coating builds up the surface of the ejector pins 0.0002" -0.0004" or 0.005mm per side. Additional hole clearance must be applied to compensate.
- ** DO NOT apply grease to TiN coated ejector pins.
- ** Stamp on the end of the ejector plate " TiN Coated Pins - DO NOT Grease"
- * All ejectors pins are to be vented as directed by the JCI Tool Engineer.
- * Ejector pins beneath sliders must be avoided if at all possible. If absolutely necessary for an ejector pin to be used under a slide or other action, (A) Must use a micro switch safety system. (B) Approval from a JCI Tool Engineer.
- * Label each pin head and hole on the ejector plate for ease of assembly.
- * Label transducer pins on the side of the head only.
- * All Contoured ejector pins must be keyed in place.
- * Ejectors are to be round. Rectangle shape can only be used with a the approval of a JCI Tool Engineer.
- * DO NOT use pins < 1/8" or 3.0mm without approval from a JCI Tool Engineer.
- ** Stepped ejector pins should be considered first in this application.
- * DO NOT use blade ejectors without the approval from a JCI Tool Engineer.
- * All ejector pins must be one solid piece, NO screwed on heads.

.250" / 6 mm - MIN. from water lines, cores etc.

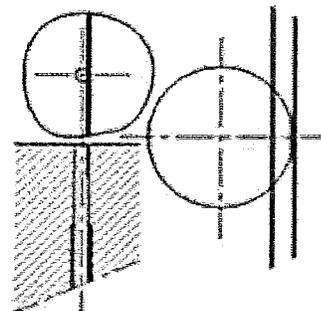
For ejector pins-
For diameter relief - bearing surface and diameter clearance for the pin.

Follow the DME specifications.

Nominal Relief .8
-1.0 mm



Use for added rib ejection as needed.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **EJECTOR GUIDE PINS & BUSHINGS**

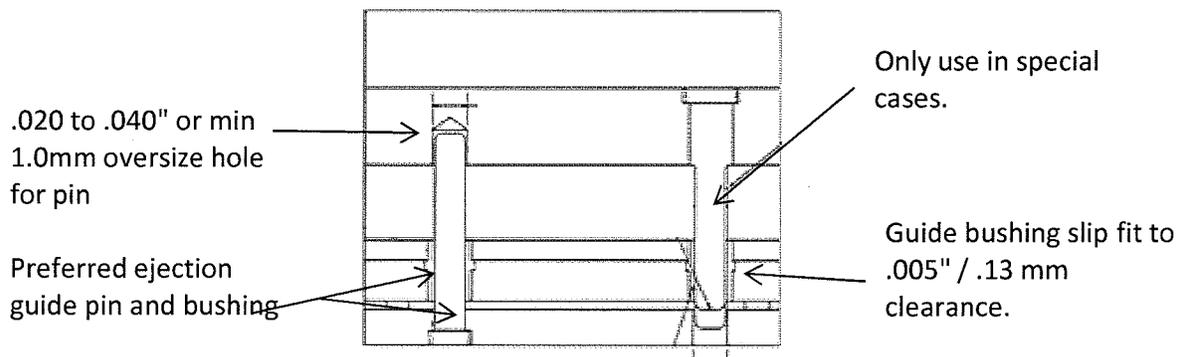
SECTION # **VI**

VIEW # **D**

FILE:

DATE: Aug 3, 2012

- * Only pins that are engineered and designed for use in this application are to be utilized as ejector guide pins. Use standard components . NO self made guides or bushings.
- ** Over -length guide pins that are cut off to length are NOT to be used.
- ** Fits for guide pin installation are to follow manufactures specifications.
- ** Graphite plug bushings are required in EU, as long as they are standard components.
- * Thick wall bronze ejector bushings or bronzed steel bushings (with Grease groves .003" or .08mm clearance) are the preferred components for use in JCI - ASG plants. -(Not in EU)
- ** The bushing are to be shouldered , between both ejector plates.
- ** Hardened steel bushings are NOT allowed without written consent.
- ** Bushings with graphite plugs are not allowed in NA without a JCI Tool Engineer approval.
- * Guide pins are to be centrally located around the center of the machine on offset tools whenever feasible.
- * All guide bushings are to have grease fittings, and must be able to be greased without disassembly of the tool. Except self lubricated bronze bushings.
- * There are two style shown in the drawing. These are NOT to be used in the same tool.
- ** The head of the guide pin coming thru the clamp plate , is the PREFERRED style. With clearance for the pin in the back of block/plate. (.020 to .040" or min 1.0 mm)
- ** The head of the guide pin coming thru the Block / plate is NOT recommended. But can be used if needed. With clearance for the pin in the clamp plate. Approval from a JCI Tool Engineer.
- * Tools without expected risk for ejection problems are connected to the ejection system of the machine for a positive pull back of the ejector plates.(must meet machine specifications).
- * Tools with unbalanced ejection forces and /or long ejection plates must have Hydraulic ejection system. Refer to plant / press specifications. Equal length of hydraulic lines is mandatory. Drilled lines in distance bars, rails or plates is preferred.
- * For ejection plates with risk of heat expansion . All guide pins are mounted the clamp plate.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **EJECTION RETURN PINS & SPRINGS**

SECTION # **VI**

VIEW # **E**

FILE:

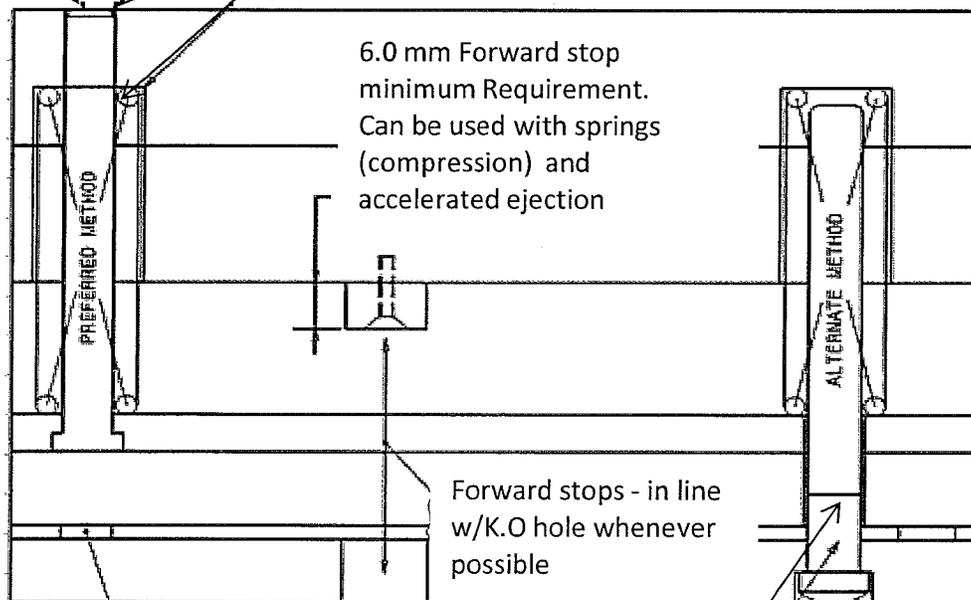
DATE: Dec.19, 2013

- * Always need the EU JCI tool engineers approval.
- * Total force required > 150% of the ejector plate weight.
- * DO NOT include springs on molds with pocketed lifters.
- * Positive returns ARE REQUIRED on all molds using lifters.
- ** DME external type preferred, DME internal type optional.
- ** Machine pull back optional at mold site request.
- * DO NOT use spring cages. Springs must use guide rods.
- * Spring pocket must not break through the side on mold.
- ** DME standard bases require pin relocation of 5.0mm
- * Return pins should be centrally located around the machine centerline on offset tools whenever possible.
- * The requirement of (4) return pins , larger tools may require additional. (max distance between pins = 81.28 cm)
- * There should be return buttons under all return pins, sucker pins, and lifters or as close as they can be. Appropriately spaced to minimize deflection.
- * Option when using draw / pull back bars - No springs required. MUST verify with manufacturing site and JCI Tool Engineer approval.
- * Option - Gas Spring / Shock can be used with the approval of the JCI Tooling Engineer.

Flat , perpendicular to shut off
pre-load - 0.00 - 0.02mm

1.5mm x 45° chamfer

Medium duty die spring (danly orange, lamina blue, etc) required on each return pin (preferred method) Max compression of 36% including 5-10% preload.



Alternate method of providing spring containment. Must be approved by plant and JCI Tool Engineer.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **SLEEVE AND DEEP DRAW EJECTION**

SECTION # **VI**

VIEW # **F**

FILE:

DATE: April 23, 2014

- * Sleeves to be located behind every cylindrical boss
- * Sleeves and cores to be standard sizes (DME, Hasco, Meusburger etc.)
- * Ejector sleeves to be long lead style (Equivalent to DME)

Maintain standard rib to wall . If the part design does not allow this. Contact the Tool Engineer.

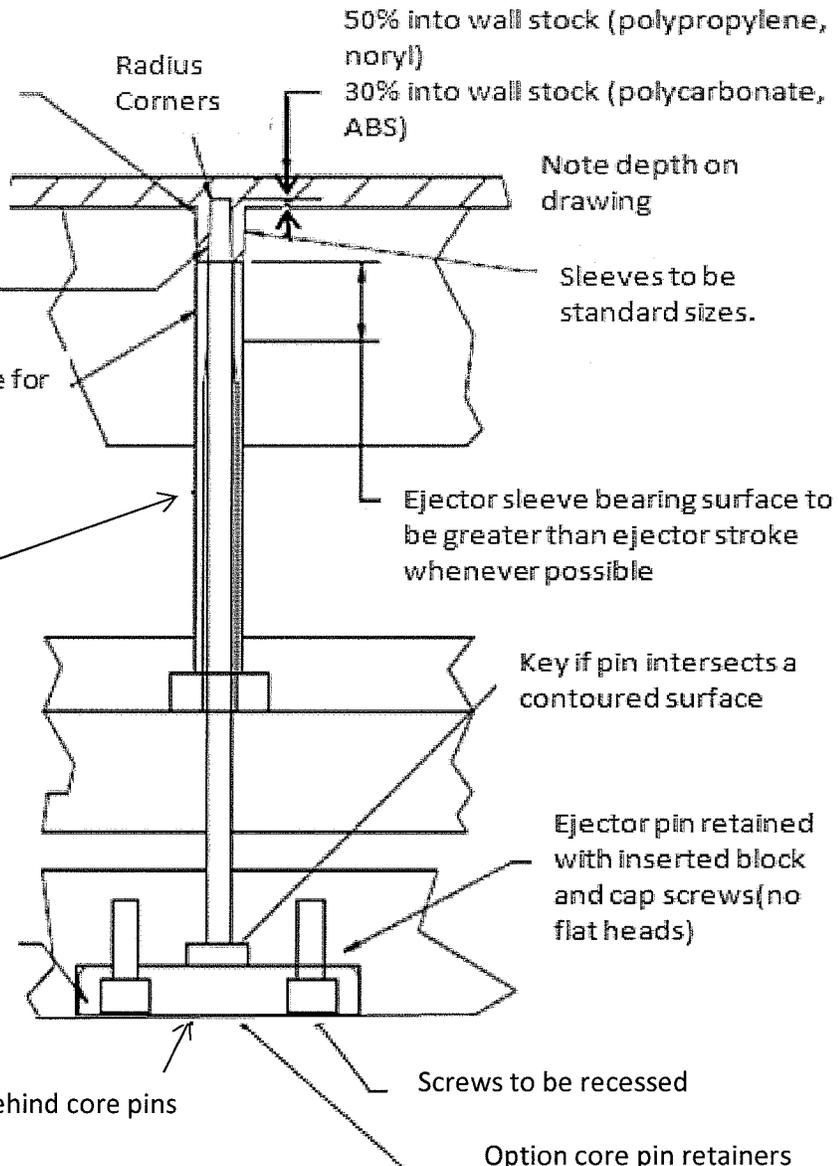
Pin should have draft

Coated sleeves on outside for parts that require a greaseless pin / sleeve

Nominal Relief .8
-1.0 mm

Block must be flush

Option of set screws behind core pins



Deep Draw Ejection

- * For deep draw parts / features, standard (equivalent to DME - etc) , air poppet's can be used to assist ejection or improve release from cover, they cannot be used to completely replace ejector pin

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: TECHNICAL GRAIN PIN DESIGN (North America Only)

SECTION # VI

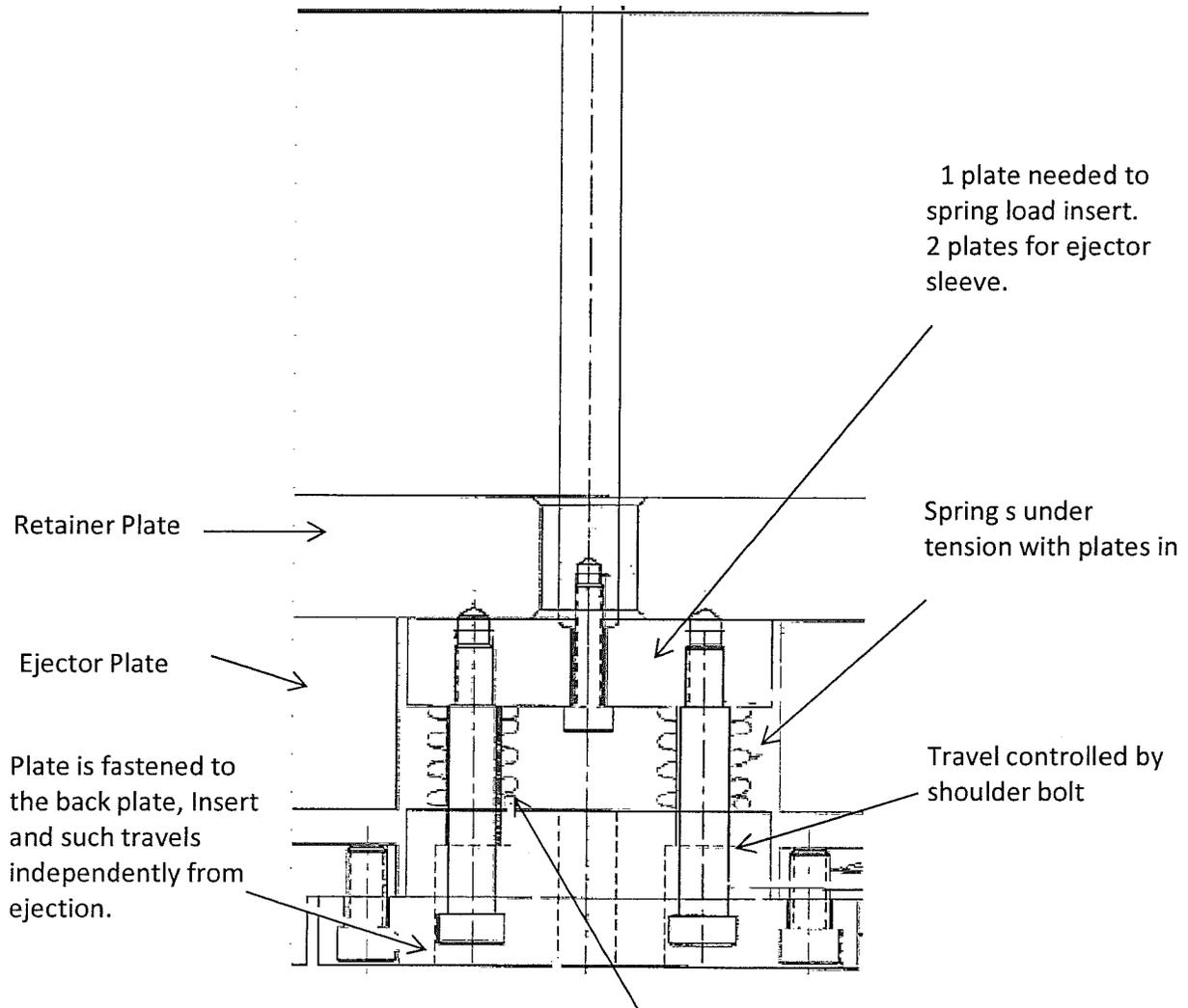
VIEW # G

FILE:

DATE: July 26, 2012

* This sleeve design is to be used if the part contains a "Technical Grain"

* This design must reviewed with / and approved by a JCI Tool Engineer.



ANCHOR LAMINA MEDIUM DUTY SPRING, *
The spring requirement is to handle the molding pressures.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

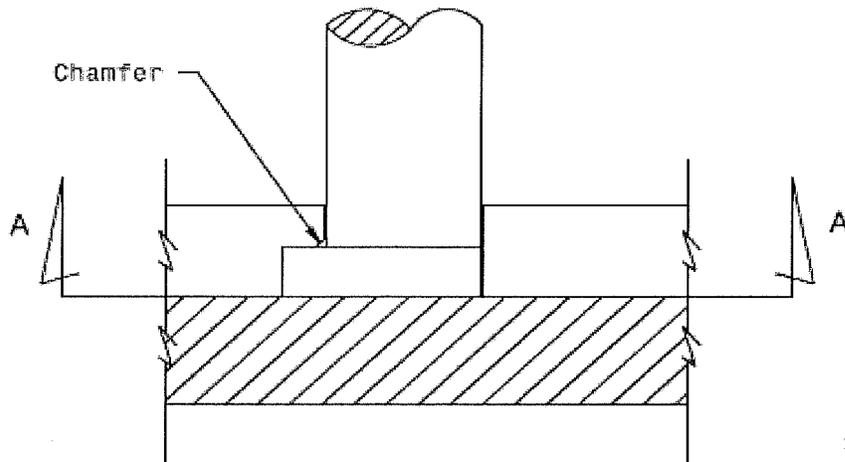
TITLE: **EJECTOR PIN KEYING METHOD**

SECTION # **VI**

VIEW # **H**

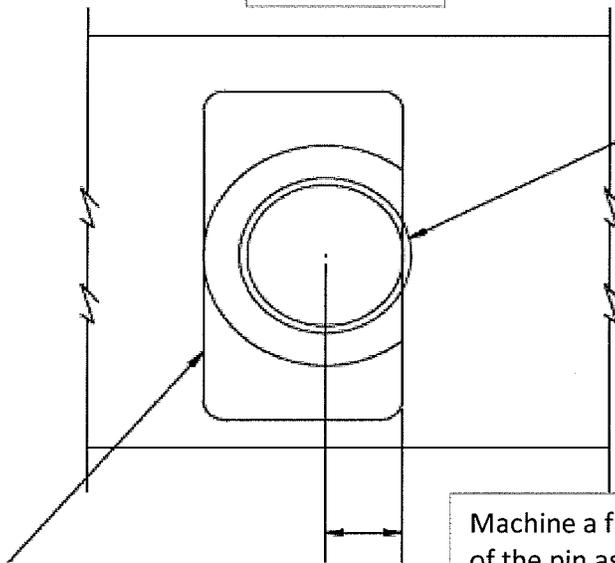
FILE:

DATE: Dec.19,2013



Number all pockets and pins

Sec A-A



Standard clearance to not strip grease during installation

Machine a flat on the head of the pin as shown , to prevent the pin from turning.

The head of the ejector pin is to fit into the the pin plate trapping it in a keyed position not to rotate, the head of the ejector pin is to have a slip fit , not forced in.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **NON -SPRING RETURN EJECTION**

SECTION # **VI**

VIEW # **I**

FILE:

DATE: Dec. 19,2013

* Preferred methods of returning the ejection when spring loaded return is not feasible for any of the following reasons:

* Safety - pocketed lifters cannot have spring returns - They are consider pinch points.

* Lifter geometry prohibits the return pins from protecting shutoff.

* If positive returns must be used, check to make sure they DO NOT interfere with the end of arm tooling (EOAT).

A)- Press 50 - 500 Tons

** Use Knock Out bars pull back holes in ejector plate as shown below:

- when ejector plate pull backs are required. (Pull Back pucks)

- Clamp plate clearance KNOCK OUT hole (+.200" or +5.0mm per side.) for the knock out/ pull back bars.

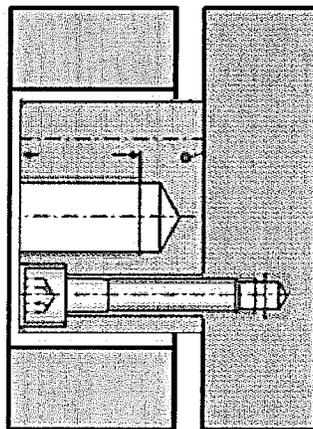
B)- Press > 500 Tons

** All tools over 500Ton use Hydraulic ejection unless specified on the RFQ. - JCI ToolEngineer.

* Tapped hole in the ejector plate for pull back bars, Verify plant / press specs

* Pull Back PUCK, is required

Pull back puck design ,
Reference Sec VI View
B-2, for details



* NA -ONLY - Use 5/8"-11 thru for all machines except Demag 440 Ton
1/2"-13 for Demag 440Ton

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **HYDRAULIC EJECTION**

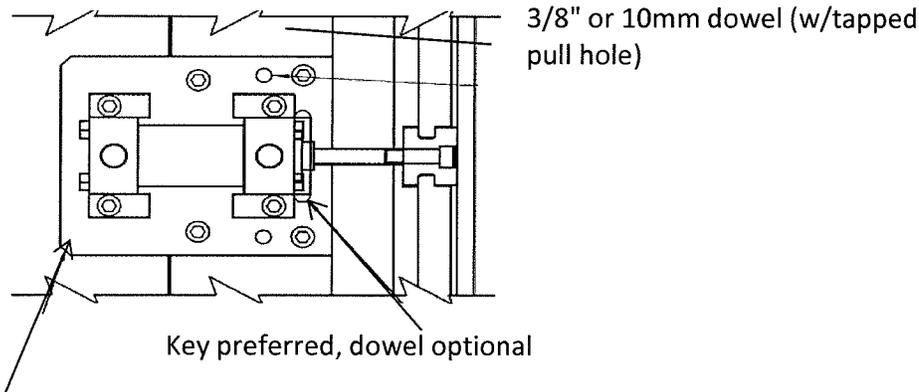
SECTION # **VI**

VIEW # **J**

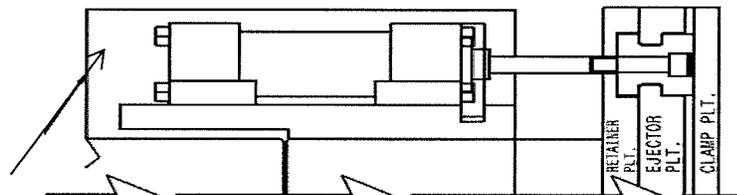
FILE:

DATE: April 10, 2014

- * All Hydraulic cylinders are to be plumbed in parallel always. Use only Parker (NA) and Merkle (EU) products.
- * Must have limit switches to indicate forward & back positions of ejector plates. See Sec VI, View for locations.
- * Hydraulic hoses to be 1/2" - ID. steel braided lines (Avoid 90 degree turns in plumping).
- * Plumping fitting to be straight hydraulic threads (NO "O" rings, NO pipe threads)
- * Use rails and plates as manifolds and oil line plumping whenever possible. (0.75"/19.0mm diameter is preferred.)
- * Cylinders for hydraulic ejection, need to use swivel type fittings to prevent stress.
- * Flow divider will need to be applied to the hydraulic ejection. If the machine does not have the capability. (Verify with the plant & JCI Tool Engineer.)
- * Position cylinders so they DO NOT interfere with falling parts, or (EOAT) end of arm tooling.
- * Hydraulic ejections can be used on any press size. with Plant & JCI Tool Engineers approval.
- * 500 Ton and above will require Hydraulic ejection 100%.
- * Smaller tonnage tool that requires Hydraulic Ejection or not, will need to be reviewed by the plant & JCI Tool Engineer for direction & approval.
- * If balance flow length can not be machined into the rails . plates. The flow divider must be used.
- * When 4 hydraulic cylnders are being for ejection -Flow divider must meet - 42 GPM / 160 LPM @ 3500 RPM, PSI 3,000 / 206 Bar
- * All cylinders , lines , flow dividers must be protected / guarded .
- * Cylinder shafts 1-3/8" min diameter.



Mounting plate may not be required on all tools.



Adequate protection /guarding required for all cylinders

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **HYDRAULIC EJECTION COUPLER**

SECTION # **VI**

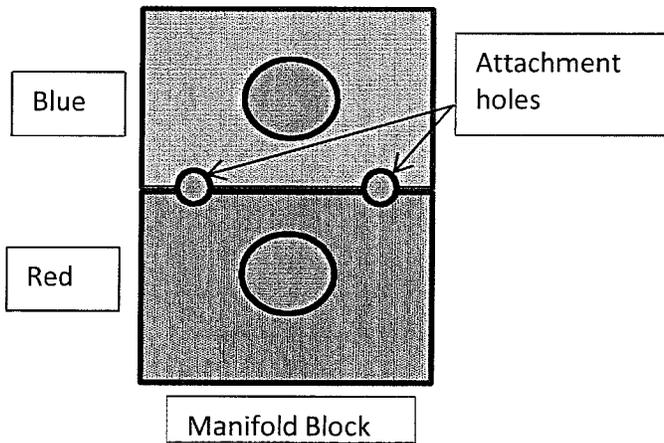
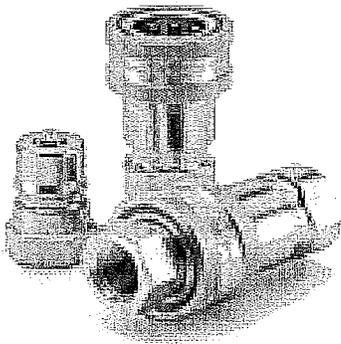
VIEW # **K**

FILE:

DATE: April 10, 2014

Reference ONLY

- * All fittings must meet the plant / press specifications for ; Water , Hydraulic and Electrical.
- * Hydraulic fitting location on the mold: - Female - OUT and Male - IN Using a color code manifold block.
 - #1 - On Non Op side - middle of mold / Center Line
 - #2 - Bottom of mold only with manufacturing site approval.
- No using black or galvanized pipe for hydraulic lines or fitting extensions.
- * This info will be provided by the manufacturing site.
- * All fitting are to ensure maximum flow, Not restricting flow.



HYDRAULIC FITTINGS

Parker 60 Series - Valve Gates

H1-62 & H1-63 are used for:

1/8" Valve gate main fittings.

H2-62 & H1-63 are used for:

1/4" Valve gate main fittings.

Press Tonnage - 0-2500H3-62 & H3-63 are used for :

Hydraulic Ejections & Core pulls.

Press Tonnage - 2501 - 5000H4-62 & H3-63 are used for

Hydraulic Ejections & Core pulls.

Parker is a global supplier for these fittings

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **HYDRAULIC EJECTION CYLINDER**

SECTION # **VI**

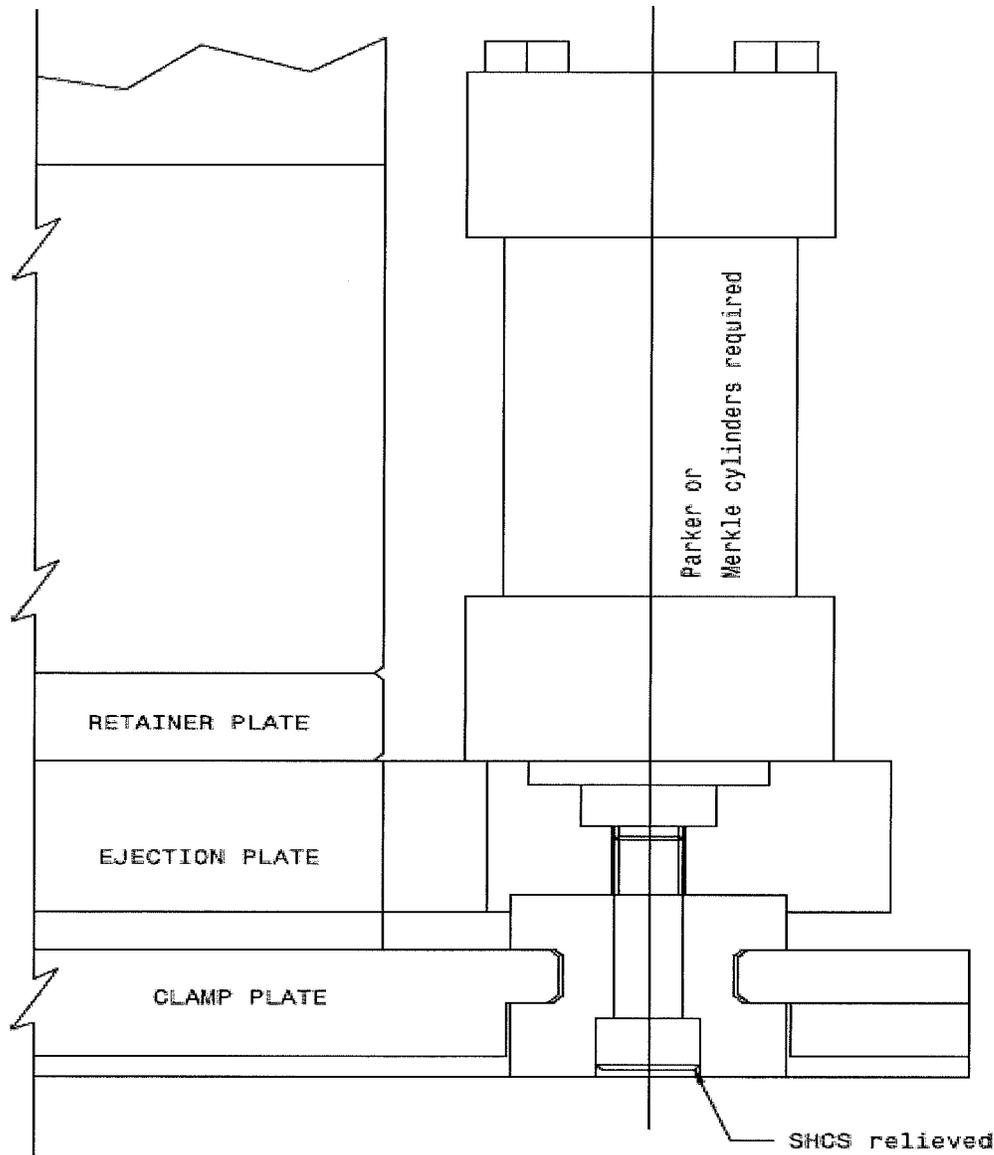
VIEW # **L**

FILE:

DATE: May 16, 2012

* Hydraulic cylinder positions for ejection (also ref . Sec VI, View J). This is an example ,that can be used. This must be approved by the Plant & JCI Tool Engineer. Supplier is responsible for functionality.

* Cylinder shaft must be adequate in diameter to support the ejection / action requirements. This is to ensure a robust action, to help prevent future failures.



* Note : Carrier is preferred on the Ejector plate, with mounted hydraulic cylinders to the side of the tool. Option shown.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **ROBOTIC REMOVAL - SUGGESTED FEATURES**

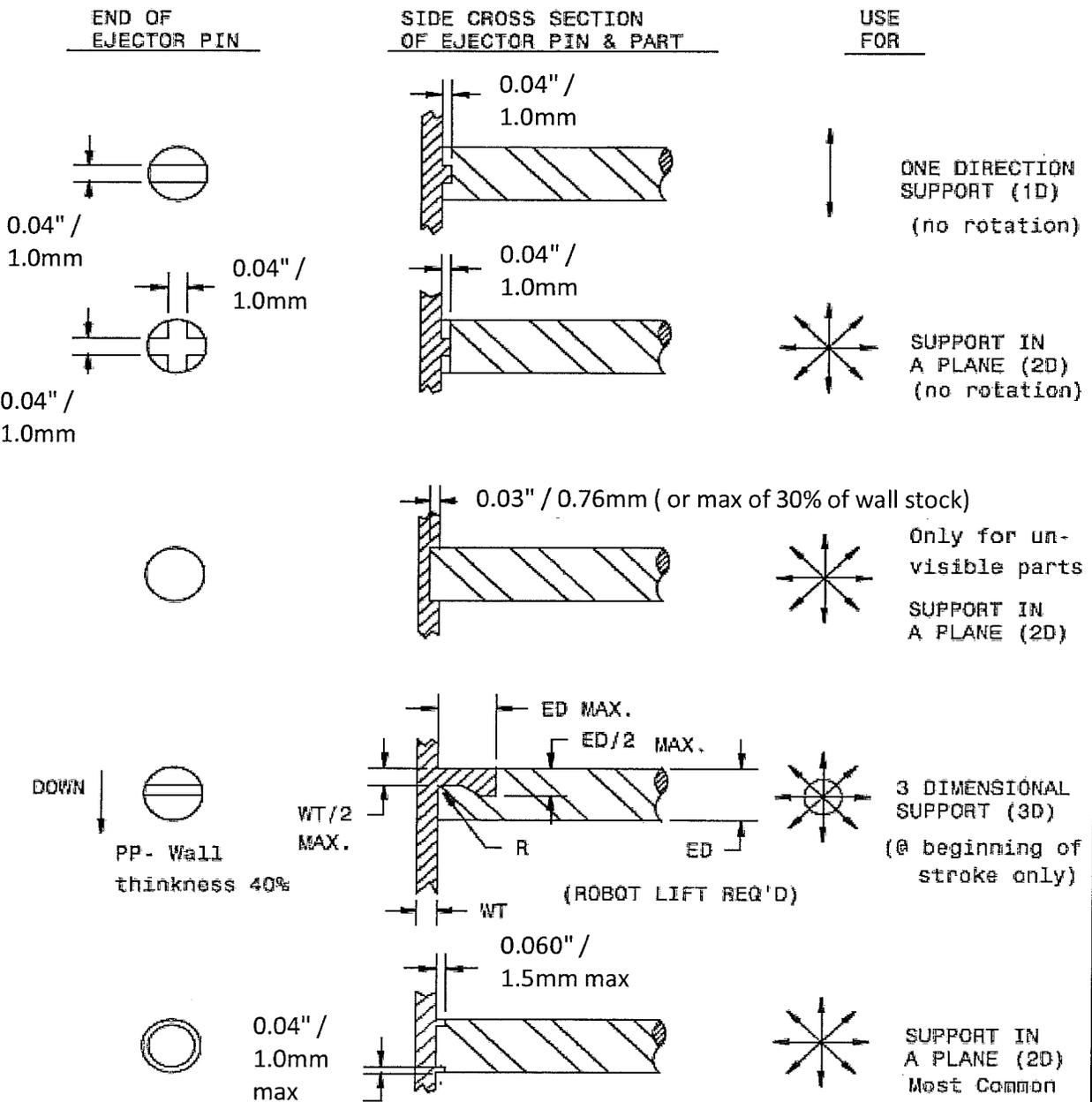
SECTION # **VI**

VIEW # **M**

FILE:

DATE: April 12, 2012

- * If the part will be removed by a robot, the following optional features can be used to prevent the part from falling or slipping during ejection.
- * NOTE: Please review with the manufacturing site and JCI Tool Engineer for preference.
- * Add draft as required.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **RUNNER PIN FEATURES**

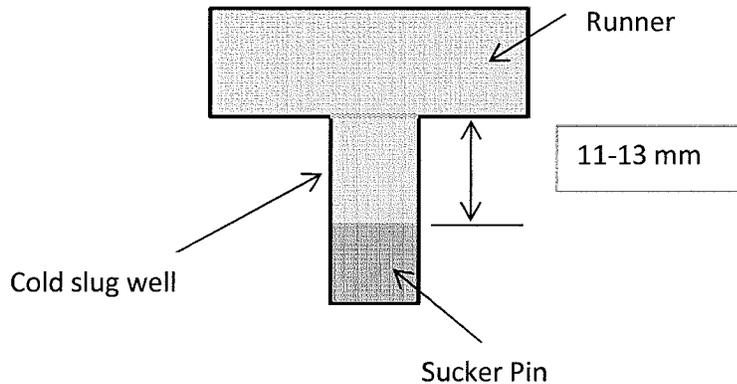
SECTION # **VI**

VIEW # **N**

FILE:

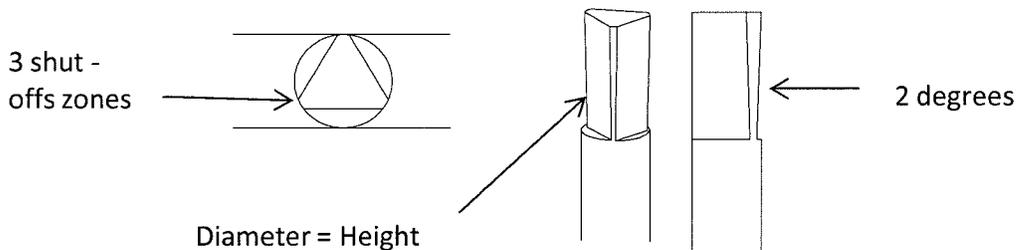
DATE: Dec. 19,2013

- * There are many sucker pin designs to hold the runner on for robot removal. (examples - square shape, and "Z").
- * Below are some preferred examples shown.
- * When to use what type of pin for automatic or robot removal. The direction must be given by the manufacturing site & JCI Tool Engineer. (dimension may vary depending on size of pin & material)



- * Sucker ring / pin , design needs to be in the data. This is used for robot removal, runner inter lock hold down feature shown.

- * EU Preferred design shown below.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **DELAYED EJECTION -- 2 PLATE SYSTEM**

SECTION # **VI**

VIEW # **O**

FILE:

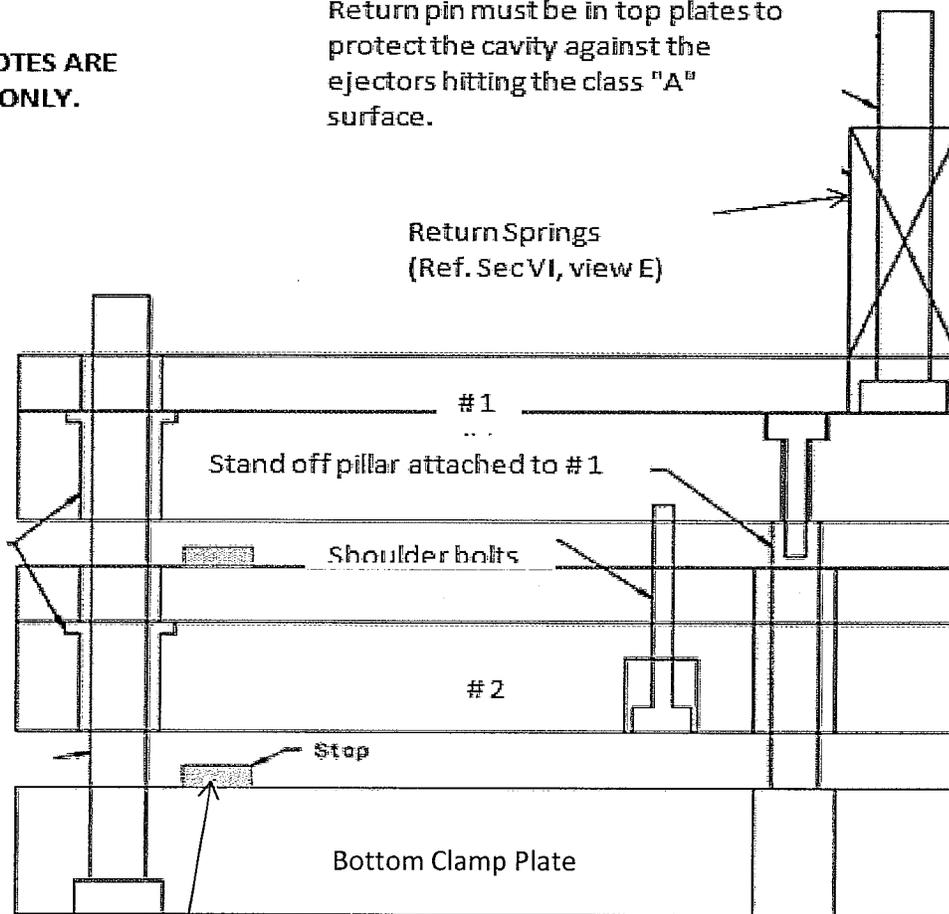
DATE: May 22, 2012

- * 2 plate ejection system, required that standard components are used. (Guide pins, bushing, return pins, shoulder bolts, springs , etc) (Follow springs note in Sec VI, View E.)
- * No self made components allowed.
- * 2 plate systems - can be purchased through a Injection Mold component suppliers like DME, Hasco, Meusburger, Strack etc.(Pending size requirements needed) These systems are preferred.
- * Must verify all tool dimensions with the manufacturing site(Press specifications) and JCI Tool Engineer. (Stack height and open day light of the press are usually affected, limiting part removal / EOAT clearance).
- * Option - a mechanical mechanism can be used to ensure the plates are all the way back.
- * All systems must be approved by the manufacturing site and JCI Tool Engineer.

**** THESE NOTES ARE REFERENCE ONLY.**

Return pin must be in top plates to protect the cavity against the ejectors hitting the class "A" surface.

Return Springs
(Ref. Sec VI, view E)



Equal number of stops spaced out to keep the plates flat.

Knock out clearance hole

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **DELAYED EJECTION -- 1 PLATE SYSTEM**

SECTION # **VI**

VIEW # **P**

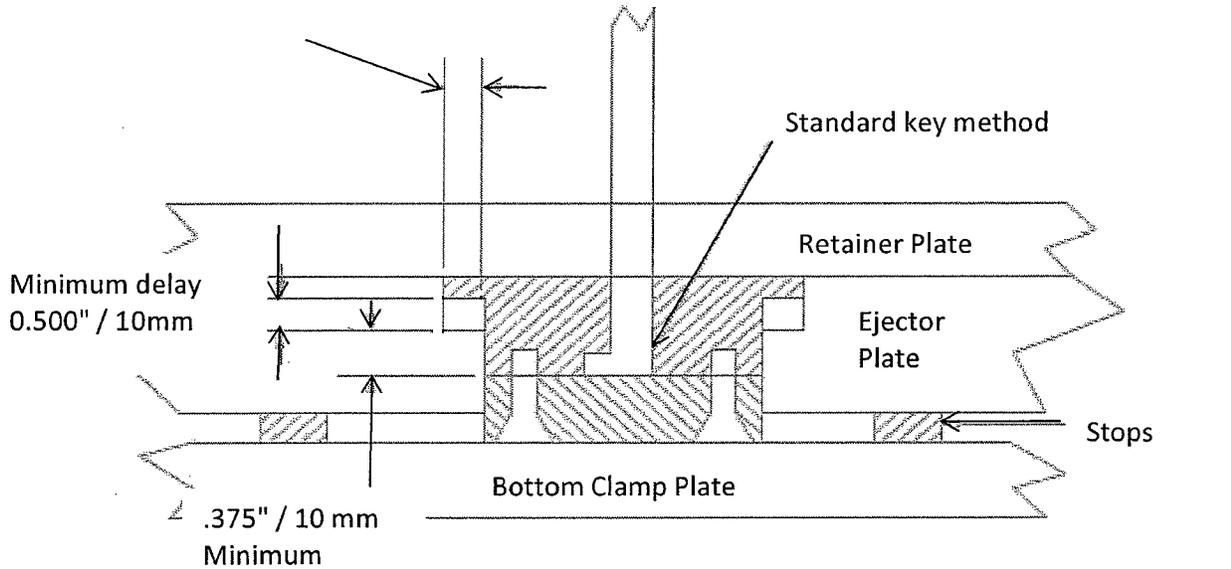
FILE:

DATE: June 15,2012

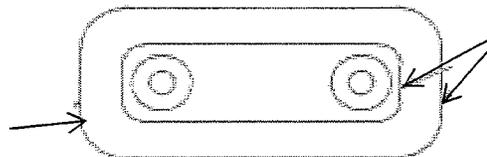
**** FOR REFERENCE ONLY**

- * Only an option if a 2 plate system is not feasible for ejection.
- * This system can be manufactured by the tool supplier. The tool supplier is to ensure the integrity of the components. (Must Supply Preventive Maintenance plan).
- * This must be approved by a JCI Tool Engineer.

Minimum Ear Size
.250" / 10 mm X .250" / 10 mm



Make entire delay block from VC44



Clearance on all fit walls 0.005" / 0.2 mm on all sides.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **EJECTOR PIN EXTENSION TOWERS**

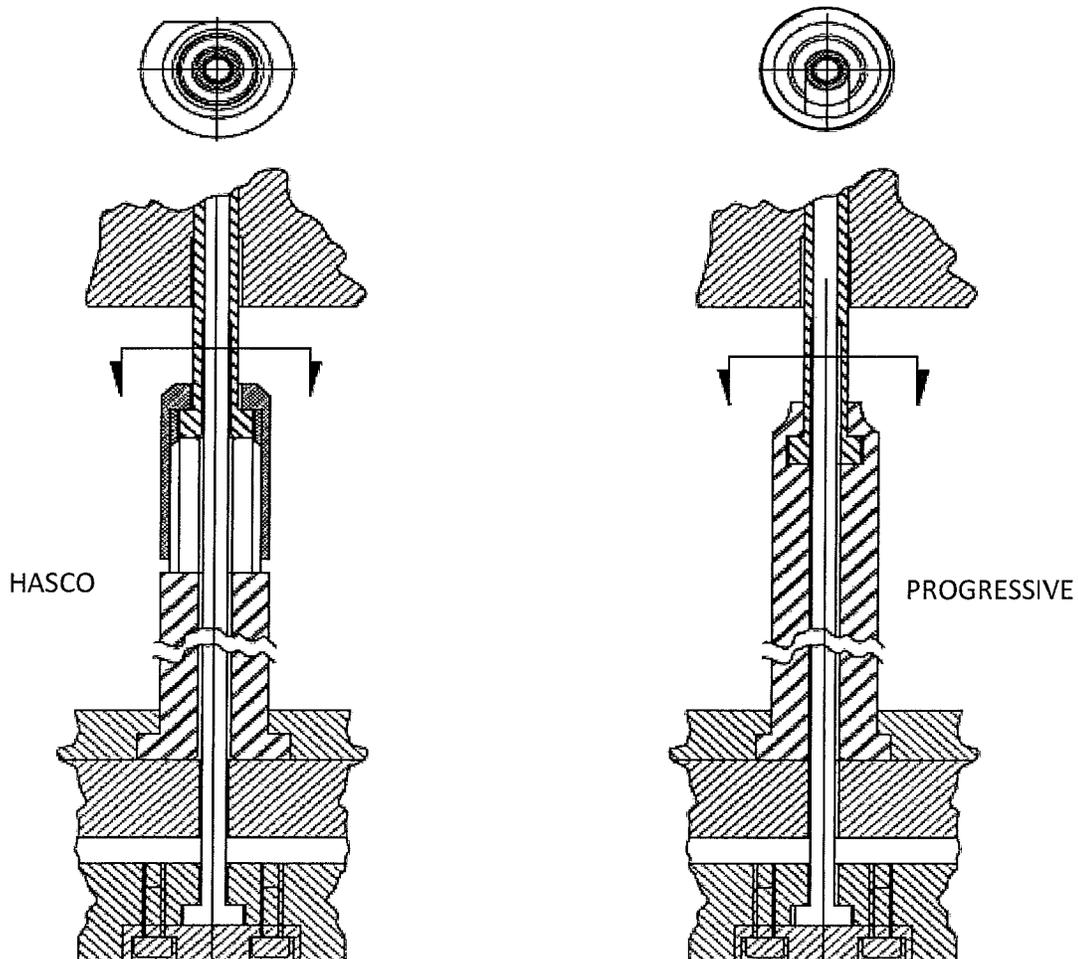
SECTION # **VI**

VIEW # **Q**

FILE:

DATE: May 22, 2012

- * Center loading or slotted style extenders may be specified at the individuals discretion of the receiving manufacturing site, tooling cost estimates should account for either specification.
- * Purchased, catalogue extensions will be considered to be the "Preferred" component whenever available.
- * If the standard component does not fit the application, and the tool supplier has to make one. This must be approved by a JCI Tool Engineer and a spare is required.
- * The ejection stroke must be reviewed and verified, also clearance into the back



Screw Cover Extension towers are manufactured by HASCO (Alternative Method (ID# Z47..) & Progressive (Standard Method(ID# SXT ...L3)

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **POSITIVE EJECTION RETURNS**

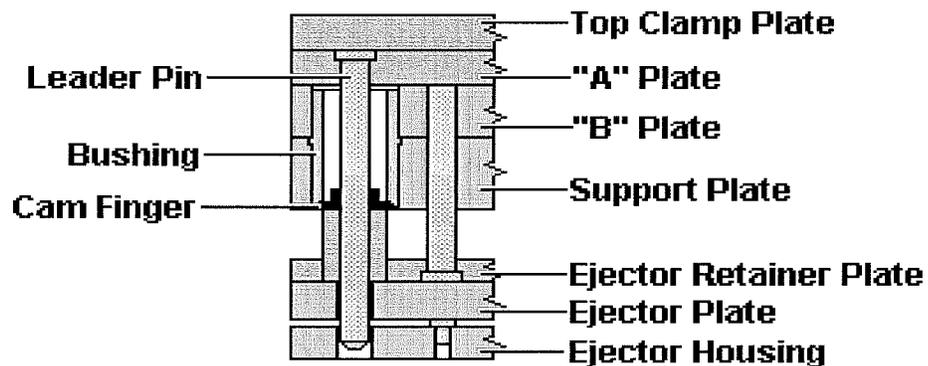
SECTION # **VI**

VIEW # **R**

FILE:

DATE: Dec. 19,2013

- * DME or Equivalent Positive Ejection Returns are the preferred method to assure ejection return to home position when tooling conditions exist that require this function.
- * Use standard components / options that meet the requirements for manufacturing.
- * Limit switches are required.
- * Mold conditions that require the use of these components include, but are not limited to:
 - Ejector pins / actions under the slides, that are Mechanical , Hydraulic / Pneumatically operated slides
 - Large lifters
- * Other mechanisms, from other manufacture may be specified from time to time for use in this application.
- * Position positive returns so they **DO NOT** interfere with falling parts, or End of arm tooling. (EOAT)
- * Actual definition of this requirement will be contained on the RFQ, and will be discussed at the Preliminary Design review.
- * **NOT** required on all tools.



EXAMPLE DESIGN

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **SPRING LOADED RETURN PINS & TAPPED PULL BACKS**

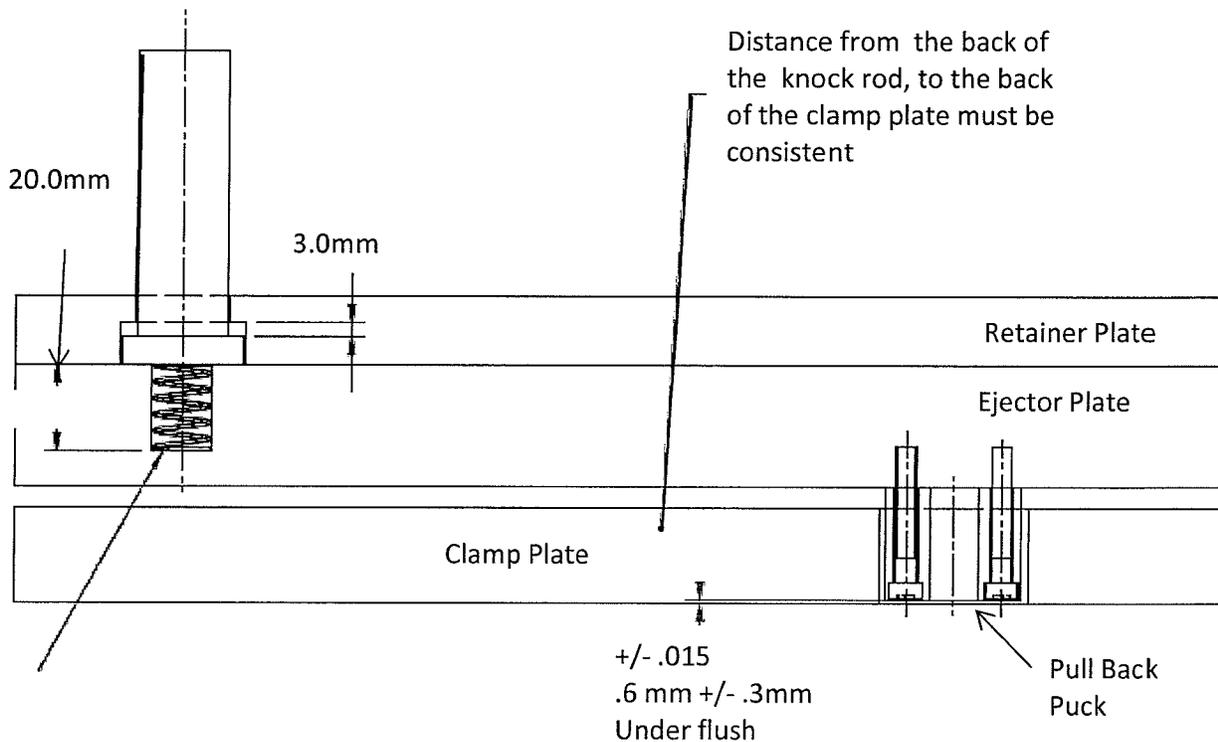
SECTION # **VI**

VIEW # **S**

FILE:

DATE: Jan 17, 2014

- * NA Only - Not used EU
- * This is NOT required on all tools.
- * This is an action that is required when your ejector pins are under SLIDES (Mechanical or Hydraulic)
- * The spring loaded return pins are required whenever any form of ejection lands on the parting line, as well as in some lifter applications.
- * Stop buttons are often located under the return pins and will need to be relocated when using the spring loaded return pins.
- * Approval by a JCI Tool Engineer are required.



Use 25.0mm Long extra heavy duty (DME -green (Ref only) springs.

* 13.0mm diameter springs for the 19.0mm and larger pins.

* 9.5mm diameter springs for pins less than 19.0mm dia.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **EJECTOR HOUSING OPENING COVER**

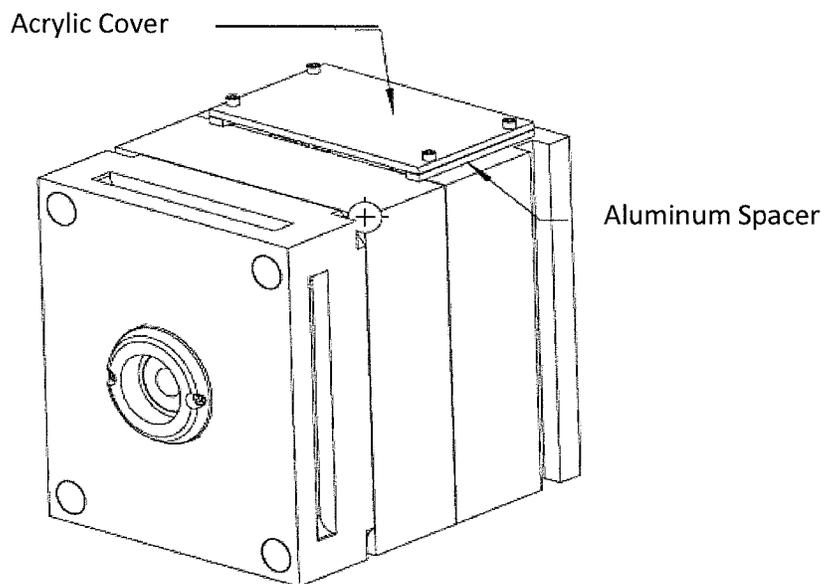
SECTION # **II & VI**

VIEW # **T**

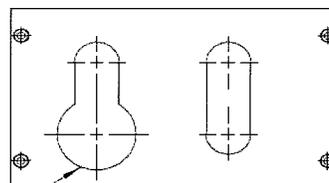
FILE:

DATE: Jan 17,2014

- * When an open end of the box faces the "TOP OF MOLD", a cover is required. This will keep dirt and other objects from falling into the ejectors.
- * Not required with hydraulic ejection.
- * Cover requirements are:
 - 1) a 6.0mm thick acrylic cover.
 - 2) Spacer between the acrylic cover and the rails will require a 6.0mm thick aluminum plates. This is to prevent rubbing between the ejectors plates and cover.
 - 3) Equal Clearances are required as needed for water pipes, connectors, limit switches. (Not to be excessive to allow anything to fall in)
 - 4) Top & bottom of the cover must overlap onto the steel.
 - 5) Spring washers behind the screw head to prevent the screws from backing out.
 - 6) NO WASHERS ARE ALLOWED TO BE USED.



Slots may be needed for water pipes , fittings , transducer, etc.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: VII COOLING SYSTEMS

SECTION # VII

VIEWS A-F

FILE:

DATE: May 22, 2012

This section outlines the basic construction expectations of the **CAVITY and CORE COOLING SYSTEMS**.

Specific views shown on the following pages are:

A) COOLING SYSTEM REQUIREMENTS	88
B-1) WATERLINE CONNECTORS & EXTENSIONS	89
B-2) WATER CONNECTORS - DETAILS	90
B-3) WATER LINE - HOSES	91
C) WATERLINE ROUTING	92
D) WATERLINE BAFFLE	93
E) O - RINGS	94
F) WATER MANIFOLDS	95

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **COOLING SYSTEM REQUIREMENTS**

SECTION # **VII**

VIEW # **A**

FILE:

DATE: Jan. 13, 2013

- If a cooling system begins leaking for any reason, it must not affect the tool electrical system in any way.
 - Cooling connectors are to meet molding site specifications for size and style.
 - All cooling system connectors must be on the non-operator side. Any deviation requires Tooling Engineer and molding site approval.
 - Only standard cooling connectors may be used.
 - Cooling channels should be equally divided, parallel to the tooling surface according to the equilateral triangle principal. The tool surface must be evenly cooled (within 5° C from hottest to coolest area). Must maintain the temperature with in the delta. when running continuous in production.
 - Each cooling circuit must achieve turbulent water flow.
 - The pressure drop in the cooling system must not exceed 35psi (2.5 bars).
 - Water system inlets and outlets must be clearly marked per SECTION II View G-2.
 - Cooling circuits are required in all lifter heads. All smaller lifter heads that do not have room for adequate water lines and non-steel lifter heads require cooling lines near by. See SECTION VIII View D2.
 - Lifter head cooling connectors must be standard and affixed to the ejector plates.
 - Hoses must be process temperature resistant without expanding.
 - When used, cooling manifold diameters must be 5 times the diameter of the largest cooling channel.
 - Maintain short cooling circuit lengths and avoid over use of jumpers between circuits.
 - Test each cooling circuit at mold process temperature for 1 hour with 70psi (5 bars) of pressure.
 - Pulse cooling can only be used with Tooling Engineer and molding site approval.
- * Below is the ideal cooling layout, Some condition may cause deviation such as actions & inserts.

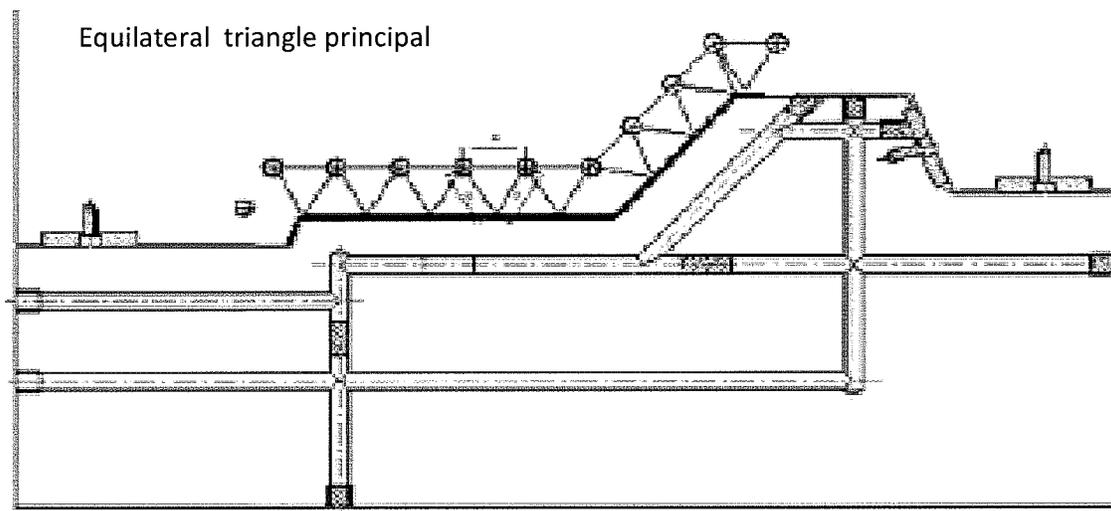
Minimum GPM "Gallons per Minute" for turbulent flow should be the following

1/4 NPT 1.5 GPM

3/8 NPT 2.0 GPM

1/2 NPT 2.25 GPM

Based on Reynolds number of 10,000



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

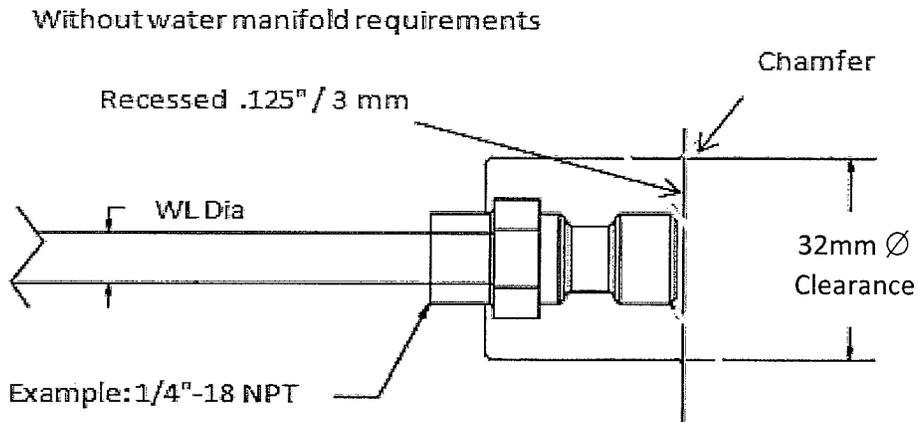
TITLE: **WATERLINE CONNECTORS and EXTENSIONS**

SECTION # **VII**

VIEW # **B-1**

FILE:

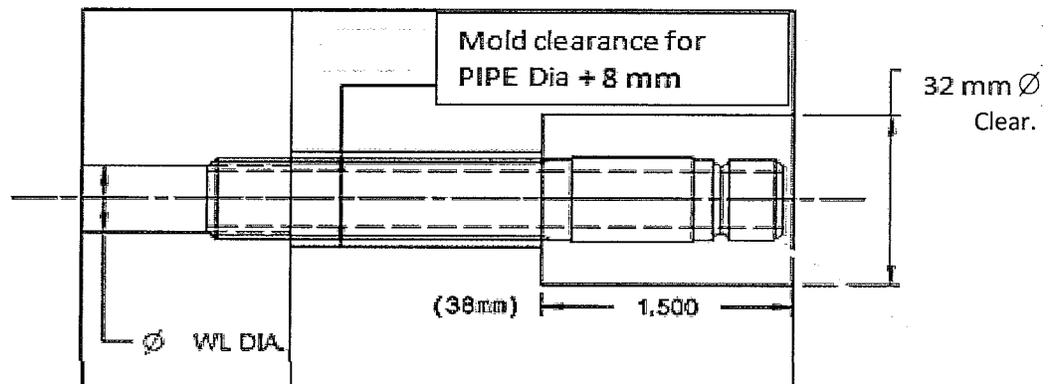
DATE: May 22, 2012



Note: North America will use English standard fittings (shown).

The EU and Asia will use metric standard fittings.

* Clearance according supplier specification, whichever is larger.



* Standard JCI minimum water line diameters are 7/16" / 12 mm. (This size may vary pending mold size) Any changes will require a JCI Tool Engineer approval.

* If plug connector is connected to a pipe it must be brazed.

* Verify adequate clearance to allow for mold clamps, tie bars, etc. to stay clear of all waterline connections and hoses.

* If water-cooled elements (inserts) are used inside or on top of the tool, Vertical discharge channels must be created to avoid tool or process disturbance.

* Use standard fittings. Parker fitting series - 200, 300 and 500. are to be used as base line.

* All fittings must be to the manufacturing site and press specifications.

* EU Doesn't require the water lines to be recessed when using over size clamp plates.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **WATERLINE CONNECTORS - Details**

SECTION # **VII**

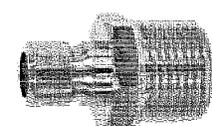
VIEW # **B-2**

FILE:

DATE: May 17, 2012

* Parker fittings are listed below, the Parker part numbers are listed.

PART DESCRIPTION	FITS HOSE I.D.	SOCKET WATER PASSAGE SIZE	PART NUMBER	USE WITH PLUG NUMBER
 STRAIGHT STEM SOCKET	1/4"	1/4"	PC-204-BP	PN-250, PN-251, PN-252, PN-253, PN-250F, PN-251F, PN-252F, PN-253F, BPN-250F, BPN-251F, BPN-252F, BPN-253F
	3/8"	1/4"	PC-206-BP	
	3/8"	3/8"	PC-306-BP	PN-351, PN-352, PN-353, PN-354, PN-351F, PN-352F, PN-353F, PN-354F, BPN-351F, BPN-352F, BPN-353F, BPN-354F
	1/2"	3/8"	PC-308-BP	
	1/2"	1/2"	PC-504-BP	PN-552, PN-553, PN-554, PN-556, PN-552F, PN-553F, PN-554F, PN-556F, BPN-551F, BPN-552F, BPN-553F, BPN-554F
	3/4"	1/2"	PC-506-BP	

PART DESCRIPTION	SERIES	PIPE THREAD SIZE NPT	MINIMUM PLUG I.D.	PART NUMBER	DIMENSION INFO			
					A	B	C	D
 MALE THREAD PLUGS BRASS & STAINLESS STEEL	200 Series	1/16"	3/16"	PN-250	11/16"	11/16"	1"	5/8"
		1/8"	1/4"	PN-251	11/16"	11/16"	1"	5/8"
		◆ 1/8"	1/4"	PN-251SS	11/16"	11/16"	1"	5/8"
		* 1/8" BSPT	1/4"	PN-251BSPT	11/16"	11/16"	1"	5/8"
		1/4"	1/4"	PN-252	27/32"	15/16"	1-3/16"	7/8"
		◆ 1/4"	1/4"	PN-252SS	27/32"	15/16"	1-3/16"	7/8"
		* 1/4" BSPT	1/4"	PN-252BSPT	27/32"	15/16"	1-3/16"	7/8"
		3/8"	1/4"	PN-253	1"	15/16"	1-1/4"	29/32"
		◆ 3/8"	1/4"	PN-253SS	1"	15/16"	1-1/4"	29/32"
	* 3/8" BSPT	1/4"	PN-253BSPT	1"	15/16"	1-1/4"	29/32"	
	300 Series	1/8"	15/64"	PN-351	1"	1-1/8"	1-7/16"	1-1/32"
		* 1/8" BSPT	15/64"	PN-351BSPT	1"	1-1/8"	1-7/16"	1-1/32"
		1/4"	3/8"	PN-352	1"	1-3/32"	1-7/16"	1-1/32"
		◆ 1/4"	3/8"	PN-352SS	1"	1-3/32"	1-7/16"	1-1/32"
		* 1/4" BSPT	3/8"	PN-352BSPT	1"	1-3/32"	1-7/16"	1-1/32"
		3/8"	3/8"	PN-353	1"	1-1/8"	1-7/16"	1-1/16"
		◆ 3/8"	3/8"	PN-353SS	1"	1-1/8"	1-7/16"	1-1/16"
		* 3/8" BSPT	3/8"	PN-353BSPT	1"	1-1/8"	1-7/16"	1-1/16"
		1/2"	3/8"	PN-354	1-3/16"	1-1/4"	1-9/16"	1-3/16"
	* 1/2" BSPT	3/8"	PN-354BSPT	1-3/16"	1-1/4"	1-9/16"	1-3/16"	
	500 Series	1/4"	3/8"	PN-552	1-3/16"	1-1/4"	1-9/16"	1-3/16"
		* 1/4" BSPT	3/8"	PN-552BSPT	1-3/16"	1-1/4"	1-9/16"	1-3/16"
		3/8"	.484	PN-553	1-3/16"	1-1/4"	1-9/16"	1-3/16"
		◆ 3/8"	.484	PN-553SS	1-3/16"	1-1/4"	1-9/16"	1-3/16"
		* 3/8" BSPT	.484	PN-553BSPT	1-3/16"	1-1/4"	1-9/16"	1-3/16"
		1/2"	5/8"	PN-554	1-1/4"	1-1/2"	1-11/16"	1-1/2"
		◆ 1/2"	5/8"	PN-554SS	1-1/4"	1-1/2"	1-11/16"	1-1/2"
	* 1/2" BSPT	5/8"	PN-554BSPT	1-1/4"	1-1/2"	1-11/16"	1-1/2"	
	3/4"	5/8"	PN-556	1-1/2"	1-9/16"	1-3/4"	1-9/16"	

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: WATERLINE Hose - Details

SECTION # VII

VIEW # B-3

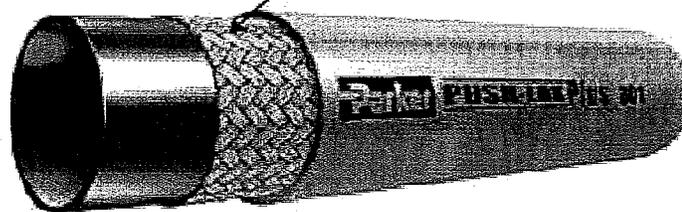
FILE:

DATE: May 17, 2012

* Parker Push Lok hoses are preferred.

801 PUSH-LOK *Plus* HOSE

SPIRALLY REINFORCED



Part No.*	Hose I.D.	Hose O.D.	Recommended Working Pressure P.S.I.	Minimum Burst Pressure P.S.I.	Minimum Bend Radius In.
801-4	1/4"	.50	350	1000	2-1/2"
801-6	3/8"	.63	350	1000	3"
801-8	1/2"	.78	300	1000	5"
801-10	5/8"	.91	300	1000	6"
801-12	3/4"	1.03	300	1000	7"
801-16	1"	1.28	200	700	10"

TEMPERATURE RANGE:

- Petroleum base hydraulic fluid, lubricating oils and anti-freeze solutions -40°F to 257°F (-40°C to +125°C)
- Diesel fuels -40°F to 257°F (-40°C to +125°C) with HY fittings only.
- Water, water/oil emulsion and water glycol fluids up to 185°F (85°C)
- Air up to 158°F (70°C)

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **WATERLINE ROUTING**

SECTION # **VII**

VIEW # **C**

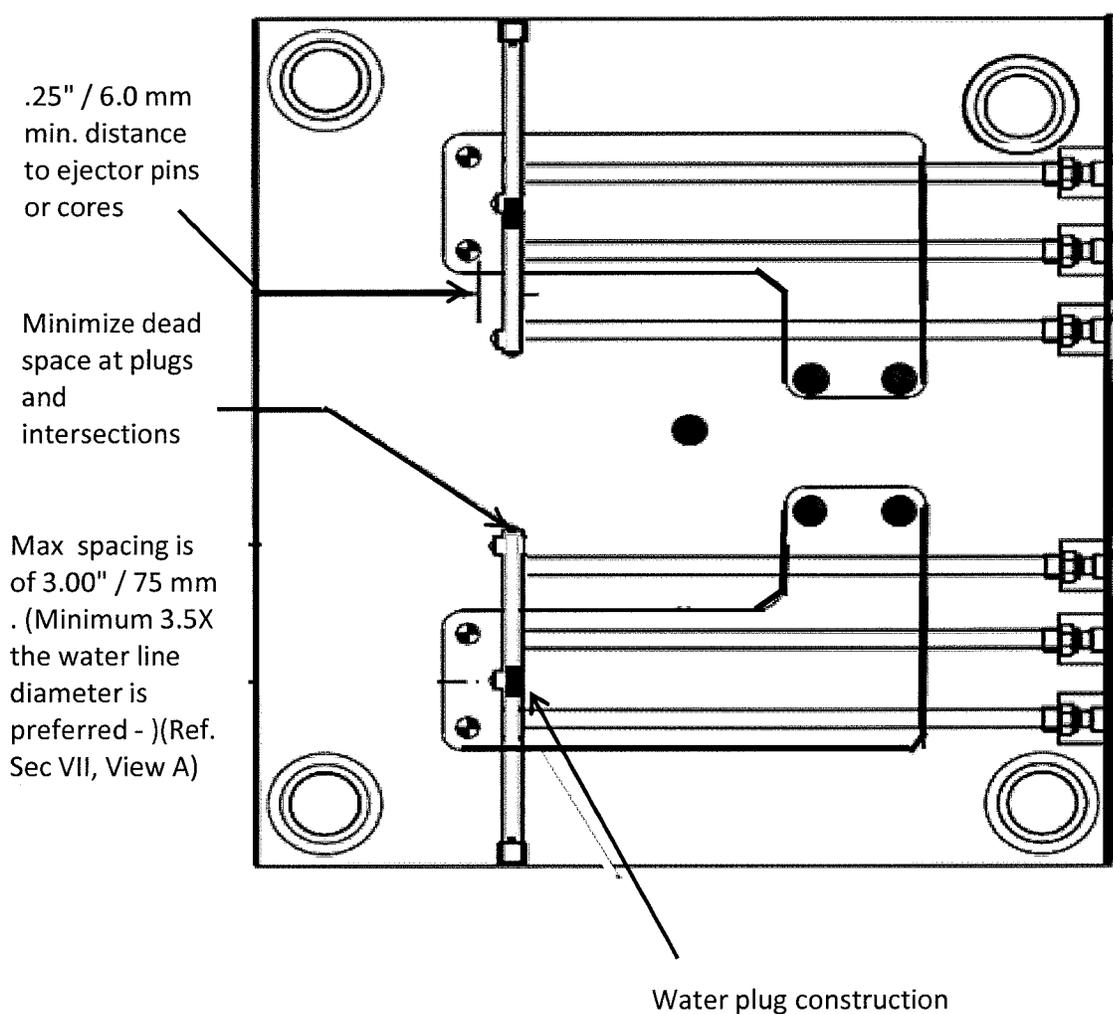
FILE:

DATE: Jan. 13, 2013

- *Cooling line locations & spacing are to be primarily dictated by ability to maximize water flow thru the mold and ability to rapidly cool the part, Ref. Sec VII, View A (i.e.. More water is better)
- * All fittings should come out on the Non -operator side or bottom of mold.
- * Water line patterns to be equivalent for each cavity (if multi - cavity mold).
- * Multiple circuits to be plumped in parallel (Depending use of manifold)
- * No "O" rings unless no other option exists, (If "O" rings are needed , then VITON Rings are required).

Shown water on Non operator side.

TOP OF MOLD



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **WATERLINE BAFFLE**

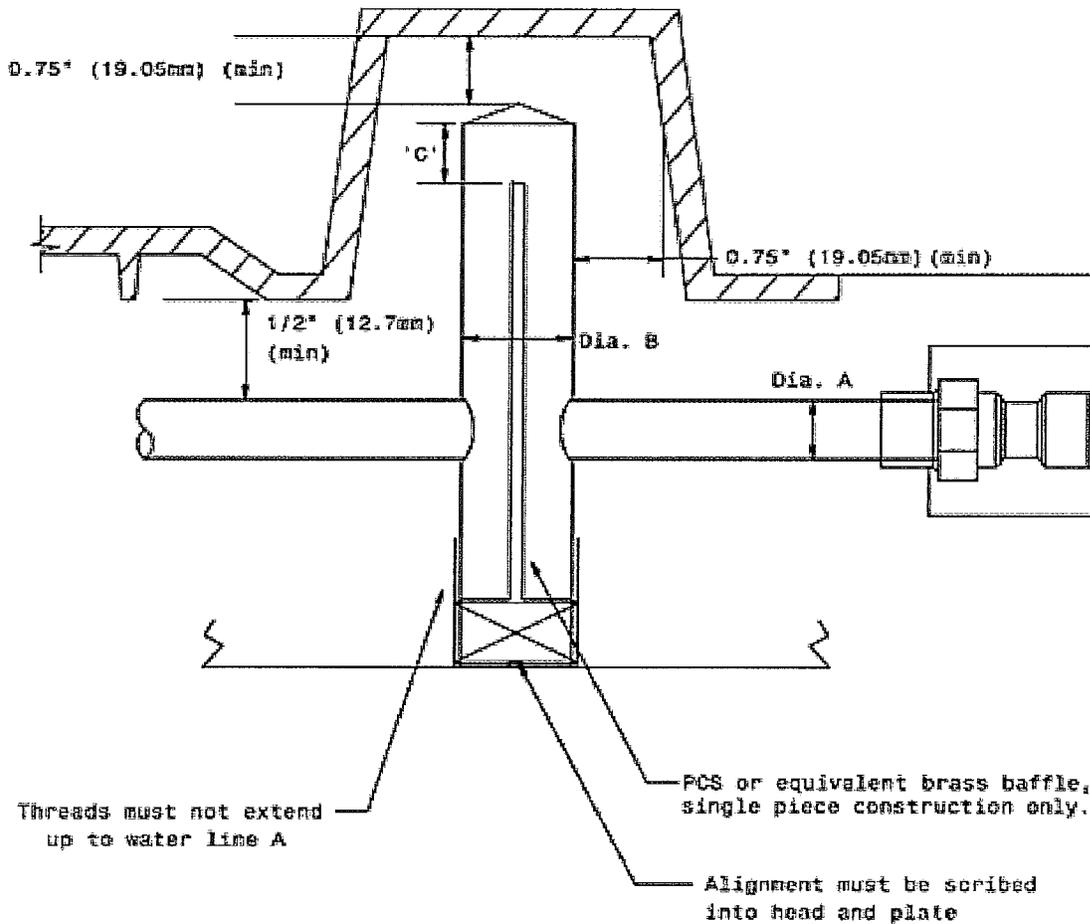
SECTION # **VII**

VIEW # **D**

FILE:

DATE: April 14, 2014

- * Water line baffles are preferred
- * Cooling circuit is the preferred method.
- * Baffles are not preferred and needs TE approval in case of, dont exceed more than 6 baffles in one circuit.
- * Diameter "B" should be at least (1.4 x) pipe thread size larger than Diameter "A".



(DME Standard sizes below, Refer to Supplier specifications , but must equivalent)

Plug Size	C Dimension
1/8	0.12
1/4	0.17
3/8	0.21
1/2	0.26
3/4	0.35
1	0.42

Plug Size	C Dimension
3.0 mm	3.0 mm
6.0 mm	4.0 mm
9.0 mm	5.0 mm
12.5 mm	7.5 mm
18.5 mm	9.0 mm
25.0 mm	10.0mm

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: O - RINGS

SECTION # VII

VIEW # E

FILE:

DATE: Jan. 13, 2013

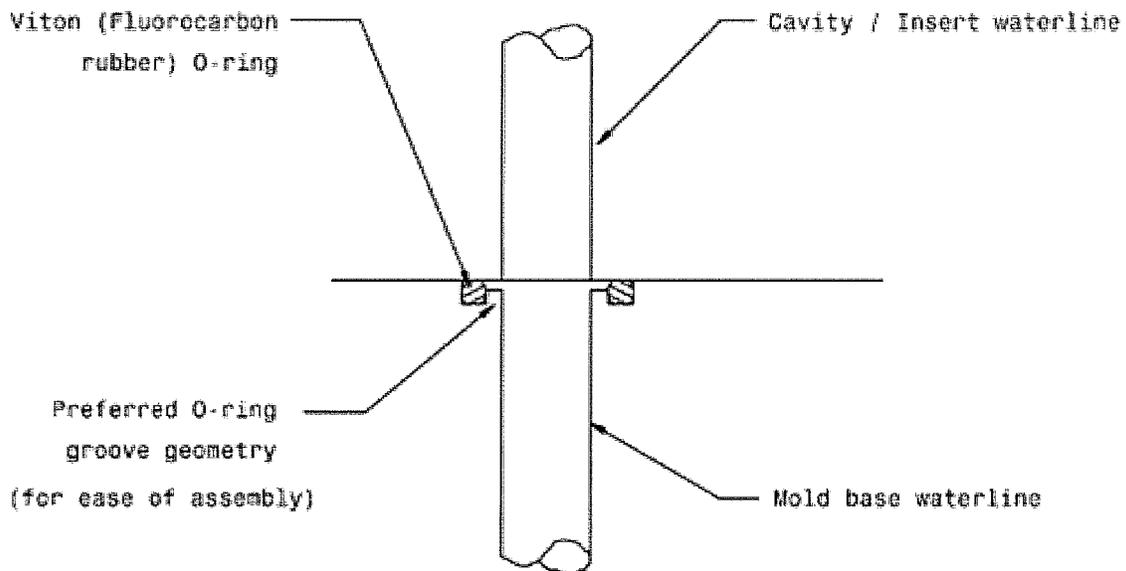
The use of O - Rings must be approved by the JCI tooling Engineer and molding site.

* When O-Rings are needed. they are to be used on all interfaces which have water channels crossing through them as shown below.

* Note - O-Rings are not preferred, and alternative methods should be used when ever possible.

* O- Rings when being used, Can be used on the bottom of a flat pocket only. Not on any vertical or shaped walls.

* Always use Viton O-Rings.



*Groove dimensions must be to the vendors specs.

*O-rings directly in compression
(no possibility of shearing O-ring during assembly)

All O-rings must be replaced upon disassembly - do not re-use.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **WATER MANIFOLDS**

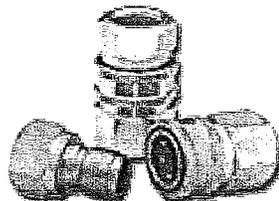
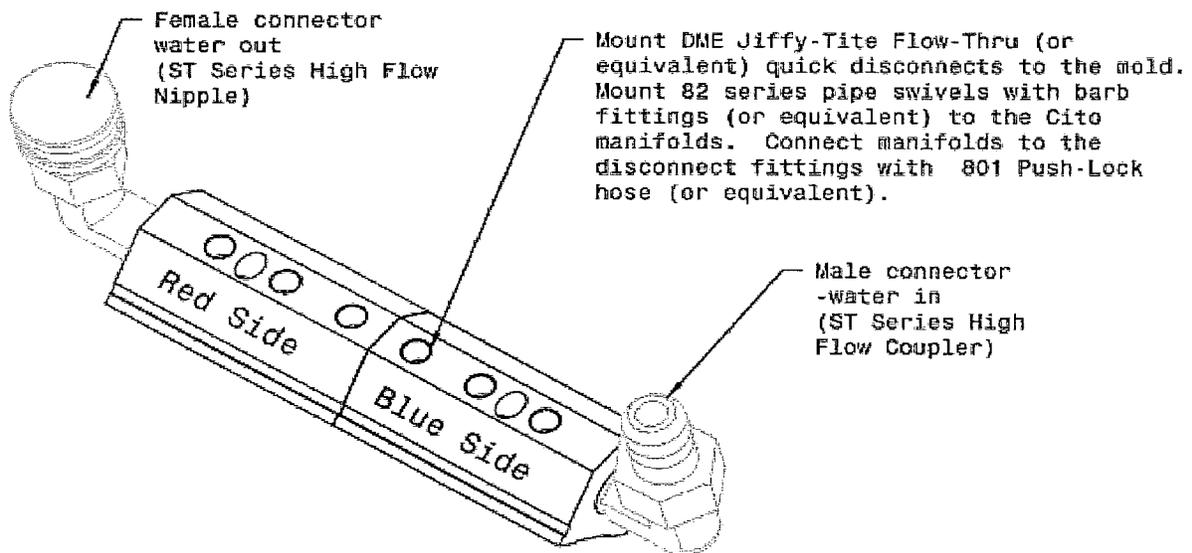
SECTION # **VII**

VIEW # **F**

FILE:

DATE: June 15, 2012

- Water manifolds are required on all tools running in presses of 500 ton and above.
- Cito type divided manifolds are preferred. Any deviation needs a JCI Tool Engineer approval.
- Manifolds mounted on the bottom of the tool should be piped to the non-operator side.
- Manifolds must be protected from incidental contact with the press or other objects.
- Manifolds may be required on smaller tools at the Tooling Engineer or molding sites request.
- Molding site to verify manifold sizes during tool design phase. needs Tool Engineer approval.
- * The manifold must fulfill the requirements .
- * All fittings must be to the manufacturing site and press specifications.



CITO TYPICAL MANIFOLD SIZES			
Press Size	Manifold Series	Parker Conector - Out	Parker Connector - In
500 to 1500	IM6	BST-10	BST-N10
Above 1500	IM8	BST-12	BST-N12

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **VIII SLIDES / LIFTERS**

SECTION # **VIII**

VIEWS **A-F**

FILE:

DATE: April 10,2014

This section outlines the basic construction expectations of the **SLIDES** and **LIFTER** details and features.

Specific views shown on the following pages are:

A-1) TYPICAL CAM SLIDE NOTES	97
A-2) TYPICAL CAM SLIDE DESIGN REFERENCE	98
B) CAM SLIDE WITH INSERTED HEEL BLOCK	99
C-1) TYPICAL LIFTER & ROD - NOTES	100
C-2) TYPICAL LIFTER ROD - DESIGN REFERENCE	101
D) ANGLED LIFTER RETAINER	102
E) PURCHASED LIFTERS	103
F) LIFTER WATER LINES	104

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TYPICAL CAM SLIDE NOTES**

SECTION # **VIII**

VIEW # **A -1**

FILE:

DATE: Jan. 13,2014

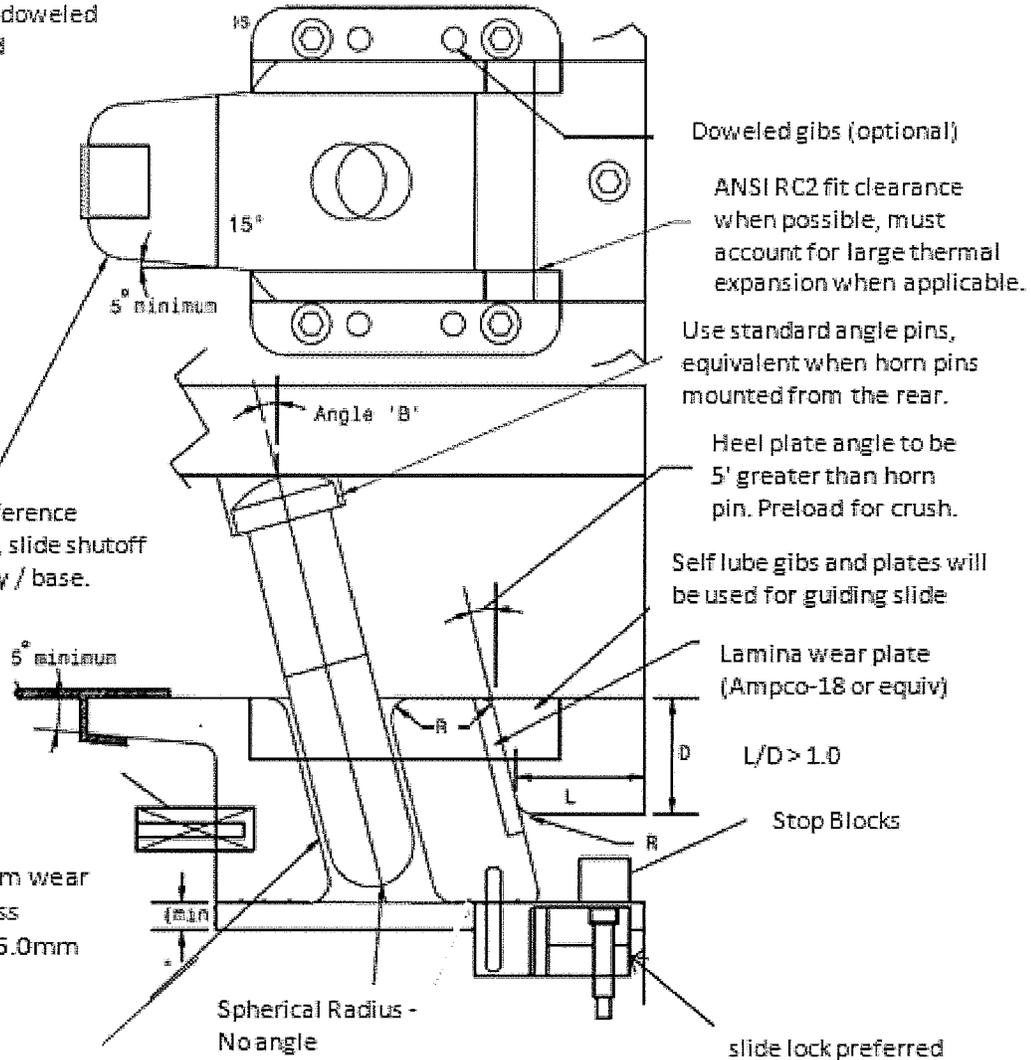
- * All components need to be standard - nominal sizes. No grinding to fit. Example: 6.5 mm wear plates are not ground down to 5.8 mm.
- * Slides must be removable from the tool without complete disassembly of the tool.
- * Slides are to have a medium duty spring (max 36% compression) and a detent to retain the slide in the open position regardless of tool orientation , - Cage style or a guide pin to support the spring are optional . Note: Spring preload force to be greater than 2x slide weight. Internal & external return springs for slide return Must be approved by a Tool Engineer. To insure the safety of the slide to be in the open position. 2 types of components are required on all slides , spring & detent.
- * Vent slides (and Lifters) whenever possible.
- * Leader pins must engage into the tool 25 mm prior to the horn pin engaging into the slide.
- * Water is required in the slide whenever possible.
- *No ejector action under the slide (suicide slide) without a JCI Tool Engineer approval.
- * If ejection must be placed under the slide. "Positive Ejection Returns" are required. With limit switches.
- * Nose tips/ insert of the slide are to be replaceable - keyed or doweled for location. Slide detail should be inserted for replace-ability on molds with annual production volumes above 100,000 - or the slide face contains fragile details - or ejection exists under the slide face - or- damage is expected to the slide face.
- * All components / Pocket must be " ID" with "Tool # " and " Location"
- * ID slide for, Location, material type & hardness and weight over 50lbs / 30 kgs.
- * 10Rc difference between the slide shutoff and the cavity base are required. (Not when using hardened steels).
- * HEEL /PLATE NOTES: - angle is required to be 5° greater than the horn pin, - preloaded for crush, - plate will be recessed 90% into the slide to absorb slide and slider forces , the wear plate must have a different hardness and composition than the slider / tool. -Lamina wear plates (Ampco-18 or equivalent) will be used.
- * Self lube gibs and plates will be used for guiding the slide. (EU only)
- * Grease grooves are required in the bottom of the slide, when graphite plates are not used.
- * Wear plates are to be 6.0 mm Thickness minimum.
- * Positive stops locks are required, (Preferred Superior Brand or equivalent, purchased not homemade.)
- * Spherical radius required at the end of the horn pin (No angles)
- * Notes for deceleration -
 - Angle "A " (deceleration) Max = 10 degrees.
 - Angle "B " (horn pin) Max = 22 degrees
 - The combination of "A" and "B" is not to exceed 22 degrees. ("A" + "B" = 22 degrees)
- * **All deviations must be approved by the JCI Tool Engineer.**

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE:	TYPICAL CAM SLIDE DESIGN REFERENCE	
SECTION # VIII	VIEW # A-2	FILE: DATE: Jan. 13,2014

* Design reference and notes.

Replaceable nose tips,
keyed or doweled
preferred



10 Rc difference
between, slide shutoff
and cavity / base.

Minimum wear
thickness
6.0mm

1.0mm to 1.5 mm
Clearance per side

Doweled gibs (optional)

ANSI RC2 fit clearance
when possible, must
account for large thermal
expansion when applicable.

Use standard angle pins,
equivalent when horn pins
mounted from the rear.

Heel plate angle to be
5° greater than horn
pin. Preload for crush.

Self lube gibs and plates will
be used for guiding slide

Lamina wear plate
(Ampco-18 or equiv)

$L/D > 1.0$

Stop Blocks

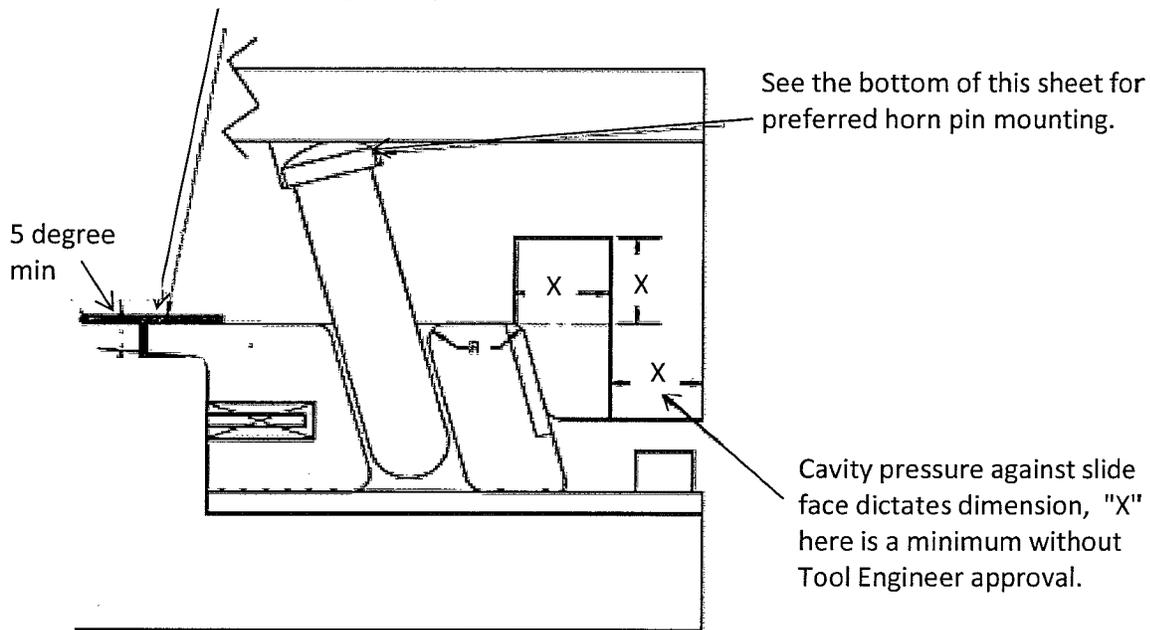
slide lock preferred

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

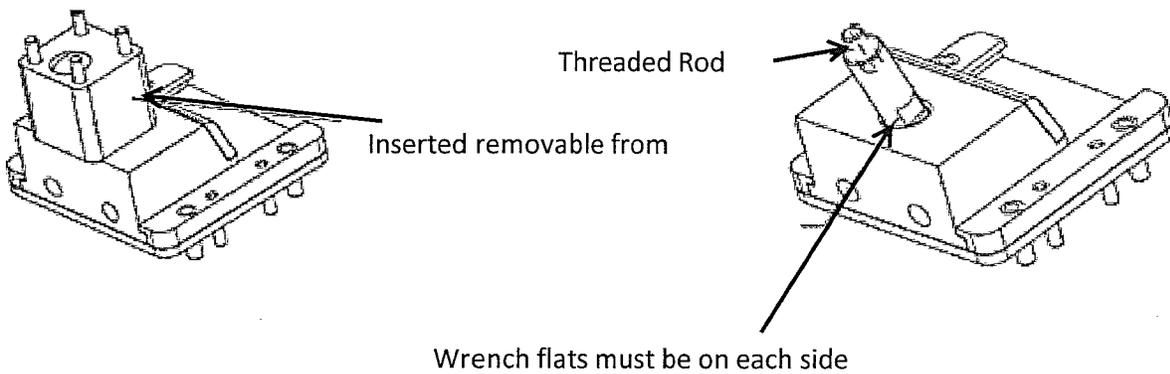
TITLE: CAM SLIDE WITH INSERTED HEEL BLOCK			
SECTION # VIII	VIEW # B	FILE:	DATE: June 15, 2012

** PLEASE referee to Sec VIII, View A-1 & A-2, for additional requirements pertaining to slides.
 * All information contained in view, applies to this page except where superseded by information displayed below.

Nose tips/ insert of the slide are to be replaceable - keyed or doweled is preferred. Slide detail should be inserted for replace-ability on molds with annual production volumes above 100,000 - or the slide face contains fragile details - or ejection exists under the slide face - or- damage is expected to the slide face.



PREFERRED HORN PIN MOUNTING STYLES



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **TYPICAL LIFTER & ROD NOTES**

SECTION # **VIII**

VIEW # **C-1**

FILE:

DATE: April. 14, 2014

TYPICAL LIFTER CONSTRUCTION TECHNIQUE FOR CUSTOM LIFTERS

- * Machined lifter heads and harden rod are preferred design.
- * Note: Spring steel lifters are not an option, unless approved by the JCI Tool Engineer and manufacturing site.
- * Vent lifters whenever possible.
- * Large lifters should have (2) rods for stabilization.
- * Medium (blue) Loctite required on all lifter bolts.
- * Do Not include return springs on tools with pocketed lifters.
- * Purchased cars / carriers for lifters , or they can be manufactured by the tool supplier. Use a standard component /options that meet the requirements for manufacturing.
- * All Steel angle / straight lifter heads need to be cooled, otherwise AMPCO heads are options to be used with proper cooling lines around them.
- * Cooling channels must be drilled near by the lifter . Review with JCI Tool Engineer.
- * Bearing surface of a lifter head - 25% engagement with water in the lifter head , - 75% engagement without water in the lifter head. - Lifter head is to be relieved .02"-.04" / .5 mm - 1.0mm dp after engagement .
- * All angle lifter heads must have the possibility to be disassembled at the ejector plates and ejection position. (Clearance access hole through the clamp plate)
- * All access holes may need cover plates for Mag platens - Review with the manufacturing site and Tool Engineer to supply press specifications.
- * All bushing are to be bronze - No steel bushings. The bushing is to be with in 25 mm of the lifter head pocket and as long as possible. Secured in with a S.H.C.S (socket head cap screw)
- * All rods are made from harden shaft of 62 Rc. (Thompson Shaft for NA).
- * Rod / shaft 25 mm diameter is the minimum. Smaller must be approved the JCI Tool Engineer.
- * Rod & car/carrier fit -"Tight fit "- with one side keyed with 4 mm flat on the shaft. Buried 5 mm into the car / carrier body at 0 to 90 degrees to the dowel.
- * All lifter heads are to be doweled with a Roll Pin.
- * Minimum shut off requirement - flat shutoffs is 5 mm
- * Lifter / pockets are to be 1-5 degrees more than the lifter angle, (preferred is 5 degrees).
- * Pre load of lifters in there home position. Recommended.

Pre - Load	Tonnage
0.003	500T >
.003 - .005	500T - 1200T
.005 - .008	1200T <

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

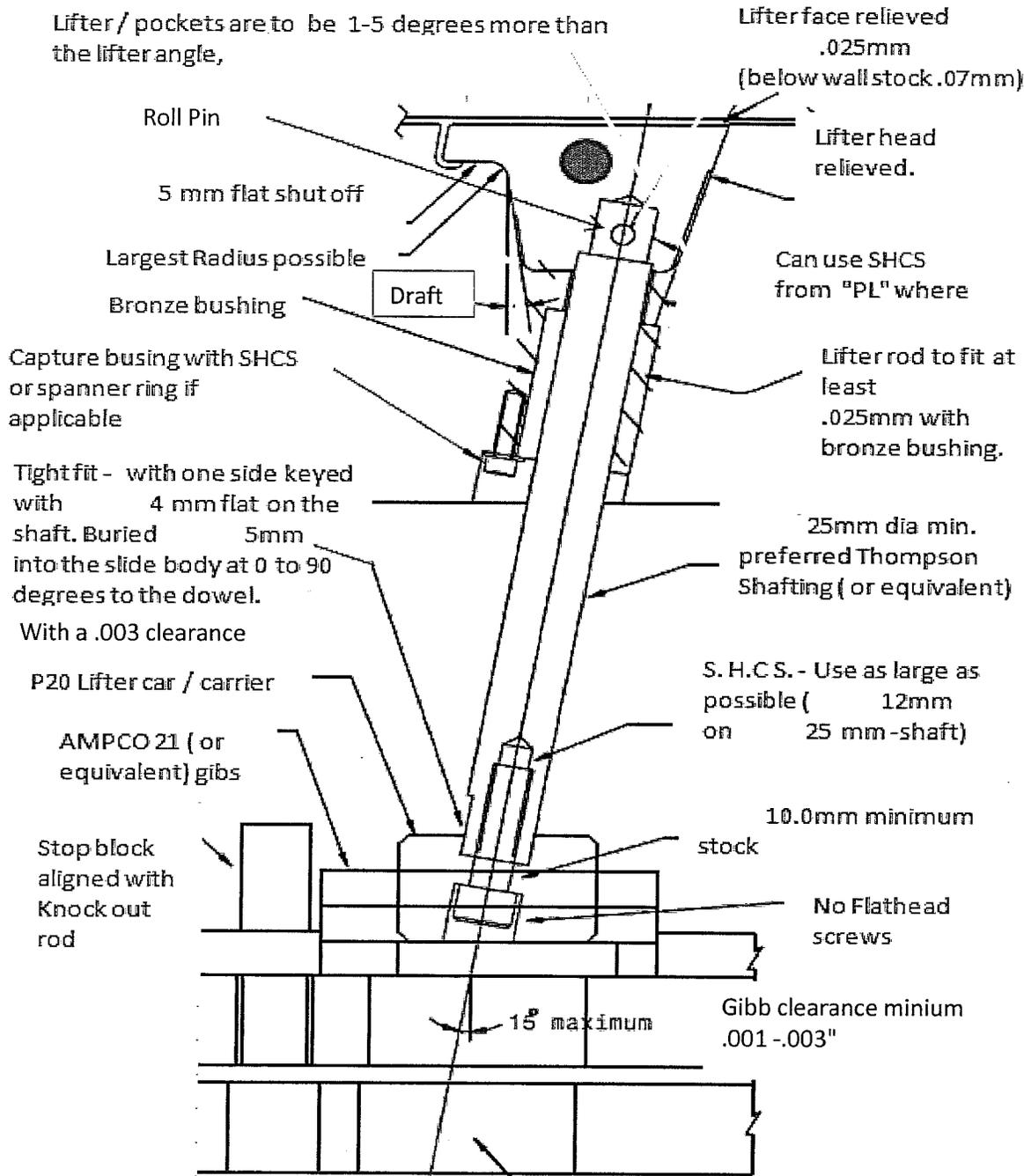
TITLE: **TYPICAL LIFTER ROD DESIGN REFERENCE**

SECTION # **VIII**

VIEW # **C-2**

FILE:

DATE: April 23, 2014



SHCS access hole, must have enough clearance to remove the SHCS without disassembly of the tool.

* All access holes may need cover plates for Mag platens - Review with the manufacturing site and Tool Engineer to supply press specifications.

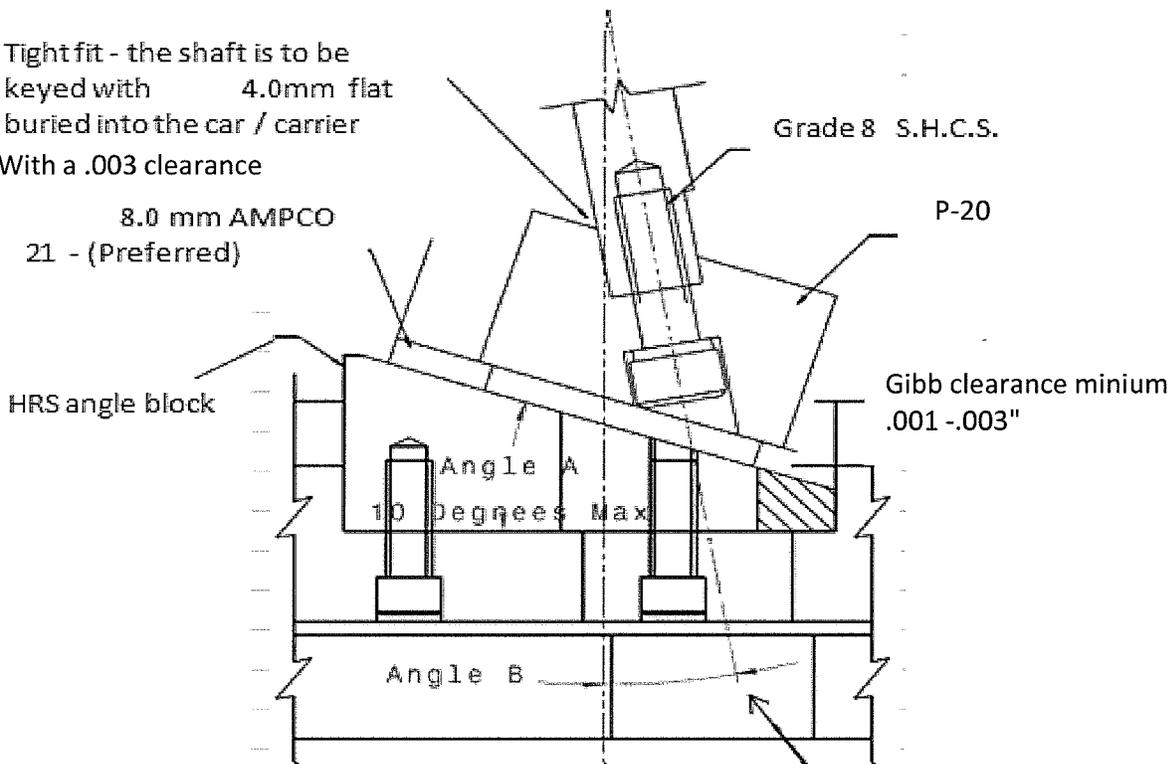
JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: ANGLED LIFTER RETAINER			
SECTION # VIII	VIEW # D	FILE:	DATE: April. 23, 2014

- * Angle "A" Maximum = 10 degrees
- * Angle "B" Maximum = 15 degrees
- (Total lifter angle combination Angle "A" + Angle "B" can not be greater than 15 degrees.)
- * If the total angle exceeds the 15 degree, special mechanics must be used.
- * DME Vector form systems are to be used whenever feasible. - All others must be approved by the JCI Tool Engineer on a case by case basis, depending on the room in the tool. (Pillar supports may be affected or other actions)
- * Use standard components that can be applied to these applications.
- * In case a bigger angle is required, the use of double forced guiding is required.

Tight fit - the shaft is to be keyed with 4.0mm flat buried into the car / carrier
With a .003 clearance

8.0 mm AMPCO
21 - (Preferred)

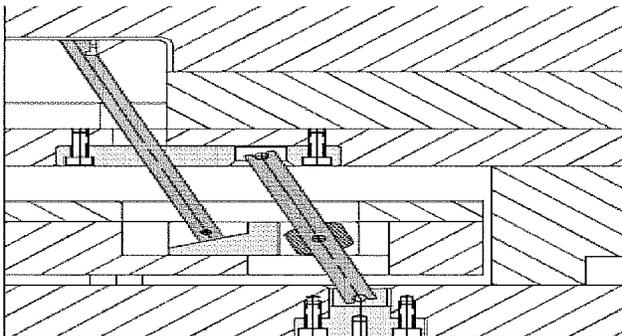


HRS angle block

Angle A
10 Degrees Max

Gibb clearance minium
.001 -.003"

Angle B



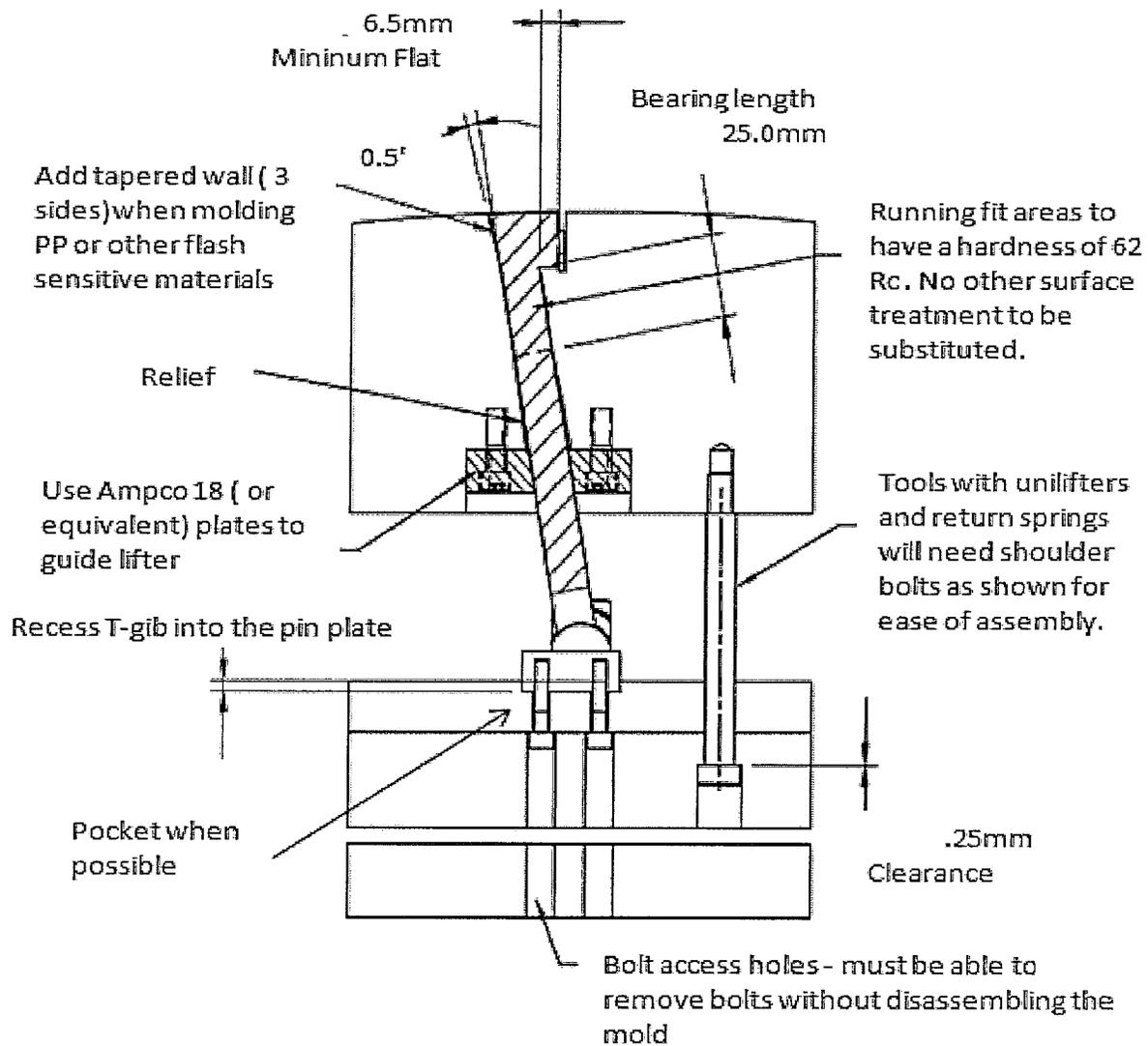
SHCS access hole, must have enough clearance to remove the SHCS without disassembly of the tool.

Reference Only for double force guiding system, For angles greater than 15 degrees

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: PURCHASED LIFTERS			
SECTION # VIII	VIEW # E	FILE:	DATE: Jan. 13,2014

- * Progressive Unilifters (or equivalent) must be a standard component.
- * All components / Pocket must be " ID" with "Tool # " and " Location"
- * ID slide / lifter for, Location, material type & hardness and weight over 50lbs / 30 kgs.
- * Reference the recommended specification when installing these components.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **LIFTER WATER LINES**

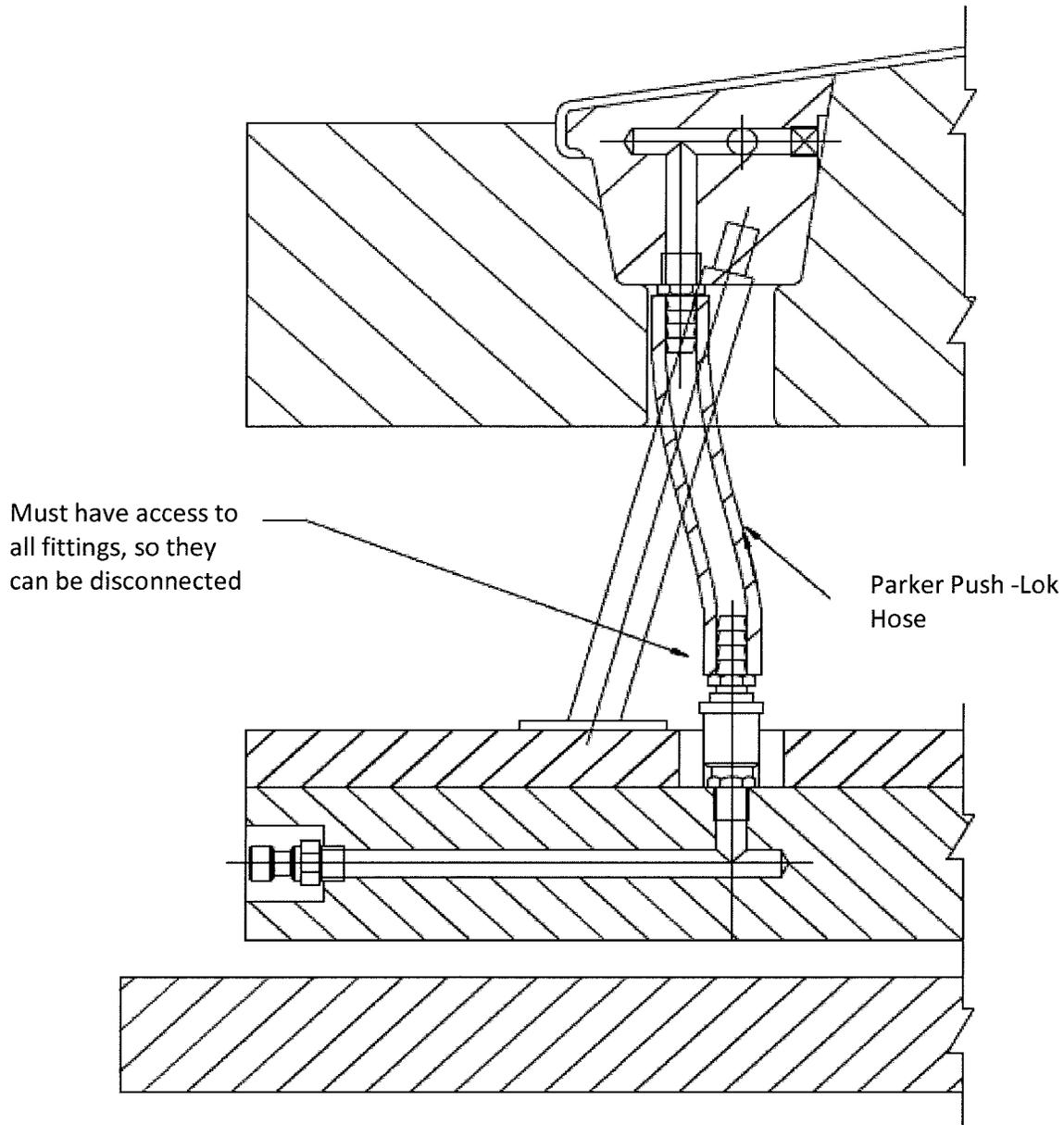
SECTION # **VIII**

VIEW # **F**

FILE:

DATE: May 24, /2012

- * Water must be in all lifters whenever possible (and slides) (Sec VIII, View D-1)
- * Must have access to all fittings, so they can be disconnected by hand- without complete tool disassembly.
- * Parker Push -Lok hose
- * Hose clamps are with temps above 60' C / 140' F.
- * Optional plumping using the ejector plate.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **IX CORE PULLS AND HYDRAULICS**

SECTION # **IX**

VIEWS **A-D**

FILE:

DATE: Jan. 13,2014

This section outlines the basic construction expectations of any **HYDRAULICALLY** activated **CORE PULL**.

Specific views shown on the following pages are:

A) HYDRAULIC SLIDE	106
A-1) ADDITIONAL HYDRAULIC CORE NOTES	107
B) LIMIT SWITCH ASSEMBLY	108
C) MOLD SEQUENCE PLAQUE	109
D-1) LIMIT SWITCH CONNECTOR WIRING	110
D-2) LIMIT SWITCH CONNECTOR WIRING	111

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **HYDRAULIC SLIDES**

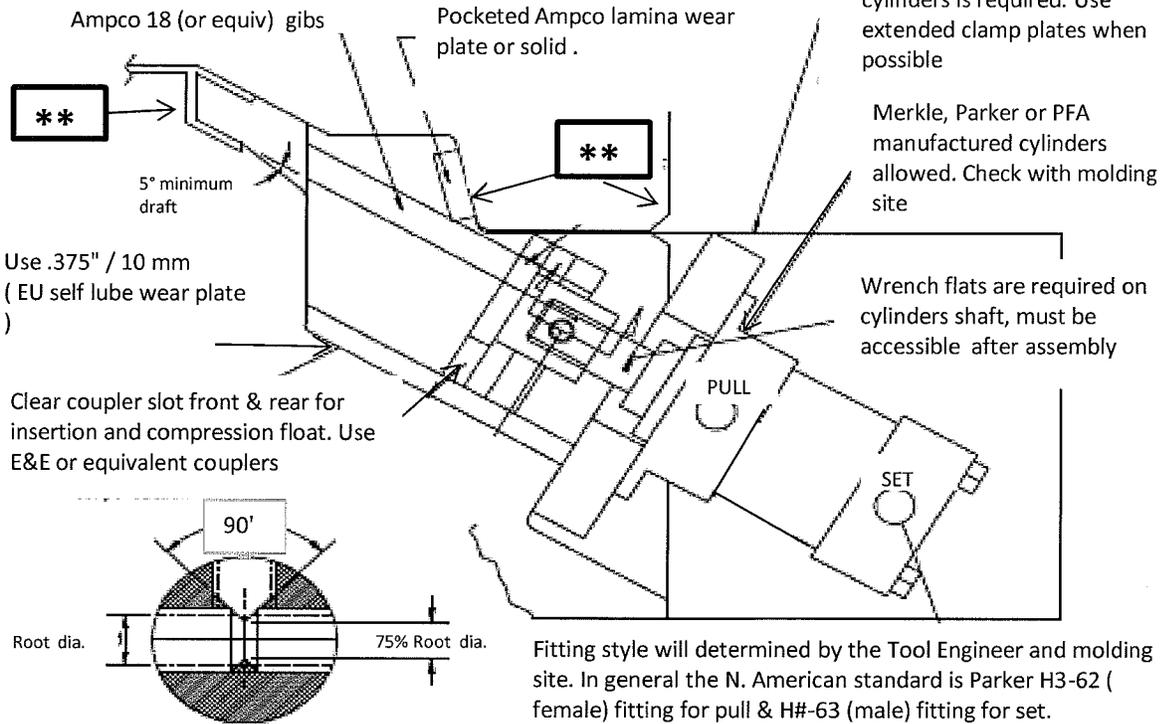
SECTION # **IX**

VIEW # **A**

FILE:

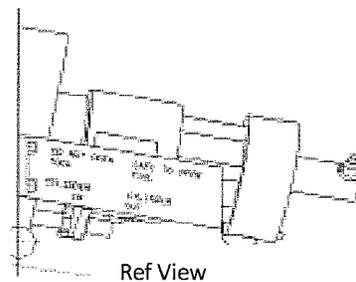
DATE: Jan.17,2014

- Deviations from this standard requires Tool Engineer and molding site approval.
- Main SET and PULL quick fittings to be located on the non-operator side
- Hydraulic lines to be incorporated in to mold base or plates when possible.
- Hydraulic lines cannot be in proximity to waterlines.
- Use quick connect fittings wherever possible to facilitate assembly.
- Use 3/8" steel braided hoses. (depending volume requirements / cylinder size)
- All fittings to be straight hydraulic threads (no "O" rings or pipe threads).
- All cylinders will be plumbed in parallel.
- Cushions are required when piston reaches the end of its travel by design.



Cylinder locking detail, use cone point set screw. No sharp corner at bottom of the "V" groove. Optional construction is drilled through the roll pin. Roll pin diameter is not to exceed 25% of the root diameter.

Internal slides must have an external indicator to show the slide position



All cylinders and components must be rated for a minimum of 3,000 psi (200 bar) constant load.
 - Assume available machine hydraulic pressure is 1,700psi (115 bar).

****** Assume plastic pressure is 7000 psi (480 bar). - Pressure on the part surface of the action - MUST have adequate support / heel to prevent action blow back.

Limit switches are required to detect the slide positions (Set & Pull) Not the cylinder shaft position.

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **ADDITIONAL HYDRAULIC CORE NOTES**

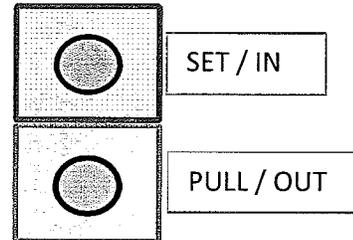
SECTION # **IX**

VIEW # **A-1**

FILE:

DATE: Jan. 13,2014

- No using black or galvanized pipe for hydraulic lines or fitting extensions.
- Hydraulic manifold blocks are to be color coded and labeled.
 - * BLUE - IN - male fitting - Labeled -
 - * RED - OUT - female fitting - Labeled -



- All hydraulic core pin carriers with 2 or more pins. Requires to have guides, 2 shoulder bolts or guide pins. To prevent deflection and gulling.
- All buried cores / slides that are non visible from the outside of the tool will require, limits switches and a labeled lighted box mounted to the operator side of the tool. See picture below.



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **LIMIT SWITCH ASSEMBLY**

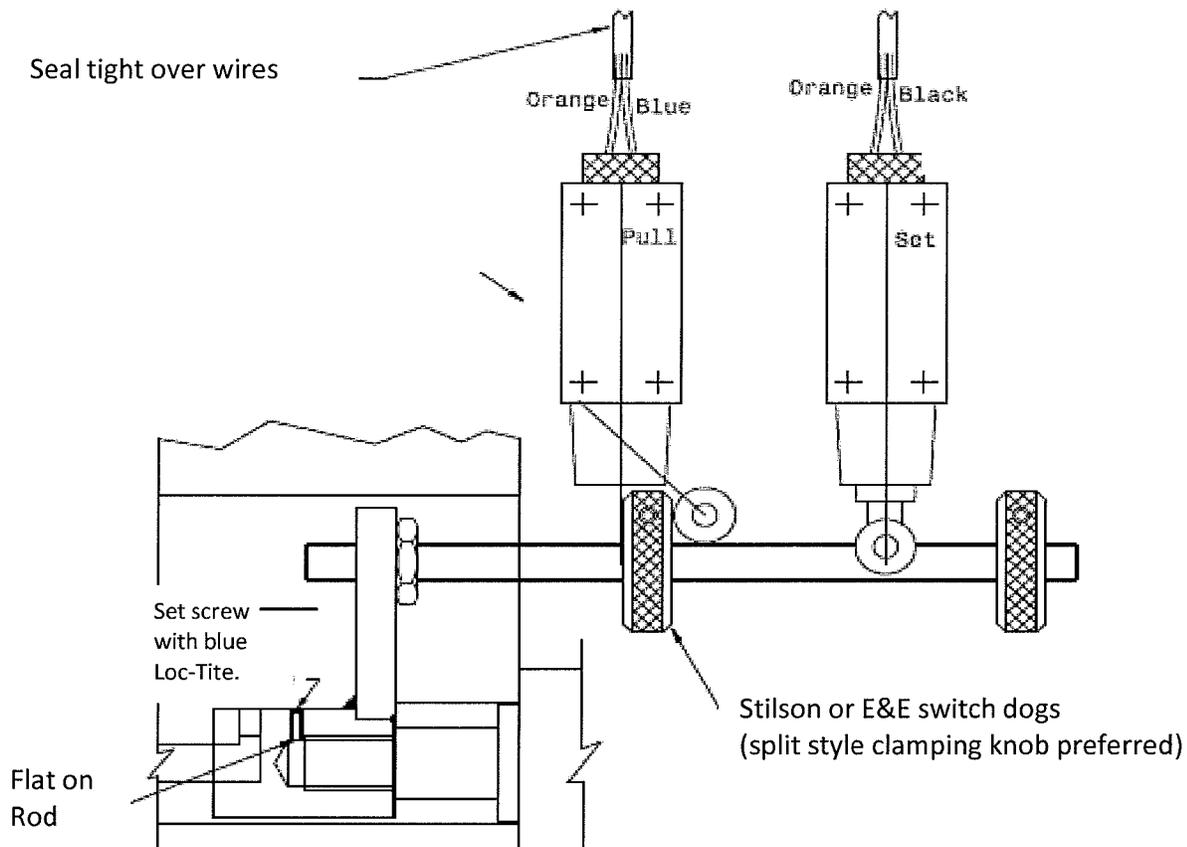
SECTION # **IX**

VIEW # **B**

FILE:

DATE: Aug 3, 2012

Note - Always follow plants specifications, * EU requires 3 wire connections.



- Limit switches are required on all slides, ejection, and core pulls.
- Inside or buried slides must have an LED detection sensor. Must be visible from the outside of the tool.
- The tool supplier is required for wiring and final adjustment of the limit switch actuations.
- Two Balluff or Allen Bradley 802T ALP limit switches are required for each core pull or hydraulic cylinder.
- Honeywell or Telemacanique #XCM A102 plunger micro switches are acceptable with Tooling Engineer and molding site approval. Add anti-vibration material under the micro switch .

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **MOLD SEQUENCE PLAQUE**

SECTION # **IX**

VIEW # **C**

FILE:

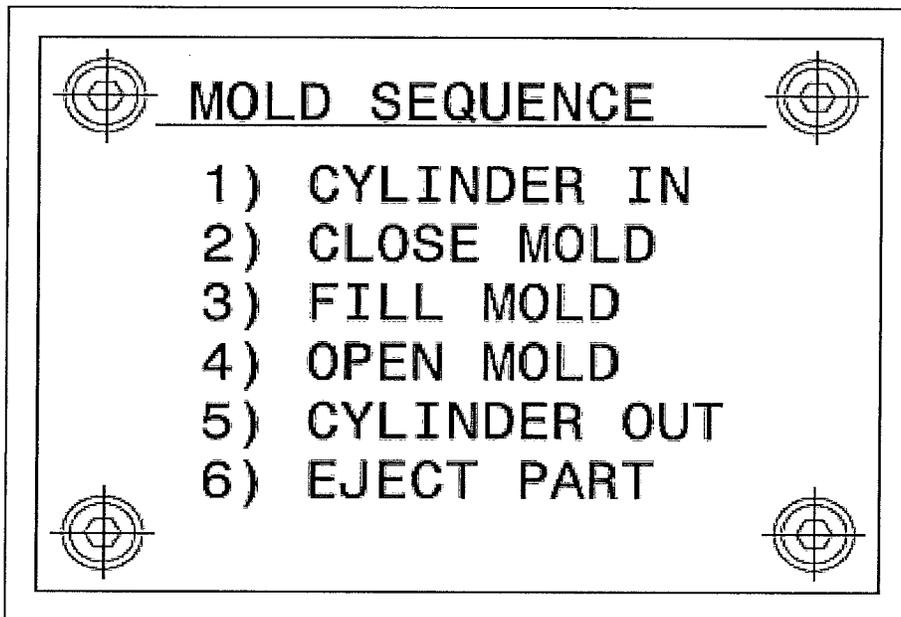
DATE: Aug 3, 2012

Reference view of a sample aluminum plaque. (to be recessed & staked or screwed on the operator side of mold) Except on molds with oversize clamp plates.

Note that the specific sequence for the events will be unique to each mold and should be established by the Mold Designer and Tool Engineer.

Native languages on the plaque for country the tool is going to run in.

Example Shown



- Sequence plate required on all tools with cylinders and non-standard action sequences.
- .250" (6.00mm) high letters are preferred (plate size can vary but plaque must be legible).

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **LIMIT SWITCH CONNECTOR WIRING**

EURO MAP 13

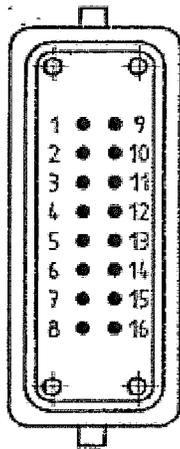
SECTION # **IX**

VIEW # **D -1**

FILE:

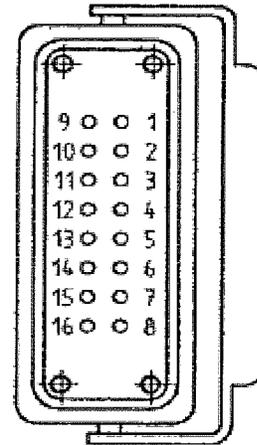
DATE: Aug 3, 2012

* Always follow press specifications at the manufacturing site, other connectors may be required.



Plug on the core pullers

● = pin
○ = socket



Plug on the injection

Table 1: Plug contact assignment

Plug contact No	Signal designation	Description
1 – 4	Power supply	Positive voltages
5 – 8	Reference potential	Ground
9	Core 1 retracted	The signal is delivered to the plug contact if core 1 is retracted.
10	Core 1 is in	The signal is delivered to the plug contact if core 1 is in the mould.
11	Core 2 retracted	The signal is delivered to the plug contact if core 2 is retracted.
12	Core 2 is in	The signal is delivered to the plug contact if core 2 is in the mould.
13	Ejector is back	The signal is delivered to the plug contact if ejector is back.
14 – 16		Not assigned.

- Before designing more than core pullers. Verify that the molding site molding machine is capable of handling the additional plugs.
- Always wire multiple limit switches in series.
- Use 14 or 16 gauge, oil resistant wiring for limit switches.
- * Always wire to plant / press specifications. Review with manufacturing site & Tool

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **LIMIT SWITCH CONNECTOR WIRING**

EURO MAP 13

SECTION # **IX**

VIEW # **D-2**

FILE:

DATE: Jan.13,2014

1. SCOPE AND APPLICATION

This EUROMAP recommendation defines the connection between the injection moulding machine and the core pullers. This is intended to provide interchangeability.

The connection may be used for two core pullers only. In case of further core pullers another plug has to be applied.

2: DESCRIPTION

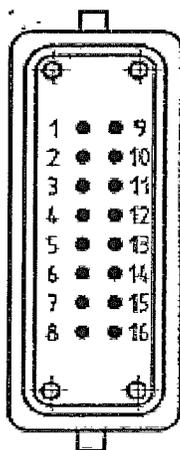
The plug is suitable for potential-free contact of limit switches as well as for proximity switches. Reference potential and power supply of 24 V, direct current is available (see table 1).

The range of signal voltages is +24 V \pm 20 % d.c. All signals are continuous signals, capable of driving a maximum of 50 mA.

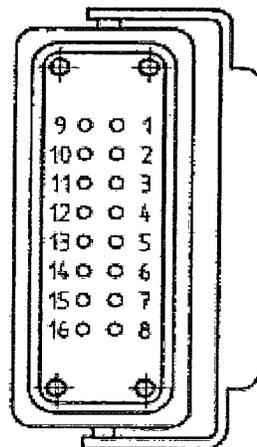
3. PLUG AND SOCKET OUTLET

The connection between the injection moulding machine and the core pullers is achieved by the plugs specified below ¹⁾. The female side of the plug is fitted to the injection moulding machine.

Arrangement of pins and sockets viewed from the mating side (opposite the wiring side).



Same as
View D-1



JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **X ENHANCED - REVISION REQUEST FORM**

SECTION # **X**

VIEWS **A**

FILE:

DATE: Jan. 15,2014

This section outlines the basic construction expectations of a **REVISION REQUEST** to the standards, for the tooling standards

Specific views shown on the following pages are:

A) REQUEST FORM 113

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **ENHANCED / REVISION REQUEST FORM**

SECTION # **FILL IN**

VIEW # **FILL IN**

FILE:

DATE: **YOUR DATE**

All of the requests for updates, enhancements, or revisions to the JCI / JCIIM tooling standards should be submitted on this form. Photocopy or attach your request below, or provide a sketch of the requested change in the space provided. Submit your request to Frank Quillen (Frank.Quillen@jci.com). Your request will be logged, and a copy returned to you with a tracking number. If you do not receive the return copy within 5 business days you should consider your request lost, and are encouraged to resubmit. All submitted requests will be reviewed at the next scheduled tooling standards meeting. If the request is approved, it will be included in the subsequent release of that document. All requests must be submitted electronically, and all appropriate documentation and illustrations must be provided before a request will be logged, and a tracking number issued.

Requested By: **YOUR NAME and / or Supplier**

Tracking Number: **FOR FRANK QUILLEN ONLY**

Important Note: All request need to be in by October 1st, and reviewed with the Advance Manufacturing Engineers from EU, Asia and NA for approval. (As to any changes will be affected globally).

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **XI TOOL DRAWINGS**

SECTION # **XI**

VIEWS **A-B**

FILE:

DATE: Jan. 14,2014

This section outlines the basic construction expectations of the **TOOL DRAWINGS**.

Specific views shown on the following pages are:

A) TOOL DRAWING NOTES	115
B) TOOL DRAWING TITLE BLOCK	116
C) LINKs for -Tooling forms , Press specifications and Title block	117

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: JCI TOOL DRAWING

SECTION # XI

VIEW # A

FILE:

DATE: Jan. 14,2014

The cad model tool design must be retained by the tool shop for a minimum of 2 years. The files may be deleted after 2 years with written approval from JCI.

All JCI drawing sets are to include:

1) Complete parts list

- Full bill of materials including:
 - a) Listing of all mold detail numbers and descriptions
 - b) Complete list of all purchased components with catalog numbers.

2) Full Cover & Ejector plan views and section views

- Balloons to identify all details (with title block stock list)
- Adequate section views to show parting line steps and all details.
- Tooling datum hole and features dimensioned to the centerline of mold.
- Show tie bars for targeted machine size.
- Show knock out pattern for targeted machine size.
- Plate - thicknesses and dimensioned
- Ejection travel dimensioned
- Mold height, length & width dimensioned
- Dimension high points of Cover & Ejector from back plates
- Dimension Sprue offset (if any)
- Identify "0" (zero) corner.
- All cooling lines Cover & Ejector
- Components labeled in Ejector plan view: - Support pillar, - guide pins, -stop buttons, -ejector pins, - return pins, - knock-out holes, -forward stops, - etc.

3) Detail drawings

- Inserted details to be shown, dimensioned to be shown in separate view.
- Gate detail to be shown in a 4X scale view
- Any welded areas to be identified on drawings.

4) Full size drawing of all schematics to be included

- Hydraulics, - Pneumatics, -Electrical, -Water lines (Cover, Eject, Slide , Lifter,), -Counter air, - Gas assist.

5) Provide (2) CD-ROM's for each mold design. Each CD must contain the following:

- Complete Mold Design in 3 D step format, -Part data in STP & IGES formats, -All mold drawings, and part drawings, in DXF and PDF / TIFF formats, -All manifold designs and schematics from the manifold supplier (Any special requirements) Must upload to Ontrax for North America. / 2 hard copies of the assembly drawings are required for EU.

6) Each CD-ROM supplied must be labeled with the following information as a minimum, - JCI Tool number, -JCI Part number, - Part Name & Platform.

GENERAL:

- * Steel hardness , finish, coatings, and any weld to be shown on appropriate views
- * All dimensions in
- METRIC, native language for Asia, Europe & North America.
- * Original drawing and tulip dimension certification to be supplied to the Tooling Secretary at or

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: JCI TOOL TITLE BLOCK

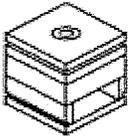
SECTION # XI

VIEW # B

FILE:

DATE: Aug 3, 2012

* Title block required to be completely filled out and shown on the lower right corner of each sheet in drawing package

				JCI GLOBAL INJECTION TOOLING	
Tool Name: XXXX					
Built By: JCI Interiors		Date:		Design By:	Checked By:
Stack Ht:	Stack Ht with Locating Ring		W X L (include Components)		Diagonal Dimension
Project Number	Design For Machine & Tonnage			Approximate Weight	
Design For Part Number:	REV	Original Build Work Order Number			
Material	Shrink	Scale	Sheet	JCI Tool Number	
Tool Revision	JCI Part Number			Tool Shop Tool Number	

JCI GLOBAL INJECTION MOLD TOOLING STANDARDS

TITLE: **XI INFORMATION LINKS**

SECTION # **XI**

VIEWS **C**

FILE:

DATE: Aug 17, 2012

**CONTACT YOUR TOOL ENGINEER
FOR THE FOLLOWING**

A) Tooling Forms for Tooling Vendor

B) Press specifications and plant

C) Title block for Johnson Controls

2014 Global Injection Mold Tooling Standards

Page Notes

Changes (Same as Overview)

Page # Section /View

- 1) Cover Page, New Picture “Globe” & 2014
- 2) Table of Contents – **Yes Changes** , Sec II - Mold Base Information – Added in a page (page # 14)“Mold Base Typical Notes”
- 3) Table of Contents – **Yes Changes**, Page number updates
- 4) Table of Contents – **Yes Changes**, Page number updates
- 5) Table of Contents – **Yes Changes** , Page number updates
- 6) Introduction – **No Changes**
- 7) Introduction Continued – **No Changes**
- 8) **Sec II Mold Base Information Table of Content** – Yes Changes, Added page – E-2 Mold Base Typical Notes / page 14
- 9) Sec II / View A - Surface Specs – **No Changes**
- 10) Sec II / View B – Tool Steels – **No Changes**
- 11) Sec II / View C – Typical Mold Construction Materials – **No Changes**
- 12) Sec II / View D – Mold Surface Treatments – **No Changes**
- 13) Sec II / View E-1 – Mold Base Typical Features – **Yes Changes**, Added in connector locations. (See page for details).
- 14) Sec II / View E-2 – Mold Base Typical Features – **Yes Changes**, **NEW page** – regarding stand offs / oversize clamp plates. (see page for details)
- 15) Sec II / View E-3 – Mold Base Typical Features – **Yes Changes** , Removed note “Adequate finger clearance required”

- 16) Sec II / View F – Insulation Plate – **No Changes**
- 17) Sec II / View G-1 – Mold Base Tool Labeling & Identification – **Yes Changes**, Removed Notes-
“1mm deep pocket” and “the scribe lines” are no longer required - (see page for details).
- 18) Sec II / View G-2 – Mold Base Tool Labeling & Identification – **Yes Changes**, Removed Note –
Letters being 3” / 75 mm tall. (See page for details).
- 19) Sec II / View H – Support Pillars – **No Changes**
- 20) Sec II / View I – Leader Pins & Bushing – **Yes Changes**, Removed Notes- “ English dimensions” ,
and “ All bushings are to have grease fittings that are accessible without disassembly” , and “Not
required with self-lubricated bronze”.(see page for details)
- 21) Sec II / View J-1 – Guide Bars – **Yes Changes**, Removed Note – “ Required with all materials,
except PP & TPO”. (See page for details).
- 22) Sec II / View J-2 – Guide Bar – Design & Location - **No Changes**.
- 23) Sec II / View K-1 – Safety Straps – **Yes Changes**, Added in notes to the spring loaded plates,
added a slot....(see page for details)
- 24) Sec II / View K-2 – Safety Straps – **Yes Changes**, Removed “ English dimensions”
- 25) Sec II / View L-1 – Eye Bolts & Eye Bolt Holes – **Yes Changes**, Added notes for handling holes to
be in all plates “ ejector, spacer, & clamp / details – rails , slides & inserts” and “eye bolt key
note” (see page for details).
- 26) Sec II / View L-2 – Eye Bolts & Eye Bolt Holes – **No Changes**.
- 27) Sec II / View M – Lift Bars – **Yes Changes**, Removed note – “ Tongue & Groove” – Added –
“ Locking design”

- 28) Sec II / View N - Locating Ring and Locations – **Yes Changes**, Added notes – Must see page for details.
- 29) Sec II / View O – Off Set Sprues – **Yes Changes**, Added Note – “One Direction” (see page for details)
- 30) Sec II / View P-1 – Positive Location Holes NA Only – **No Changes**.
- 31) Sec II / View P-2 – Positive Location Lock Button NA Only – **No Changes**.
- 32) Sec II / View Q – Porcerax Inserts Tag – Example – **Yes Changes**, Metric Dimensions
- 33) Sec II / View R – Porcerax – Water & Venting - **Yes Changes**, Added Notes & New design- must see page for details.
- 34) Sec II / View S – Center line / Parting Line locks – **Yes Changes**, Added in new picture. (See page for details).
- 35) Sec II / View T – Ejector Housing Opening Cover – **Yes Changes**, Added Note – “ With hydraulic ejection, a metal mesh cage material can be used to keep objects out of the ejector plates”. (see page for details)
- 36) **Sec III / Cavity & Core Construction – Table of Contents** – **Yes Changes**, Page number updates
- 37) Sec III / View A-1 – Typical Features – Notes – **Yes Changes**, Removed Note- “30% of runner to vent” – (see page for details).
- 38) Sec III / View A-2 – Typical Features – Views - **Yes Changes**, Removed “English dimensions”
- 39) Sec III / View B – Cavity / Core Labeling I Identification –Plan – **Yes Changes**, Removed –“PCS” – (see page for details).
- 40) Sec III / View C – Typical Cavity / Core Features – Section view – **Yes Changes**, Added Note – “Add water for cooling when the size of the insert allows , plum spate from water manifold (see page for details).

- 41) Sec III / View D – Wedge Inserts and Texture Split Lines – **Yes Changes**, Added Note – “Add water for cooling when the size of the insert allows , plum spate from water manifold (see page for details).
- 42) Sec III / View E – Vent Requirements and Pressure Plates – **No Changes**
- 43) Sec III / View F – Vent Depth Chart - **Yes Changes**, Removed “English dimensions”.
- 44) **Sec IV / Table of Contents** – **Injection Systems** – **Yes Changes**, Page numbers updated.
- 45) Sec IV / View A – Overview – **Yes Changes**, Revised note change –“the use of torpedo style drops are to be avoided. (See page for details).
- 46) Sec IV / View B-1 – Cold Sprue Bushing and Locating Ring – EU & Asia – **No Changes**.
- 47) Sec IV / View B-2 – Cold Sprue Bushing and Locating Ring – NA Only - **Yes Changes**, Must see page for all details.
- 48) Sec IV / View C – Runners – **No Changes**.
- 49) Sec IV / View D – Default Runner Diameter Chart – **Yes Changes**, Removed “English Dimensions”
- 50) Sec IV / View E – Trapezoid Runner – **Yes Changes**, Removed “English Dimensions”
- 51) Sec IV / View F – Subgates – **Yes Changes**, Removed “English Dimensions”
- 52) Sec IV / View G – Jump Gates – **Yes Changes**, Removed “English Dimensions”
- 53) Sec IV / View H – Cashew and Winkle Gates – **Yes Changes**, Removed “English Dimensions” and Added Note- “ Ejector pin / sucker pin $L = > L+6 \text{ mm}$ ” (see page for details).
- 54) Sec IV / View I – Hot Sprue – NA Only - **No Changes**.
- 55) Sec IV / View J-1 – Typical Hot Manifold System Notes – **Yes Changes**, Removed Note - * Split construction preferred (and required if the part is mold in color.) – (see page for details)
- 56) Sec IV / View J-2 – Typical Hot Manifold System – Design Notes – **Yes Changes**, Note change “ Titanium support at pressure points” – Removed “ 440 Stainless” (see page for details).
- 57) Sec IV / View K – Electrical Schematic for 2 or more drops NA Only - **No Changes**.

- 58) Sec IV / View L – Valve Gate Connectors – **Yes Changes** Must review page for all details.
- 59) Sec V / Table of Contents – **Yes Changes**, Page numbers updated.
- 60) Sec V / View A – Pressure Transducers NA Only – **Yes Changes**, Must review page for all details.
- 61) Sec V / View B – Pressure Transducers NA Only – **No Changes**.
- 62) Sec V / View C – Pressure Transducers NA Only – **No Changes**.
- 63) Sec V / View D – Pressure Transducers NA Only – **No Changes**.
- 64) Sec V / View E – Pressure Transducers NA Only – **No Changes**.
- 65) Sec VI / Table of Contents – **Yes Changes**, Page numbers updated.
- 66) Sec VI / View A – Limit Switch Locations – For Ejection – **Yes Changes**, Design changes to the sketch, and Added Note for Brand names for switches. (See page for details).
- 67) Sec VI / View B-1 – Pull Backs and Knock out Locations – **No Changes**.
- 68) Sec VI / View B-2 – Pull Backs Puck Design - **Yes Changes**, Design & Note changes, Must review this page for details.
- 69) Sec VI / View C – Ejector Pins – **Yes Changes**, Added Note – “Nominal Relief .8 – 1.0 mm” (see page for details).
- 70) Sec VI / View D – Ejector Guide Pins & Bushings – **No Changes**.
- 71) Sec VI / View E – Ejector Return Pins & Springs – **Yes Changes**, Removed “English dimensions” and Added Note - Must see this page for details.
- 72) Sec VI / View F – Sleeve and Deep Draw Ejection – **Yes Changes**, Added Note – “Nominal Relief .8 – 1.0 mm” (see page for details).
- 73) Sec VI / View G – Technical Grain Pin design NA Only – **No Changes**.
- 74) Sec VI / View H – Ejector Pin Keying Method – **Yes Changes**, Added Note – (see page for details).
- 75) Sec VI / View I – Non Spring return Ejection – **Yes Changes**, See revised design, Must see page for details.

- 76) Sec VI / View J – Hydraulic Ejection – **Yes Changes**, Added Notes – “Manufacture note” & Added “Flow Divider info” & “Cylinder shaft 1-3/8” diameter” (see page for details).
- 77) Sec VI / View K – Hydraulic Ejection Couplers – **Yes Changes**, Added Notes & Designs – Must see this page for all details.
- 78) Sec VI / View L – Hydraulic Ejection Cylinder – **No Changes**.
- 79) Sec VI / View M – Robotic Removal – Suggested Features – **No Changes**
- 80) Sec VI / View N – Runner Pin Feature – Yes Changes, Removed Note – “Draft of 2 degrees” and Revised design. (See page for details).
- 81) Sec VI / View O – Delayed Ejection – 2 Plate System – **No Changes**
- 82) Sec VI / View P – Delayed Ejection – 1 Plate System – **No Changes**
- 83) Sec VI / View Q – Ejector Pin Extension Towers – **No Changes**
- 84) Sec VI / View R – Positive Ejection Returns – Yes Changes, Added Note – “Ejector pins under the slides. That is Mechanical, Hydraulic / Pneumatically operated slides.
- 85) Sec VI / View S – Spring Loaded Return Pins & Tapped Pull Backs – Yes Changes, Revised and Notes, See page for details.
- 86) Sec VI / View T – Ejector Housing Opening Cover – **Yes Changes**, Added Note – “ With hydraulic ejection, a metal mesh cage material can be used to keep objects out of the ejector plates”. (see page for details)
- 87) Sec VII / Table of Contents – **Yes Changes**, Page numbers updated.

88) Sec VII / View A – Cooling System Requirements – **Yes Changes**, Added “Gallons per Minute Chart”, see page for details.

89) Sec VII / View B-1 – Water Connectors and Extensions – **No Changes**.

90) Sec VII / View B-2 – Waterline Connectors - Details – **No Changes**.

91) Sec VII / View B-3 – Waterline Hose - Details – **No Changes**.

92) Sec VII / View C – Waterline Routing – **Yes Changes**, Removed Note – ‘Fittings on side’ (see page for details).

93) Sec VII / View D – Waterline Baffle – **Yes Changes**, Change the number of baffles in one line from 4 to 6. (See page for details).

94) Sec VII / View E – O Rings – **Yes Changes**, Added Note – “can be used on the bottom of a flat pocket. Not on any vertical or shaped wall “ (see page for details).

95) Sec VII / View F – Water Manifolds – **No Changes**.

96) Sec VIII / Table of Contents – **Yes Changes**, Page numbers updated.

97) Sec VIII / View A-1 – Typical Cam Slide Notes – **Yes Changes**, Revised note changes “ejector action under the slide...” & “keyed or doweled for location....” (See page for details).

98) Sec VIII / View A-2 – Typical Cam Slide Design Reference – **Yes Changes**, Removed – “English dimensions”

- 99) Sec VIII / View B – Cam Slide with Inserted heel Block – **No Changes**.
- 100) Sec VIII / View C-1 – Typical Lifter & Rod Notes – **Yes Changes**, Revised notes and added Pre-load chart, Must review this page for details.
- 101) Sec VIII / View C-2 – Typical Lifter & Rod Design Reference - **Yes Changes**, Removed “English dimensions” and Added – use a “Roll Pin”, (see page for details).
- 102) Sec VIII / View D – Angled Lifter Retainer – **Yes Changes**, Removed –“English dimensions” Added Notes- for minimum clearances. (See page for details).
- 103) Sec VIII / View E – Purchased Lifters- **Yes Changes**, Removed “English dimensions” (see page for details).
- 104) Sec VIII / View F – Lifter Water Lines – **No Changes**.
- 105) **Sec IX / Table of Contents** – **Yes Changes**, Page numbers updated.
- 106) Sec IX / View A – Hydraulic Slides – **Yes Changes**, Removed – “English dimensions”
- 107) Sec IX / View A-1 – Additional Hydraulic Core Notes - **Yes Changes**, **NEW page** – Must review this page for all the details.
- 108) Sec IX / View B – Limit Switch Assembly – **No Changes**
- 109) Sec IX / View C – Mold Sequence Plaque – **No Changes**
- 110) Sec IX / View D-1 – Limit Switch Connector Wiring Euro Map 13 – **No Changes**

111) Sec IX / View D-2 – Limit Switch Connector Wiring Euro Map 13 – **No Changes**

112) **Sec X / Table of Contents** – **Yes Changes**, Page numbers updated

113) Sec X / View – Enhanced / Revision Request Form – **Yes Changes**, Removed Mike

Snellers name. & Added - Frank Quillen.(see page for details).

114) **Sec XI / Table of Contents** – **Yes Changes**, Page numbers updated

115) Sec XI / View A – JCI Tool Drawing – **Yes Changes**, Removed – “inches” (see page for details).

116) Sec XI / View B – JCI Tool Title Block – **No Changes**.

117) Sec XI / View C – Information Forms – **Yes Changes**, Added Note – “Contact your Tool

Engineer for the following Forms”. (See page for details).

Thank you, if you have any questions. Please contact me @ frank.quillen@jci.com or 313-942-9706

Frank Quillen