CAMACO/AMVIAN

DIE DESIGN & BUILD STANDARDS

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The purpose of these specifications is two-fold. First, it is intended as a summary of the high standards of excellence expected by Camaco/Amvian and its customers. Secondly, it is intended as a blueprint for standardization and safety to give Camaco/Amvian vendors a concise picture of tooling specifications.

1. DIE DESIGN SUBMISSION

1.1 A REPRODUCIBLE COPY OF A COMPLETE DIE DESIGN IS TO BE SUBMITTED TO Camaco/Amvian for design approval signed by both parties. Camaco/Amvian will not accept responsibility for any purchased items or work performed on any tooling prior to design approval. Die design approval does not in any way relieve the vendor of responsibility for the function, performance and dependability of the tooling and timing stated in our P.O.

2. DIE DESIGN

A complete die design must include all the below and submitted prior to run off at Camaco/Amvian:

2.1. A strip layout showing progression and all stations.
2.2 Top and bottom plan views.
2.3 Sufficient section views.
2.4 A complete set of drawing in 8.5" x 11" format
2.5 Detail Drawings must be of sufficient detail and clarity to enable manufacture of replacement parts. If in the case of 3D machined Punches/Dies etc. full dimensions are not possible, a 3D CAD model, sufficient to produce an NC program, should be supplied.
2.6 An accurate bill of material including purchased parts (punches, bushings, springs, etc.).
2.7 CAD files in Unigraphics.PRT files, DXF or IGES S.T.E.P. FORMAT Auto CAD 14 or higher
2.8 Spare part list/Dwg Excel
2.9 Current engineering level X-Y-Z printouts, N.C. and EDM wire cut programs are to be delivered with the tool drawings.
2.10 All punches, buttons, and other purchased perishable items shall be designed and detailed. Use only Moeller or Dayton Progress unless authorized in writing by Camaco/Amvian.
2.11 The die build tooling source is to provide a timeline for each die set at Die Kick Off. Updated timeline will be provided every 15th and 30th (end of month) from the die build tooling source until die is delivered to home line.
2.12 Tool numbers to be on all timelines, drawings, and tools as provided by Camaco/Amvian.
2.13 Dies must be designed to the press specifications they are assigned to.
- Proper shut height
- Equal shut height on multiple dies running in the same press
- Proper feed height
- Proper cushion pin pattern and size
- Proper locating system

2.14 Unless process dictates a different clearance and is approved by Camaco/Amvian, a 7%-10% per side cutting clearance will be required on all material thicknesses. In a note near the title block, specify the cutting clearance used.
2.15 Tool Shop is responsible for the design of the poke yoke system using 24-volt PNP sensors (Pepperl + Fuchs) and (Wire-Bus system).
2.16 Strip layout to be signed off before tool design.
2.17 Die design to be provided with cam speed diagram, green forming simulation, tonnage calculation for the first die design review.
2.18 Die design dimensions are to be in Metric.
2.19 Safe FLD prior to OK to construct. Excessive material thinning or thickening is not allowed. Any questionable thinning or thickening requires Camaco/AMVIAN approval.
2.20 All mating and critical surfaces must have a restrike station with inserts where applicable.
2.21 Pierce holes to be on max tolerance -.05mm.
2.22 Part locater holes (Datum holes) to be stamped at 90-degree, other holes max 82 degrees.
2.23 All heel blocks must be backed up 45 degrees from point of function.

3. DIE SETS

Die sets must:

3.1 Be ground and stress relieved with the shoe thickness being 3.0”/75mm if the die is less than 60”/1500mm in length and 4.0”/100mm if the shoe is over 60”/1500mm.

3.2 Have 4 posts 2” – 50mm diameter if under 72” and 6 posts 3” – 75 mm diameter if over 72” /1800mm.

3.3 Be made foolproof by the offsetting of one pin.

3.4 Have a total of 8 lifting holes, 1.0-8 UNC/M24x3 positioned evenly as well as 8 lifting bars welded to die shoe, according to weight to allow for easy flipping of the die without the disassembly of the nitrogen, etc.

3.5 If required have the Camaco/Amvian supplied die number, stamped on the bottom front shoe.

3.6 The right front, top surface of the lower die shoe is to be milled smooth (if casting) for an area as needed to stamp as follows:
- Property of
- Part No.
- Material
- Material thickness
- Material width
- Progression
- Shut height
- Top Shoe Weight
- Total Weight
- Tonnage
- Built by

3.7 Ford tooling requires an additional tag stating, ‘PROPERTY OF FORD MOTOR COMPANY”, PART NUMBER, PART LEVEL, and FORD ASSET NUMBER. Camaco to provide.

3.8 Total weight to be stamped on bottom shoe of die. Top shoe die weight is to be stamped on the top shoe.

3.9 Good engineering judgment is required to ensure that all castings or weldments are designed with sufficient strength to perform the required die function. For large cast iron dies, follow section 8060-03 (GM246 or GM190) or cast D2 sections.

3.10 In castings, provide cored relief to reduce weight without compromising strength.

3.11 Break all sharp outside edges of die shoe weldments.

3.12 Use bosses on the top shoe equal in height to the upper components. This will keep the lower guide pins short enough to allow transferring the parts from station to station.

3.13 All non-ball-bearing sets will have mountable bronze plated shoulder bushings. Ball bearing guide pin to be in all dies that run at 35 strokes or more per minute; plus all dies that run in AIDA Press. All other dies will have non-bearing pins.

3.13-B AMX prefers bronze bushings with guide pins, NO ball bearing pins and bushings.

3.14 All die sets with heel blocks, as a guiding system must enter 1” – 25mm before guide pins.

3.15 All dies to be painted safety red (Sherwin Williams #4081) unless otherwise specified. (Edges only), unless Camaco/Amvian customer color code is required. Paint color chips to be supplied by Camaco/Amvian.

3.16 Closed cut-offs in punching situations.

3.17 In die sets using a wearplate in conjunction with guide pins, fail-safe the heels and use guide pins of the same size.

3.18 If the bushing hole on the top shoe is obstructed by the manifold or parallel, etc. then a vent hole must be drilled 3/8”/10mm diameter (not a groove with a die grinder).

3.19 Have grooves to be milled out between the die shoe and manifold to allow for drainage after die washing.

3.20 Nitrogen holes should be 1/32”/1mm bigger in diameter to ensure removal. They are to include an offset hole to allow for drainage when the cylinder is installed. Upper Nitrogen cylinders MUST be retained to prevent nitrogen cylinders from falling out if pad is removed in the press.

3.21 Avoid blind dowel holes where possible. If blind dowel holes cannot be avoided, pull dowels must be used.

3.22 Avoid reamed holes of excessive length in either the die section or the die shoe.

3.23 Dowels to be tap fit into die shoe and slip fit in the hardened die steels.
3.24 No altered, homemade screws or fasteners will be allowed.
3.25 All casted die shoe must use (G-2500). Design approval required prior to casting.
3.26 All transfer dies need to be built in and mounted on a Master Die Shoe with Camaco/Amvian locator pin system (See FIGURE 25.0) Master Die Shoe to be divided as two (2) pieces.

4. STOP BLOCKS AND SAFETY

4.1 Stop blocks are to be mounted directly above a parallel. Have a ½" wide x .050 deep grove for shut height adjustment.
4.2 Stop blocks must have integrated die set up pins, to be painted red. (Figure 4.0)
4.3 Stop blocks may be round or rectangular. Round blocks will be at least 2" in diameter and increase with tonnage.
4.4 Four stop blocks are required - 4 stop blocks required if under 72"/1800mm and 6 stop blocks required if over 72"/1800mm.
4.5 Locate stop blocks within the ram and bolster area above parallels. Assure location and number of stop blocks provides proper balance of die forces. Locate in an exposed area to aid die setting, but not to interfere with any transfer systems.
4.6 Appropriate guards around the pinch points are required.
4.7 Have hardened plates pocketed in where stripper bottoms out.

5. SUB-PLATES

Sub-plates shall always be included and must:

5.1 Be manufactured from pre-hardened 4140 material or equivalent.
5.2 Be a minimum of 3.0"/75mm thick yet not too large to hinder easy handling.
5.3 Have threaded lifting holes (on top, NOT on sides) to allow easy handling if weight is over 50 pounds.
5.4 Be keyed on the die shoe.
5.5 Clearance between the cut out in the sub-plate and the cut out in the die shoe must not exceed ¼"/6mm
5.6 Clearance between die section cutout and sub-plate cutout to be .100"/2.5mm.
5.7 All cavities to have drain holes for excessive stamping lubricants.

6. STRIPPER PLATES

Stripper plates must:

6.1 Be made of pre-hardened 4140 material or equivalent and a minimum thickness of 2.0”/50mm.

6.2 Piloting of part or webbing is done by inserts.

6.3 Have windows where ball lock piercing/punches go through the stripper for easy service while the die is in the press. The window inserts should be of hardened 01 or equivalent material and held in with 10mm socket head cap screws. If this makes the window insert too weak, or if there is not enough space to do so, Camaco/Amvian must be advised to make a decision. Camaco/Amvian will decide for dies with less than 100,000 hits per year.

6.4 Have stock levelers either pocketed into them or located on the die to prevent the stripper from tipping when starting or finishing a strip. (-005”/0.010”/0.25mm below minimum material thickness)

6.5 Be of reasonable size with lifting holes to allow for easy handling if weight is more than 50 pounds.

6.6 Standard Lifters Pilot Assemblies required for all piloting. Utilize SPF or SPW style. Reference SL guideline on pg 33.

6.7 When cam piercing, the punches must be stripped using self-contained nitrogen gas springs (Dadco or Kaller unless otherwise specified). Do not exceed average life deflection.

6.8 Gas spring location on cam strippers must not allow the stripper to be tipped. Gas springs must be positioned for even pressure around the punch. Gas springs used on cam strippers must be used in conjunction with stripper bolts. Pierce punch must be a minimum of .100”/2.5mm below the stripper.

6.9 Have hardened plates wherever the stripper or pressure pads bottom out, also over any cam pierce operation.

6.10 Bottoming block should be mounted to die shoe NOT to stripper.

6.11 Have nitrogen cylinders used with a manifold system or self-contained nitrogen cylinders (no springs) in the main stripper.

6.12 Have stripper clearance to maximum opening of guide rails. (Figure 24.0-1)

6.13 Stripper clearance around punches should be .050”/1mm per side when material is 3mm thick and .100”/2.5mm per side when material is 4-6mm thick. If very small punches are being used, may be stripper guiding is necessary.

6.14 Standard Lifters Guided Keepers required for pad guidance and retention. Apply GK205 or GK180 series with longest bushing length space will allow. Ref SL guideline on pg 33. Contain known thrust with heel blocks.

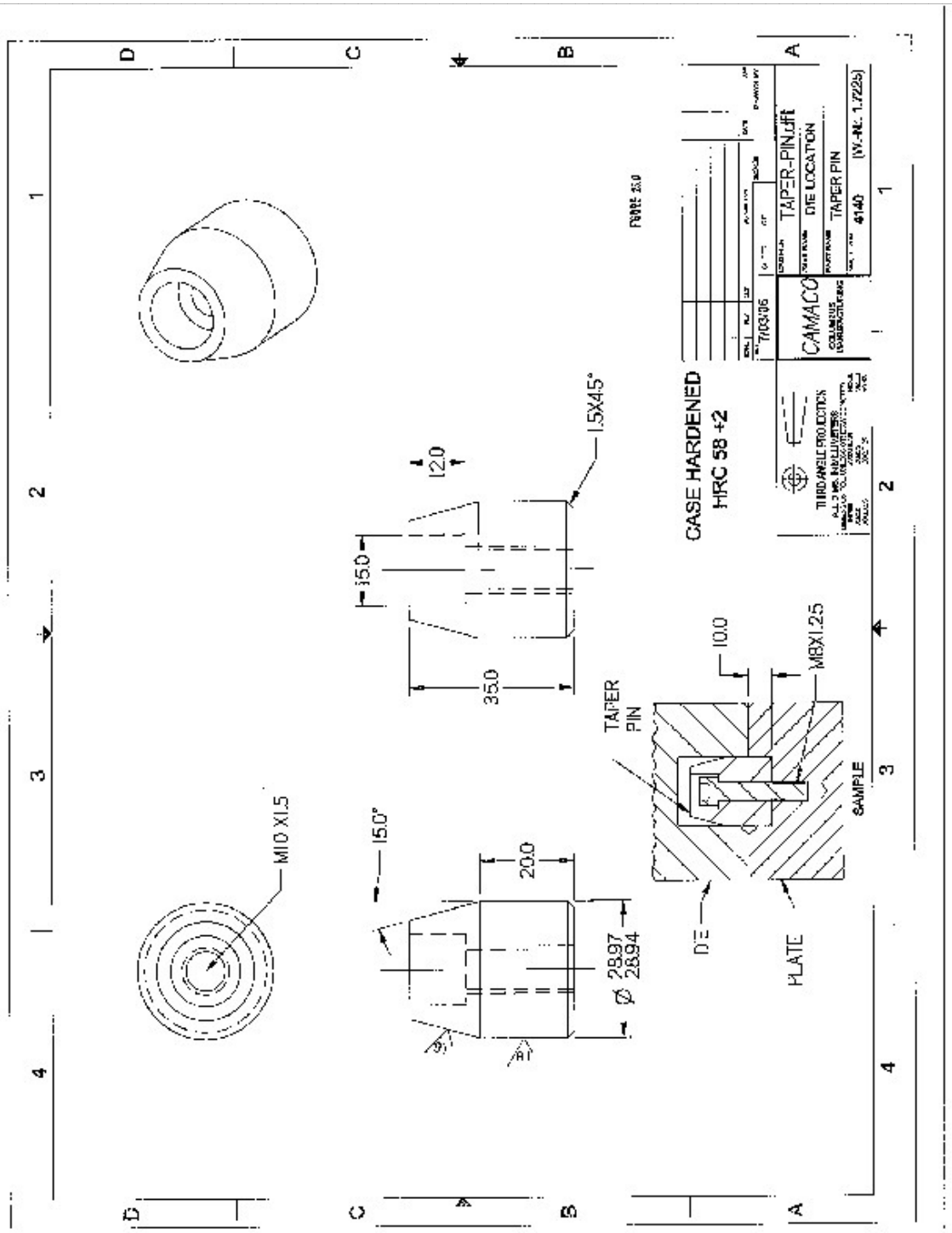
6.15 All strippers must be removable in press.

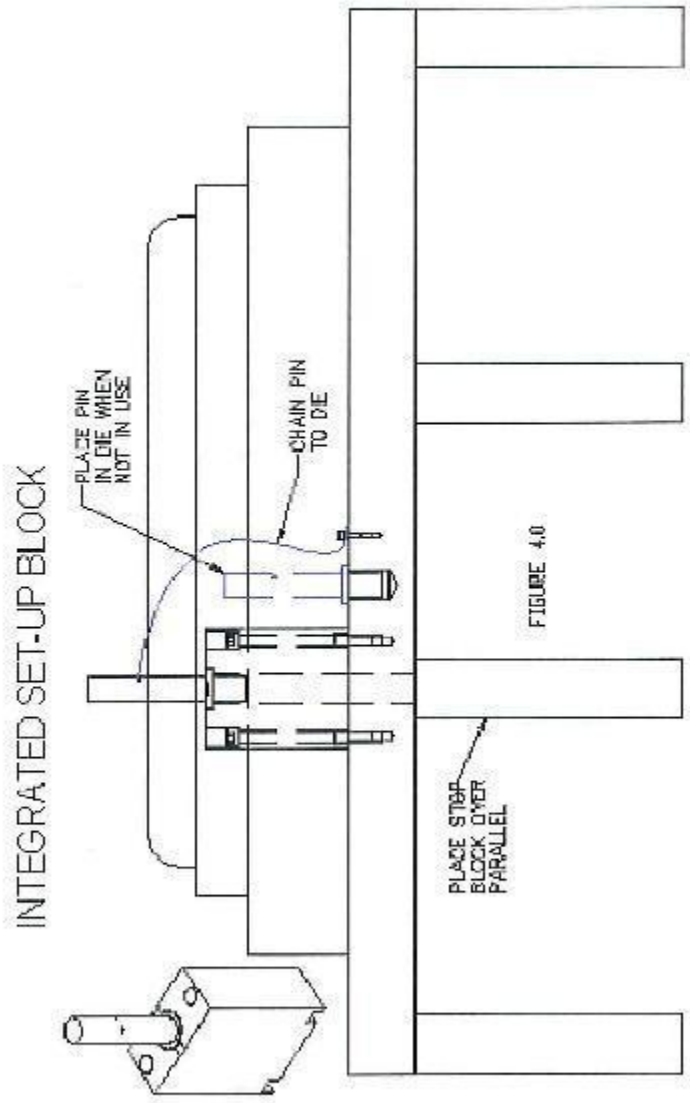
6.16 No urethane strippers! Apply Standard Lifters Ejectors for all oil break in stripper. Ref pg 33.

6.17 No pre-load on nitrogen cylinders. We must have at least a .020” gap between plate and cylinder.

6.18 Stripper to have two (**not making contact**) safety screws.

6.19 No forming allowed with stripper, never.


CASE HARDENED
HRC 58 +2
TAPER-PIN.dft
DIE LOCATION
TAPER PIN
CAMACO
1.5X45°
12.0
15.0
35.0
10.0
M8X1.25
TAPER PIN
SAMPLE
DIE
PLATE
M10 X1.5
15.0°
20.0
Ø 28.97
28.94


INTEGRATED SET-UP BLOCK
PLACE PIN IN DIE WHEN NOT IN USE
CHAIN PIN TO DIE
PLACE STOP BLOCK OVER PARALLEL
FIGURE 4.0

7. DIE SECTIONS

Die sections must:

7.1 Be 2.0”/50mm thick to ensure stability, strength, and proper fastening location.
7.2 Be keyed or pocketed in location with all pockets being chamfered. Die section should be above subplate .005”/0.10mm to .010”/0.25mm
7.3 Be of a size 12”x12”/300mmx300mm max to accommodate proper handling, lifting holes required if weight is over 45 pounds.
7.4 Be fastened to the sub-plate or die shoe from inside the die to make them accessible for removal without removing the parallels or sub-plate.
7.5 Also have jack screws, pull dowels and slide fit where necessary to allow for their easy removal.
7.6 Have the first couple threads drilled out of a threaded hole so that the threads will not pull through.
7.7 Have smaller sections within them for easy maintenance (to be discussed at die design).
7.8 Draw section be out of D2 material or alternate at Camaco’s/Amvian’s request at 58 to 60 HRC hardness.
7.9 Rest against at least one side of the pocket in the sub plate whenever possible or should be doweled if all four sides rest against other die sections.
7.10 Screw holes be counter bored – screws not longer than 25mm and the screw head must be below die life.
7.11 Lifter retaining buttons to be screwed to subplate not die section.
7.12 Have slug retaining wire cut groove in wire cut openings.
7.13 Be cryogenic tempered (if available in Europe).
7.14 Die Section minimum PVD Duplex coating for all draw sections or alternate at Camaco’s/Amvian’s request.
7.15 All inserted die blocks, sub plates, strippers, etc. shall have a ¼ to 3/8 radii relief.
7.16 Miss match cuts are be included into the trim profile to eliminate burrs from trying to match trim areas. The description or shape of the miss mach will be provided by Camaco/Amvian prior to strip layout, no scallop type miss match allowed.
7.17 All Flange, wipe and high wear area steels must be DC53 for stampings made from 490XF or higher. Excluding Dual Phase or Next Gen Ultra High Strength material.
7.18 All Flange, wipe and High wear area steels must be Vanadis for stampings made from Dual Phase or Next Gen Ultra High Strength material.
7.19 All Trim sections must be DC53 for stampings made from 490XF or higher. Excluding Dual Phase or Next Gen Ultra High Strength material.
7.20 All Trim sections must be Vandis for stampings made from Dual Phase or Next Gen Ultra High Strength material.

8. BLANK PUNCHES

Blank punches must:

8.1 Be of D-2 material 58-62HRC or A-2 material 60-62 HRC and fitted with slug ejectors. Ejector pins must not fall into previously pierced holes. Ejector pins must be installed in such a way that is prevents the slugs from pulling back (not off to one side).
8.2 Be located in a hardened (54-56HRC) A-2 punch pad (thickness 1.5”/40mm) sitting on and screwed to (not welded) a 0-1 hardened backing plate of 3/8”/10mm thickness.
8.3 Be the exact progression (+.002”-0/0.05mm) on punches used to cut the French positive stops.
8.4 Be screwed into top for accessibility. (Counter bored 1”/25mm deep plus head height of screw)
8.5 Not have heels (Heel block is located in subplate/die section.
8.6 Be cryogenic tempered. (If available in Europe)
8.7 Scrap punches for skeleton cutoff to be designed and built to be useable so punch could be used on 4 sides.
8.8 Material Grades above 420 XF HSLA will require M2 Punch steels 60 – 62 HRC with DC53 60 – 62 HRC Die steels to handle shock and compression caused from trimming High Strength material.

9. PIERCE PUNCHES

Pierce punches must:

9.1 Be of heavy-duty ball lock type (wherever specified) NOTE: Ball lock holders are to have backing plate, not plug type holders.

9.2 Be held in a common holder where a cluster of punches is required. This punch pad should be a thickness of 1.5”/40mm sitting on a 0-1 hardened backing plate of 3/8”/10mm thickness.

9.3 Be manufactured of A-2, D-2 or M-2 material depending on application with slug ejectors.

9.4 Be made to Moeller or Dayton Progress standards (length and diameter) and, in the case of a shaped punch, should have a locking device in standard location.

9.5 Be specific to Moeller or Dayton Progress (Catalog type).

9.6 Be standardized in cams so when reordering, we are not ordering different punches when one size could be standardized.

9.7 New tools must be supplied with two spares of every size punch and button.

9.8 When tool shops are ordering punches, you should order as follows:
1 I.e. Straight punches (mounting holes) +.0000/-0005” (+0/-013mm) from max tolerance.
2 I.e. 45-degree punches (chamfer punches) – 0000/+.0005” (-0/+013mm) from max tolerance.

9.9 Offset ejector for the side notch punch.

10. PIERCE BUSHINGS

Pierce bushings:

10.1 Be made to standards with locking devices in standard location.

10.2 Be, wherever possible, used instead of pierce inserts, or within an insert with a hardened backing plate screwed to the back of the insert. (Note: Pierce bushings must have excessively large holes cleared for the slugs (max. .050”/1.25mm per side). If in a case of a thin wall using (wall thickness .250”/7mm or less) then there must be a hardened backing plate to ensure bushings will not sink into section due to blanking pressure.

10.3 Shape bushings should be EDM through which standard relief of ¼ degree with a Dutch Pin.

10.4 Pierce bushings are to be installed in hardened sections with a hardened backing plate screwed on the bottom.

10.5 Retainer bushings are made from 0-1 material and be hardened to (48/52 HRC).

10.6 Heel plate to be used on notch bushings (see figure 6.01-1)

10.7 AMX requires step on punch is easier to maintain vs heel block (see figure 6.02).

10.8 Moeller or/and Dayton Progress brand buttons are required or alternate at Camaco’s/Amvian’s request.

10.9 M2 material for steel parts. A2 material for aluminum parts.

10.10 Standard key flat run is full length of button on shapes.

10.11 Light press fit headless preferred – Key shapes with ¼ key minimum. Use S.H.C.S. of appropriate size. Key flat ground full length of bottom.

10.12 No split buttons permitted.

10.13 Removable in press unless agreed upon by Camaco/AMVIAN.

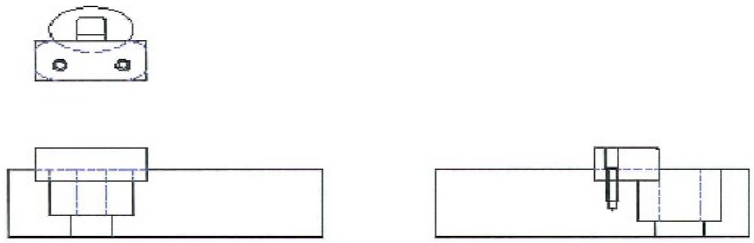


FIGURE
6.0-1

BY USING THIS METHOD OF HEEL NO STEP
WILL BE REQUIRED ON THE PUNCH

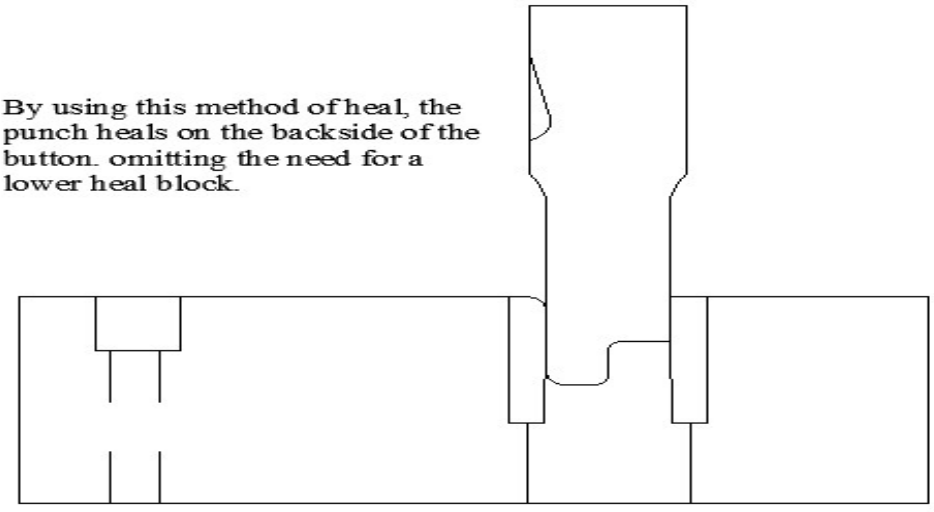


figure 6.02

11. PIERCE INSERTS

Pierce inserts must:

11.1 Be made from hardened A-2 material. A standard thickness is to be used so that ground stock can be used when replacing them. (e.g., If the insert is to be 2"to 30mm thick, then the pocket should be made .490 deep/12.75mm).
11.2 Not be made excessively large so that replacements are easily made.
11.3 Be made interchangeable if hole diameters are the same (i.e., If used in a post/horn for cam piercing and the pierce holes are the same diameter, then the inserts should be standardized.
11.4 Have jack screws for easy removal.
11.5 Be designed in such a way that after grinding, rework of rads, etc. are not necessary.
11.6 Should be a slip fit (.002"/0.05mm clearance) and held in with SHCS.
11.7 Be made foolproof by offsetting of one dowel hole.

12. PILOTS

Pilots must:

12.1 Standard Lifters Pilot Assemblies required for all piloting. Utilize SPF or SPW style. Use tapered style Standard Lifters pilots for transfer tooling. Reference SL guideline on pg 33.
12.2 have access through the bottom of the die so knocking out the pilot is possible. Pilot receiving holes must be drilled through die shoe, and parallels must be ramped so slugs can't build up if mis-hit.

13. PILOT BUSHINGS

Pilot bushings must:

13.1 Harding bushing to be used not to be head type.
13.2 Have a 45-degree x .020"/0.55mm chamfer on the inside diameter.
13.3 Be of standard length. Be installed in the die so that change is possible in the press. (With use of a key, screwed to the die section or sub-plate, to hold the bushing in).
13.4 Have access hole clearance through the bottom of the die shoe so that knocking out the bushing is possible.

14. DRAW AND FORM PUNCHES

Draw and Form punches must:

14.1 Be made from D-2 with Arvin Thermal Diffusion coating or equivalent (Note: Form dies (post/horns) must be made from A-2 or equivalent material and should be heat treated 60-62HRC for coating).
14.2 Have draw rads large enough thus preventing premature pick-up (2-4 times material thickness).
14.3 Wipe all the way past the part.
14.4 Be supported with a heel block in conjunction with a hardened O-1 wear plate.
14.5 Have potential to suit ready benders if possible.
14.6 Must wipe the part, not bottom out on rads in the punch.

15. CAMS

Cams must:

15.1 Be of by-pass (which are used to chamfer holes) at 10 DEG. so that raising and lowering of the ram of the press will not change the chamfer size. (Fig. 14.0-2)

15.2 Have a shim able insert to allow for adjustment, when necessary. (Note: The driver must by-pass the cam a minimum of 1" or 25.4mm)

15.3 Be built as per cam designs. (Figure 14.0-1 and 14.0-2)

15.4 Be designed so that strip removal is easily done in the press. (This is done using a longer travel for the cam.)

15.5 Box type cam guides with removable retainer plates are permissible. (Figure 14.0-1 and 14.0-2)

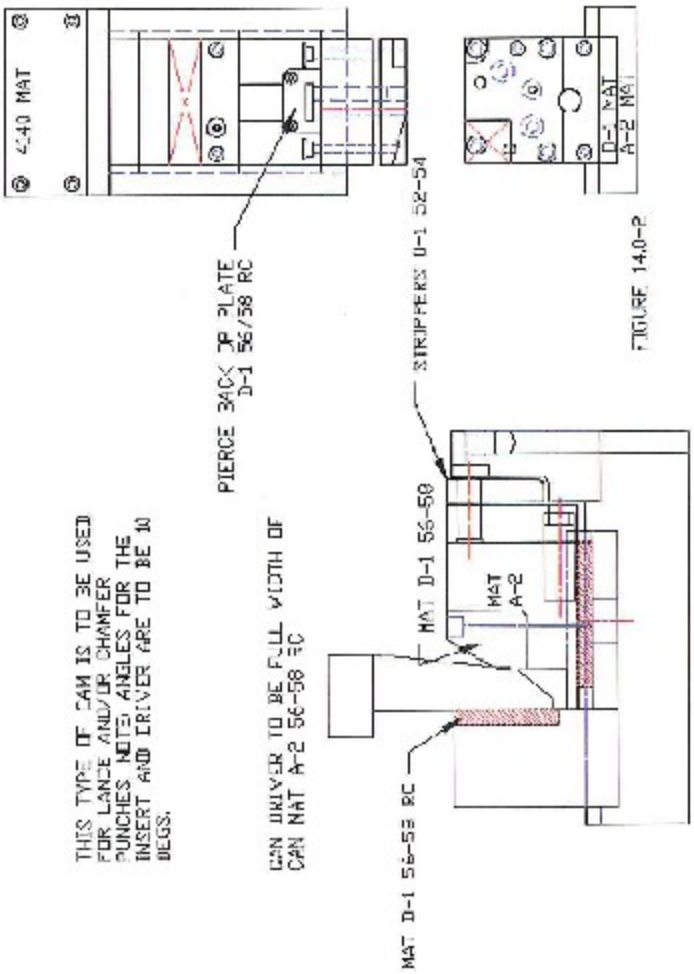
15.6 Stripper bolts minimum (3/8"/10mm) and easily accessible.

15.7 Have cam strippers that are returned activated by self contained nitrogen gas springs. Dadco Brand Drop-ins.

15.8 Have hardened 0-1material (52-54HRC) strippers with set screws to hold in stripper bolts and additionally secured with blue Loctite.

15.9 Screws for punch holders must be accessible through stripper in relation to (Figure 14.0-1).

15.10 Cam-pierce station: All die buttons must have slug retention. If die buttons are special made, a three spiral retention groove is acceptable.


4140 MAT
PIERCE BACK UP PLATE
D-1 56/58 RC
STRIPPERS D-1 52-54
MAT D-1 56-58
MAT A-2
CAN DRIVER TO BE FULL WIDTH OF
CAN MAT A-2 56-58 RC
MAT D-1 56-58 RC
THIS TYPE OF CAM IS TO BE USED
FOR LANCE AND/OR CHAMFER
PUNCHES WITH ANGLES FOR THE
INSERT AND DRIVER ARE TO BE 10
DEGS.

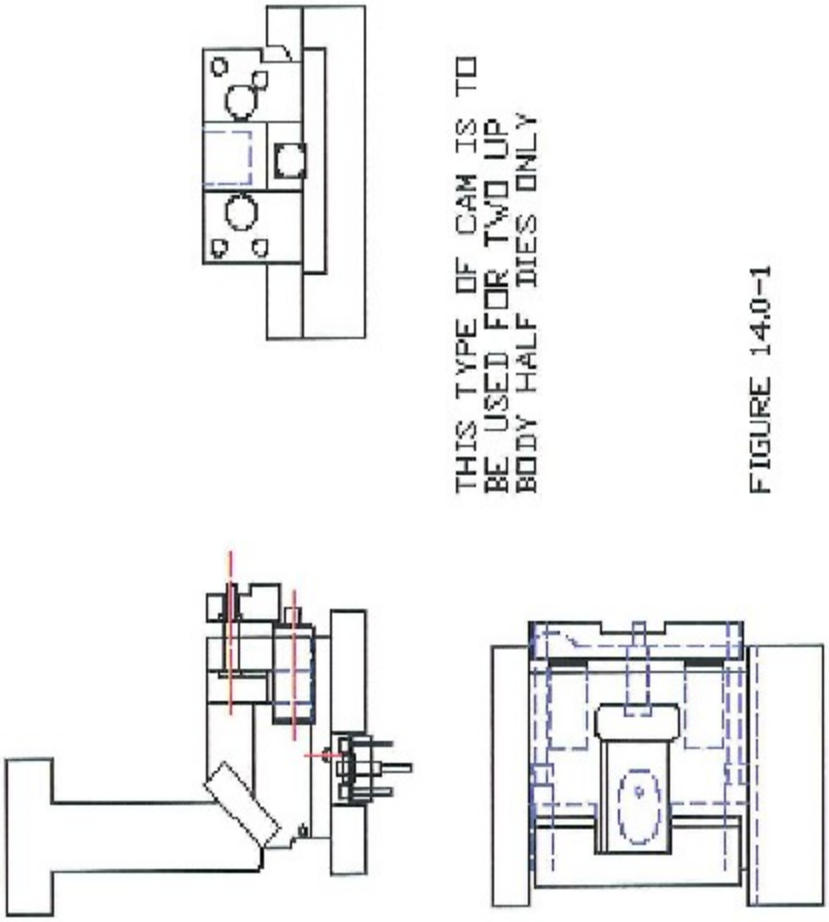


FIGURE 14.0-1

16. FRENCH STOPS

French stops must:

16.1 Not be used in conjunction with die protection (no pivoting French stops).
16.2 The strip should be cut a minimum of .150/3.8mm per side for French stops.
16.3 Have hardened inserts so that they can be easily replaced when worn.
16.4 Be located within .002”/0.05 of the punch for the French stop.
16.5 Guide rails to which French (positive) stops are mounted should be keyed or pocketed not doweled.
16.6 Be a minimum of 0.250”/6mm higher than lift height of strip.

17. GUIDED KEEPERS

Guided Keepers must:

17.1 Be Standard Lifters Guided Keepers unless authorized by Camaco/Amvian Tooling Engineering only. https://www.standardlifters.com/products/

18. NITROGEN MANIFOLD

Nitrogen must:

18.1 Be in the form of either Hyson or Forward Brand manifolds unless otherwise approved by Camaco/Amvian/Amvian (Note: Manifolds must cover the complete die shoe unless otherwise specified). No linked nitrogen cylinders without approval.
18.2 Have gauges mounted on the front of the die recessed back min. ½” from the edge of the die shoe and guarded with easy access, easily seen front and back and will not interfere with eye bolts. Tag required with min/max psi to be mounted near gauge.
18.3 Be of standard type.
18.4 Not be pre-loaded. (Note: Nitrogen cylinder tonnage is to be specified by Camaco/Amvian so that certain sizes can be standardized (standardized sizes are 1, 2, 3, and 4 ton).
18.5 Be of standard type (Hyson, Forward).
18.6 Be of quick connect type. (Not screwed)
18.7 Individual nitrogen cylinders when used can be Dadco or Kaller brand.
18.8 Upper Nitrogen cylinders MUST be retained to prevent nitrogen cylinders from falling out if pad is removed in the press.

19. GUIDE RAILS

Guide rails must:

19.1 Be made from 0-1 or equivalent hardened material (and ground), and a thickness of 1.0”/25mm. The stock pan should be a minimum thickness of .375”/10mm.

19.2 Be keyed or pocketed a minimum 3/8”/10mm deep with use of heavy stock material. Note: Rails are not to be mounted on the ends of sub-plates.

19.3 Be equipped with pull dowels.

19.4 Be made in two pieces. The body is screwed and pocketed or doweled in with a top plate screwed separately with slotted holes so that it can be slid back making strip removal in the press possible. (Fig. 24.0-1). Top plate to be drilled so access to bottom screws is possible without removing top plate.

19.5 Back guide rail should start a minimum 30mm before the front guide rail with angled edges leading into the opening.

20. WEAR PLATES

Wear plates must:

20.1 Be NAAMS wear plates. If graphite impregnated, do NOT use grease, use a light oil only.

20.2 Be attached with SHCS (No flat head or low head screws).

20.3 When wearplates are required, they will be seated in the direction of thrust on a machined surface 90 degree to the face or wear plate.

20.4 Vendor will use standard catalog wear plates.

20.5 Stamp wear plate thicknesses on details.

21. DIE PROTECTION

Die protection must:

21.1 Be installed to detect under feed, with use of a notch in the strip and a trigger stop. (Figure 20.0-1A)

21.2 This notch punch must have a minimum .020”/0.5mm rad on the corners and ejector in the center not offset.

21.3 Be installed to detect a buckle in the strip.

21.4 Be installed to detect a stuck cam. (Figure 20.0-4 A) (Note: Grooves or channels must be milled in the die shoe as to house all wires used for die protection {These channels must lead to a common area}.

21.5 Be installed to detect parts falling from the cut off (Photo Electric). See Sensor Specification. (Figures 21-A and 21-B)

21.6 If progressive dies are built, the skeleton needs to have a sensor at the end of the tool.

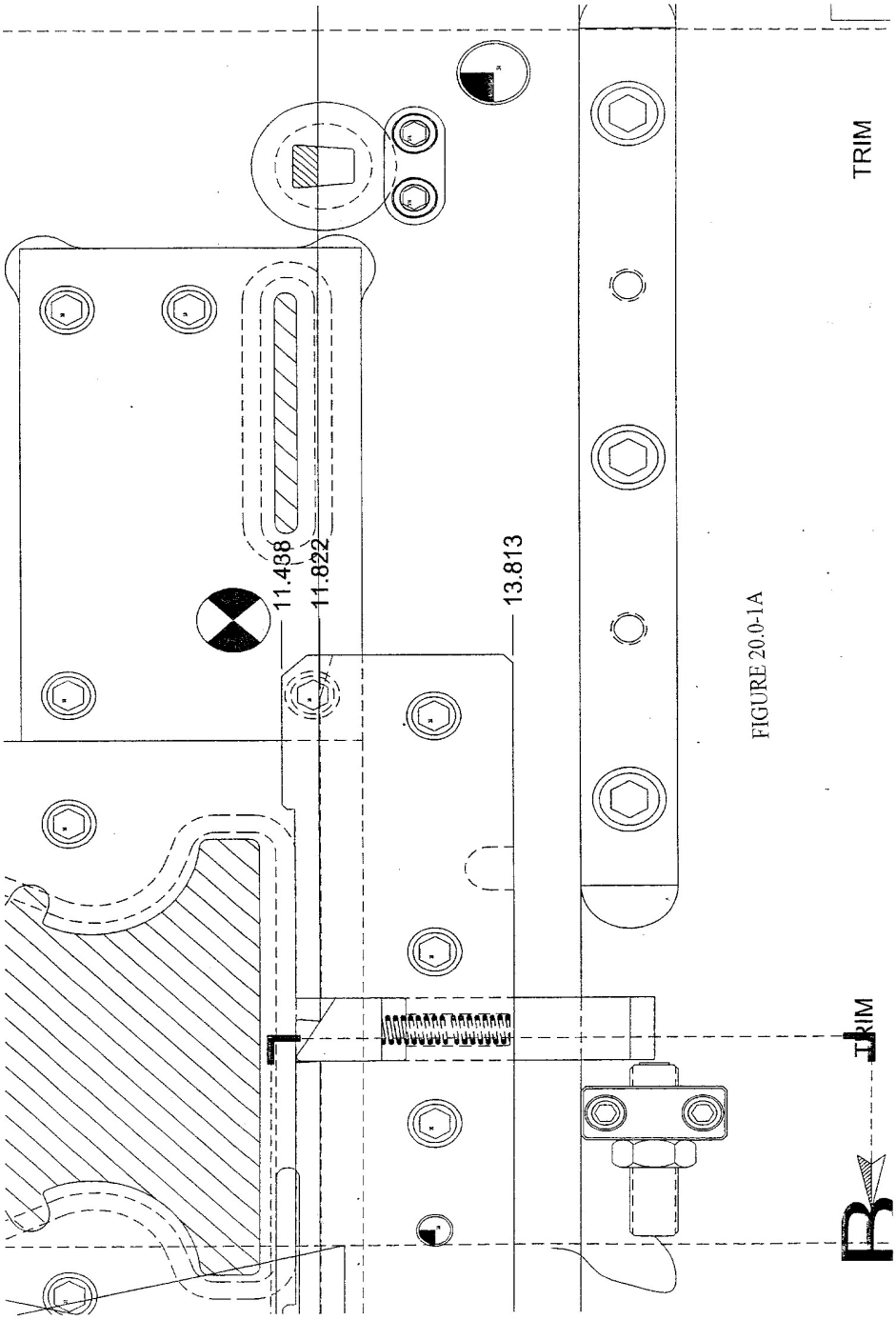
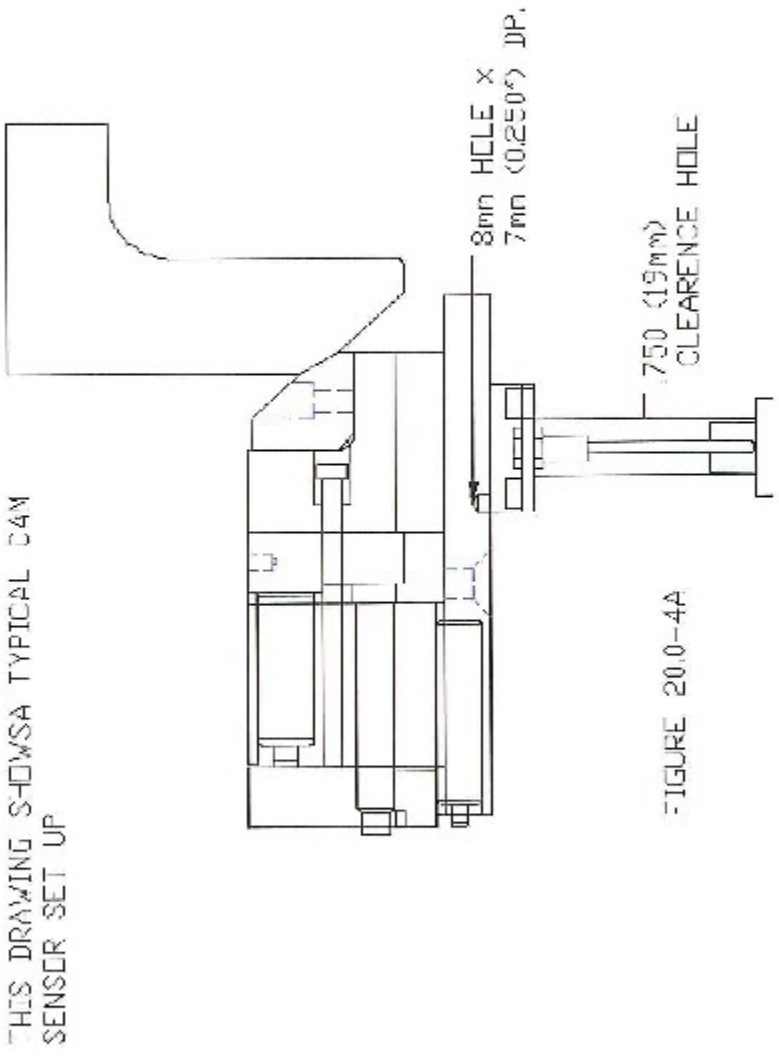


FIGURE 20.0-1A



THIS DRAWING SHOWSA TYPICAL CAM
SENSOR SET UP

FIGURE 20.0-4A

S18 and M18
Barrel-Mount Sensors

- Features EZ-BEAM® technology, with specially designed optics and electronics for reliable sensing without adjustments
- Available in plastic threaded barrel sensor (S18) and stainless steel threaded barrel sensor (M18)
- Completely epoxy-encapsulated to provide superior durability, even in harsh sensing environments
- Uses innovative dual-indicator system to take the guesswork out of monitoring sensor performance
- Available in models for ac or dc power
- Includes advanced diagnostics to warn of marginal sensing conditions or output overload (dc models)
- Meets rigorous IP69K standards for use in washdown applications

Photoelectrics Sensors
Fiber Optic Sensors
Special Purpose Sensors
Measurement & Inspection Sensors
Vision
Wireless
Lighting & Indicators
Safety Light Screens
Safety Laser Scanners
Fiber Optic Safety Systems
Safety Controllers & Modules
Safety Two-Hand Control Modules
Safety Interlock Switches
Emergency Stop & Stop Control

S18 DC Models page 127
M18 DC Models 127
S18 AC Models page 130

page 131

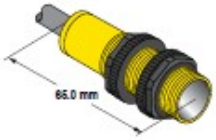
MINIATURE
COMPACT
WORLD-BEAM QS18
WORLD-BEAM Q20
MINI-BEAM
S18/M18
T18
TM18
Q25
MIDSIZE
FULL SIZE

S18 and M18 DC Sensors

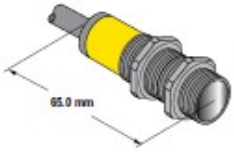
S18 Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L and D

M18 Opposed, Non-polarized Retroreflective and Diffuse Models Suffix E, R, L, D and DL

ONLINE
AUTOCAD, STEP, IGES & PDF



S18 Polarized Retroreflective and Fixed-field Models Suffix LP and FF



M18 Polarized Retroreflective and Fixed-field Models Suffix LP and FF

S18, 10-30V dc

⇒ Infrared LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	S186E Emitter		EGC-1 (p. 132)	BP-1 (p. 133)
		4-pin Euro QD	S186EQ Emitter			
		2 m	S18SN6R	S18SP6R		
		4-pin Euro QD	S18SN6RQ	S18SP6RQ		

More on next page

Connection options: A model with a QD requires a mating cordset (see pages 131).

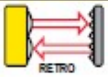
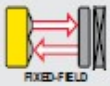
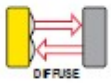
For 9 m cable, add suffix W/30 to the 2 m model number (example, S18SP6RW/30).

SENSORS

MINIATURE **COMPACT** MIDSIZE FULLSIZE

S18, 10-30V dc (cont'd)

⇨ Infrared LED ➡ Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 RETRO	2 m†	2 m	S18SN6L	S18SP6L	EGC-2 (p. 132)	BP-2 (p. 133)
		4-pin Euro QD	S18SN6LQ	S18SP6LQ		
 POLAR RETRO	2 m†	2 m	S18SN6LP	S18SP6LP	EGC-3 (p. 132)	BP-3 (p.133)
		4-pin Euro QD	S18SN6LPQ	S18SP6LPQ		
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	S18SN6FF25	S18SP6FF25	EGC-6 (p. 132)	—
		4-pin Euro QD	S18SN6FF25Q	S18SP6FF25Q		
	0 - 50 mm Cutoff	2 m	S18SN6FF50	S18SP6FF50	EGC-7 (p. 132)	—
		4-pin Euro QD	S18SN6FF50Q	S18SP6FF50Q		
	0 - 100 mm Cutoff	2 m	S18SN6FF100	S18SP6FF100	EGC-8 (p. 132)	—
		4-pin Euro QD	S18SN6FF100Q	S18SP6FF100Q		
 DIFFUSE	100 mm	2 m	S18SN6D	S18SP6D	EGC-4 (p. 132)	BP-4 (p. 133)
		4-pin Euro QD	S18SN6DQ	S18SP6DQ		
	300 mm	2 m	S18SN6DL	S18SP6DL	EGC-5 (p. 132)	BP-5 (p. 133)
		4-pin Euro QD	S18SN6DLQ	S18SP6DLQ		

Accessories page 131

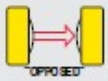
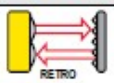
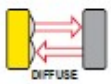
Connection options: A model with a QD requires a mating cordset (see page 131).

For 9 m cable, add suffix W/30 to the 2 m model number (example, S18SP6D W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector.
Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

M18, 10-30V dc

⇨ Infrared LED ➡ Visible Red LED

Sensing Mode/LED	Range	Connection	Models NPN	Models PNP	Excess Gain	Beam Pattern
 OPPOSED	20 m	2 m	M18E Emitter		EGC-1 (p. 132)	BP-1 (p. 133)
		4-pin Euro QD	M18EQ Emitter			
		2 m	M18SN6R	M18SP6R		
		4-pin Euro QD	M18SN6RQ	M18SP6RQ		
 RETRO	2 m†	2 m	M18SN6L	M18SP6L	EGC-2 (p. 132)	BP-2 (p. 133)
		4-pin Euro QD	M18SN6LQ	M18SP6LQ		
 POLAR RETRO	2 m†	2 m	M18SN6LP	M18SP6LP	EGC-3 (p. 132)	BP-3 (p.133)
		4-pin Euro QD	M18SN6LPQ	M18SP6LPQ		
 FIXED-FIELD	0 - 25 mm Cutoff	2 m	M18SN6FF25	M18SP6FF25	EGC-6 (p. 132)	—
		4-pin Euro QD	M18SN6FF25Q	M18SP6FF25Q		
	0 - 50 mm Cutoff	2 m	M18SN6FF50	M18SP6FF50	EGC-7 (p. 132)	—
		4-pin Euro QD	M18SN6FF50Q	M18SP6FF50Q		
	0 - 100 mm Cutoff	2 m	M18SN6FF100	M18SP6FF100	EGC-8 (p. 132)	—
		4-pin Euro QD	M18SN6FF100Q	M18SP6FF100Q		
 DIFFUSE	100 mm	2 m	M18SN6D	M18SP6D	EGC-4 (p. 132)	BP-4 (p. 133)
		4-pin Euro QD	M18SN6DQ	M18SP6DQ		
	300 mm	2 m	M18SN6DL	M18SP6DL	EGC-5 (p. 132)	BP-5 (p. 133)
		4-pin Euro QD	M18SN6DLQ	M18SP6DLQ		

Connection options: A model with a QD requires a mating cordset (see page 131).

For 9 m cable, add suffix W/30 to the 2 m model number (example, M18SP6D W/30).

† Retroreflective range is specified using one model BRT-3 retroreflector, unless otherwise noted.
Actual sensing range may differ, depending on the efficiency and reflective area of the retroreflector used. See Accessories section for more information.

22. KEYS

Keys must:

22.1 Be of 0-1 material or equivalent hardened and ground with jack screws located for easy removal (Note: The pockets machined for the keys are to be the same size as the keys).

23. STAMPS

23.1 The die must have provisions made for the date stamp and manufacturers identification with the stamps being changeable in the press. Reference stamp holders (Figure 22.0-1). Stamp holders must be designed so that they slide in and out easily and are locked in position. When stamps are in the bottom, they must be able to be removed without operator hands having to go between strip and die section. (Note: Must be discussed during design stage). (Figure 22.02 for Camaco/Amvian Style).

23.2 Should be removable without removing sub-plate.

23.3 Must be used in conjunction with a bottoming block so that the stamp does not rely on the stripper pressure.

23.4 New stamp holder design is to be used.

23.5 Part number stamps to be provided as required. Preferred place to stamp part is in the blank die. Number stamp and/or bump block to be removable and shimable in press. Characters for retainers shall be a minimum of 3/32" in height.

24. PARALLELS

Parallels must:

24.1 Be screwed to the die set from the inside and be accessible without removing die sections. Mounting holes and clamping height information will be supplied by Camaco/Amvian.

24.2 All locator and clamp parallels must be doweled. (Full dowels only).

24.3 Be 50mm minimum width for clamping/locating parallels or alternate at Camaco's/Amvian's request.

24.4 Have minimum of four M12 SHCS per parallel and should be counterbored.

24.5 Be located under form station.

24.6 Risers (Parallels) to be made from C.R.S. or H.R.S. and to be finished on top and bottom. Minimum thickness will be 1.5" and must increase with tonnage. Stamp corresponding location numbers on front edge of die shoe and risers.

247 Parallel spacing should be in even inch increments measurements to reduce the quantity of scrap or slug trays.

24.8 Parallel clamp feet shall be machined at 2-3/8" high and slotted 1-1\4" wide for use of ¾" diameter clamping bolts.

25. STOCK LIFTERS

Stock lifters must:

25.1 Be accessible from inside the die.

25.2 Have a threaded hole on the top used for removing stock lifters.

25.3 Have a lead (if the strip lift is low) large enough to accept the start of a new strip. thus, preventing the operator from prying up on the strip to start it. (Note: Bar lifters must be mounted in the same fashion). (Figures 24.0-1, 24.0-2) This is common throughout die progression.

25.4 Pressure pads need to be mounted in the stripper above material lifter guide pin.

25.5 Use Standard Lifters Guided Keepers for all lifter bars/pads. Utilize GK152 or GK122 series and apply the longest bushing length space will allow. Ref SL guideline on pg 33.
https://www.standardlifters.com/products/

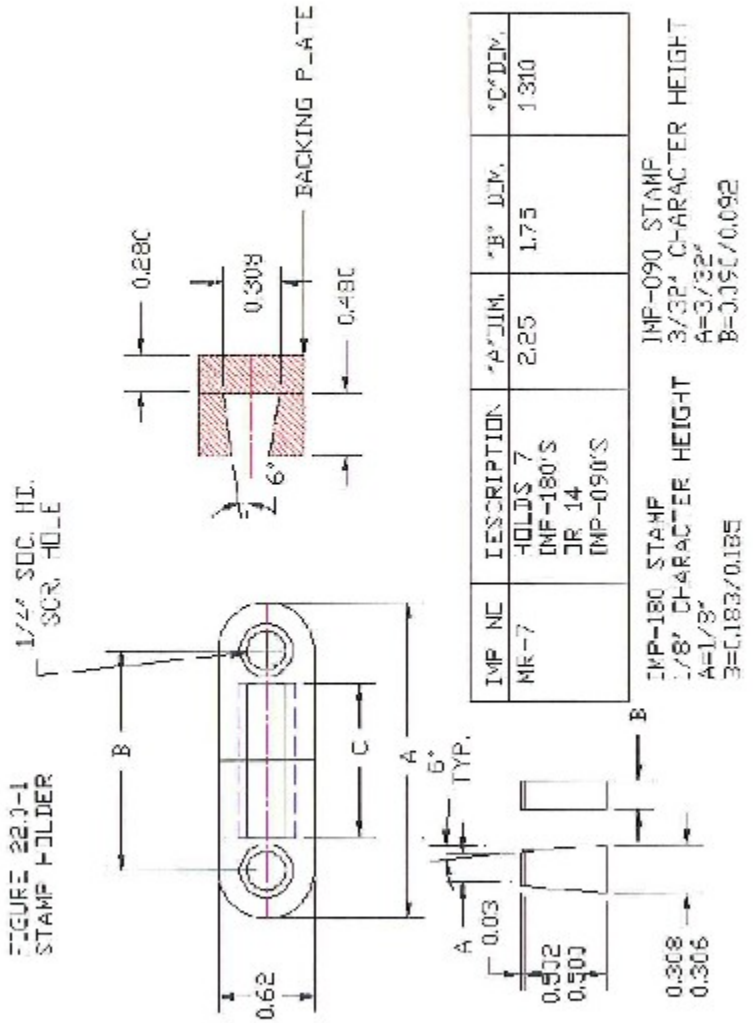


FIGURE 22.0-1
STAMP HOLDER
1/2" SOC. HD. SCR. HOLE
BACKING PLATE
0.280
0.309
0.490
6°
B
C
A
6° TYP.
0.62
0.03
0.502
0.500
0.308
0.306
IMP NO
DESCRIPTION
"A" DIM.
"B" DIM.
"C" DIM.
MK-7
HOLDS 7
IMP-180'S
JR 14
IMP-090'S
2.25
1.75
1.310
IMP-180 STAMP
1/8" CHARACTER HEIGHT
A=1/8"
B=0.183/0.185
IMP-090 STAMP
3/32" CHARACTER HEIGHT
A=3/32"
B=0.091/0.092

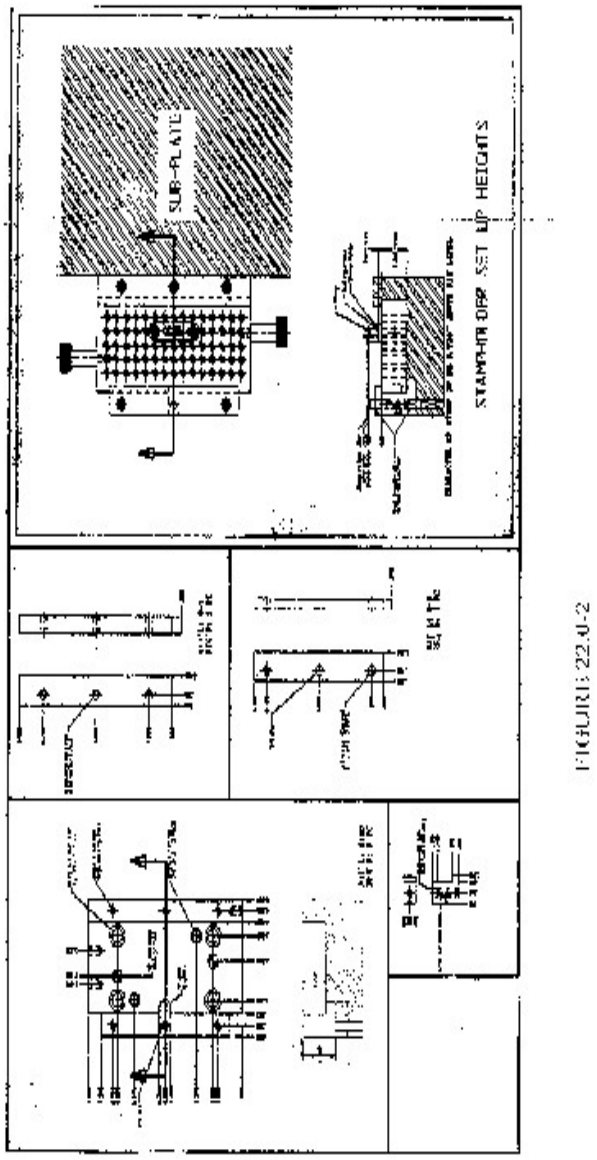


FIGURE 22.0-2

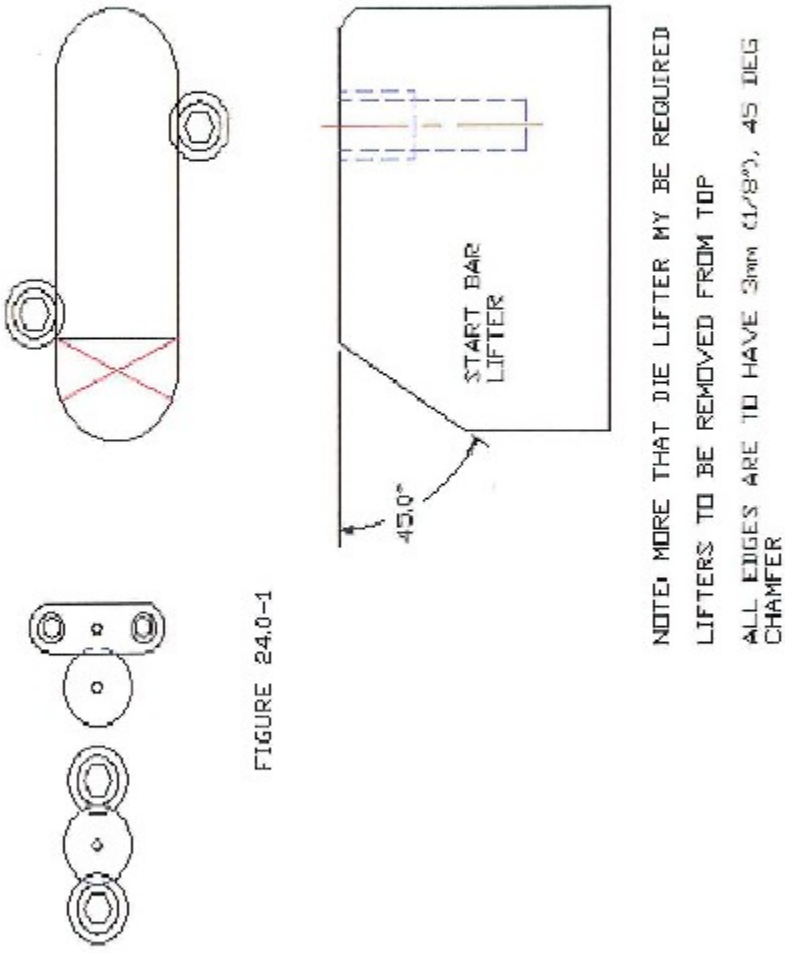

START BAR
LIFTER
45.0°
NOTE: MORE THAT DIE LIFTER MY BE REQUIRED
LIFTERS TO BE REMOVED FROM TOP
ALL EDGES ARE TO HAVE 3mm (1/8"), 45 DEG
CHAMFER

FIGURE 24.0-1

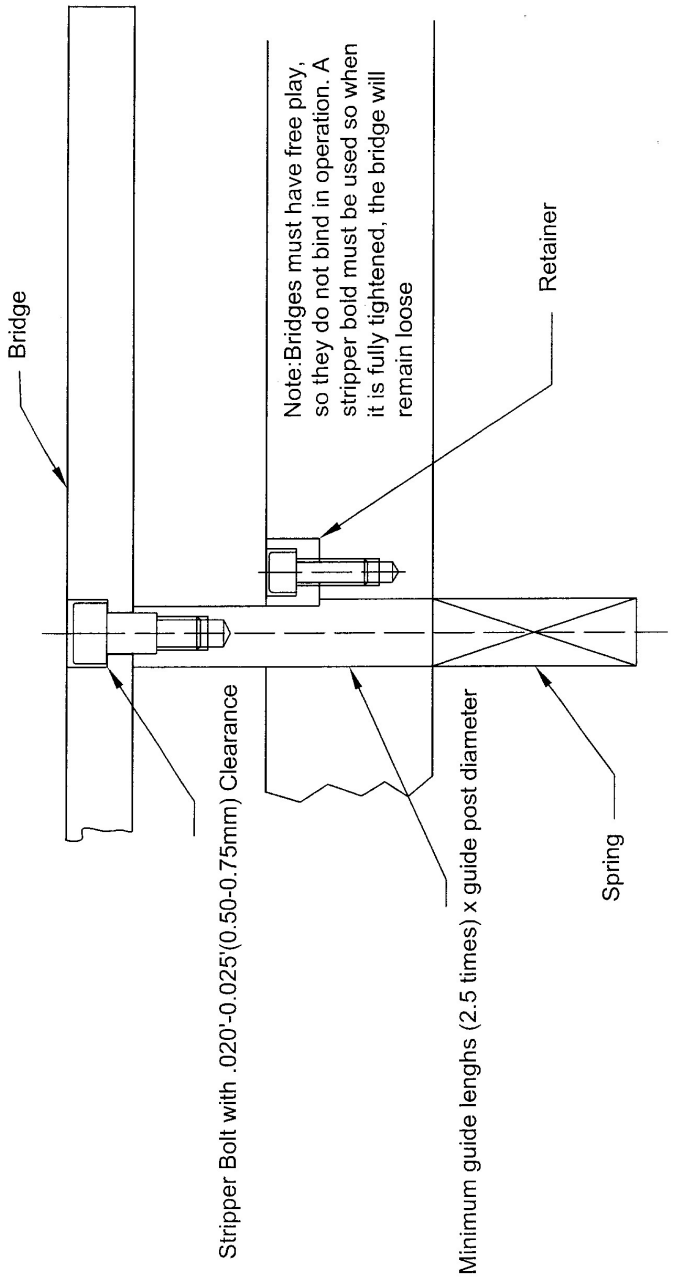

Bridge
Note:Bridges must have free play, so they do not bind in operation. A stripper bold must be used so when it is fully tightened, the bridge will remain loose
Retainer
Stripper Bolt with .020'-0.025'(0.50-0.75mm) Clearance
Minimum guide lenghs (2.5 times) x guide post diameter
Spring

FIGURE: 24-0.2

26. CUT OFF STATIONS

26.1 Stock guides into a positive stop/gaging to positively locate the blank for transfer finger pickup.
26.2 Strip must be piloted up to the station prior to the cut off.

27. FASTENERS AND DOWEL PINS

Fasteners and dowel pins must:
27.1 Be of Holochrome brand (Metric Grade 12.9).
27.2 Be pull type dowel.
27.3 Min screw size 10mm SHCS, fastener smaller than 6 mm permitted only with Camaco/Amvian sign off.

28. QUICK DIE CHANGE

28.1 Location of hydraulic die lifters are to match parallel location or 1-1/2" plate must installed be to the bottom parallels to allow for use of QDC system. Applies to tools running in 800ton press as of 5/08.
28.2 Be totally implemented according to information sheets supplied by Camaco/Amvian.

29. SAFETY BLOCK AREAS

29.1 Vendor will provide two areas in each die for safety blocks. The areas will be located diagonally as much as possible. Locations and gap dimensions in die closed position will be determined in consultation with Camaco/Amvian. Casting or weldment construction will not proceed until dimensions and locations are approved.
29.2 This area must be painted "Yellow" and stamped for proper placement of the safety blocks.
29.3 Safety block areas must be supported by parallels.

30. DIE HANDLING

30.1 Vendor will provide a means of handling dies that are compatible with Camaco's/Amvian's lifting equipment. Large transfer tooling is lifted with cranes that have chains with loops at end. Smaller tools are handled with fork trucks in and out of the press. Parallels on dies handled by a fork truck must have two fork access areas, 6 ¼" wide each without obstacles. Show on tool where to lift with Forklift. Cover between parallels where components could be damaged.
30.2 Tap (4) ¾" NC or (4) 1" NC handling holes in the edge of all die shoes and punch holders, depending on die size. Holes must be placed in such a manner that tool is stable when suspended from handling holes.
30.3 Four lifting spools will be supplied on bottom of large transfer tools. Location of spools should facilitate level lifting, ease of opening of die and safe die turnover. Strength of spool will be proportional to die size and weight. Spool must not interfere with transfer equipment.
30.4 Die set-up storage pins.

31. GENERAL NOTES

31.1 The die must have provisions for slug and scrap removal from the die to automatic scrap conveyor via chutes. Chutes to be supplied by vendor. Chutes should be screwed on and be a minimum of 3/16”/4mm thick. Scrap chutes must have a minimum of 30-degree angle to the edge the bolster.

31.2 The die must have automatic part ejection, without the use of air from the die.

31.3 The load center point for each die must be developed and defined marked on the drawing and on the die.

31.4 Tooling must be adjustable, to allow for adjustments required due to varying material thickness and key characteristics of the part.

31.5 No slug deflectors are to be inserted into post/horns, etc., use the proper size drill sharpened to a 45 point where the two holes meet; you automatically make your deflector.

31.6 When cam piercing is done using a post/horn, the punches must not be staggered so there is even blanking pressure exerted on the horn thus preventing the horn from moving.

31.7 Drain holes must be provided for stock lifters, Cam sensors spring loaded bridges, keys in the die etc.

31.8 All cam piercing must be timed within .005”/0.10mm to create even pressure on post/horns.

31.9 Cam piercing of holes for key characteristics must be positioned relative to full die progression. (i.e., If making two parts at one time then the cams must be positioned in full progression, not in half progression to pilots.

31.10 All cutting clearances must be within .002”/0.05mm of the punch when clearance is .020/0.5mm side, .001”/0.025mm when clearance is less. No inserts are to be shimmed to suit above.

31.11 When forming, the die blocks must not be undercut; undercut blocks give you inconsistent forms. No form bocks are to be used in conjunction with kicker or restrictor blocks. The blank must be developed without the use of them. (Note: provisions must be made in the form blocks so that these blocks could be installed if needed at a later date). If overbend is required past 90 degrees, a cam restrike must be used.

31.12 Thread depth must be a minimum 1.5 times the thread diameter for steel, and they are to be chamfered. Cast Iron is two times the thread diameter.

31.13 A 1/16” x .750” (1.5mm x 20mm) deep slot in the guide rail. (Both front and back) must be located in the die to start the strip. This line must be located to ensure punch will not pierce half a hole.

31.14 Chutes must also be made to separate parts from scrap.

31.15 If die produces two different parts at a time, part separators must be made by the vendor. If 2-out common parts must have identified mark to distinguish front/back of die.

31.16 The die must not be butchered in any way to get the parts to Cpk. The vendor must adjust or rework the die in a professional manner to get the parts to CPK at no cost to Camaco/Amvian. Any modified details MUST be scanned, and designs MUST be updated so details can be replaced without issues.

31.17 Tooling must be capable of producing parts consistently to a Cpk of 1.67.

31.18 Sample size to be 500 hits minimum at press speed or required strokes per/min.

31.19 30 Piece sample inspection must be done with a coordinate measuring machine, which should check every dimension on the part print. Vendor must supply data and parts for Camaco/Amvian to layout and verify.

31.20 All samples are to be made in the vendor’s press, unless otherwise arranged with Camaco/Amvian.

31.21 Should the vendor fail to make delivery as promised, any penalties listed on the Purchase Order or which are charged to Camaco/Amvian for late delivery, will be deducted from payments towards purchase order.

31.22 The vendor is responsible for any adjustments/alterations to the die if problems are found during set up, strip start up, and a run of at least 10,000 pieces or a full coil at the Camaco/Amvian specified facility.

31.23 To eliminate cracks in blocks (as well as to strengthen) due to heat treat, no sharp corners are allowed unless it is a cutting edge. Rads on inside corners are to be a minimum of 1/8”/3mm unless otherwise specified.

31.24 All clearance holes and slots are to be on maximum print dimension -.05mm unless specified by Camaco/Amvian.

31.25 All components should be stamped with material type, hardness, and detail number. Detail locations should be stamped onto die shoe.

31.26 Vendor must supply technical support during tryouts at Camaco’s/Amvian’s facility to assist with problems in our production environment that may not have been seen at sample submission.

31.27 Camaco/Amvian, with vendor’s input will come up with a corrective action plan to fix problems identified during tryout.

31. GENERAL NOTES CONT'D.

31.28 No forming or embossing using ball lock punches.
31.29 Lifting holes to be provided in components weighing more than 50 Lbs.
31.30 Standard lifter style ejectors or core pin style. https://www.standardlifters.com/products/
31.31 Die components must be foolproof to ensure proper installation.
31.32 Miss match cuts to be designed into the trim profile and part cut off. Concept of the recommended miss match to be supplied. No scallop type miss match cuts allowed!
31.33 Jack screws or pull screws (for punches) to be used throughout the die.
31.34 Spare punches, die sections, forms are to be fitted prior to die approval at Camaco/Amvian after completing 500 pcs. samples with originals.
31.35 Scrap not to exceed 4.0"/100mm square.
31.36 Vendors pre-shipping tooling checklist (Exhibit A) is to be filled out and a copy sent to Camaco/Amvian.
31.37 One set of hardened shims to be supplied for each cutting punch and die section. Stack height should be12mm, of 10 various thicknesses, to be agreed.
31.38 The Build Stage covers the interactive communication of information between Camaco/Amvian and the supplier during the build of the item purchased. The supplier will provide a bi-weekly progress report during the build state. This report is due on the 15th and last day of the month unless told otherwise. If the supplier wishes to deviate from the approved design, they must submit a request to Camaco/Amvian in writing, no cost and timing impact will be accepted. This will be reviewed and answered in writing in a timely manner.
31.39 The Sample Stage covers the production, inspection, and submission of the first sample parts. To produce first sample parts, Camaco/Amvian may elect to send a representative to the supplier's facility to observe the first production run. The supplier's responsible for operating the equipment in a production mode if possible to verify hourly first piece sample as outlined below.
31.40 Dimensional Results package should include a complete 6-piece full layout, 30-piece CAP study from each cavity of tool if applicable from a 300 piece run.
31.41 Material Certification must reference all application specifications and requirement. Material certs required for tryout material from a 3rd party.
31.42 If plating is included on first piece samples, there must be plating certifications included with the submissions.
31.43 Engineering standard testing requirements must be verified with accompanying certifications.
31.44 Statistical certifications are required with each shipment on critical characteristics. (Data must be included).
31.45 Material certifications are required for each shipment. Special circumstances can be considered on an individual basis.
31.46 These items, properly completed, must accompany the first submissions or the samples will be rejected.
31.47 The first piece samples should be shipped in a container clearly marked as samples and be addressed to the Quality Assurance Manager at our plant.
31.48 DE-STA-CO clamps preferred. Other brands only when approved by Camaco/Amvian.
31.49 All non-functional sharp edges must have chamfered edges.
31.50 On large draw dies, add titanium coating after die has been ran in-house and approved.
31.51 Maximum lubricant allowed on any steel or purchased parts must not exceed 1 gram/sq. meter. This converts to .03527 ounces per 1.196 square yards.
31.52 All Tooling and components build must conform to NAAMS METRIC standard unless specifically excepted (www.naamsstandards.org)
31.53 All suppliers are held responsible to comply with OSHA Safety and Ergonomic Handling Standards.
31.54 All supplier must provide production ready capable tooling, with consideration for maximum material usage without detriment to Die or Part Integrity.
31.55 Trim stations should only have bearing 15mm wide where cutting, not full part bearing and Form station to be blued in beyond 80%.
31.56 All working forms must be coated.
31.57 Form steel and trim steel needs to be vacuum hardened, and triple drawn.
31.58 Welding in die only with Camaco/Amvian permission allowed.

32. STANDARD TERMS AND CONDITIONS
(CAMACO/AMVIAN Tooling-Equipment-Fixture-Gage)

32.1 General expectation: Tooling is provided on a turnkey basis with Supplier responsible for all costs associated with design, build, debug, PPAP and runoff at Camaco/Amvian. Camaco/Amvian expects supplier to show proven tool capability to produce good quality product at quoted production rates on Camaco/Amvian equipment.

- Payment Terms – 45 days after Camaco/Amvian receives payment from Camaco/Amvian customer. A 5% Sales Price PENALTY will be charged per week for every week the tool is late, day into week constitutes a full week.
- Tool Cost Audit – Camaco/Amvian and/or its customers have the right to audit tool cost. Supplier is responsible for documentation and justification of tool cost, PO may be adjusted based on the audit results.
- Tool Cost Breakdown Sheets – Supplier shall complete Detailed Camaco/Amvian Tool Cost Breakdown Sheets as part of the quote submission. Quotations without cost breakdowns will not be considered.
- Freight – Quote freight DAP Camaco/Amvian.
- Tool Buyoff and Acceptance @ Supplier (300-piece run)
    - Tool Shop – Tryout time and equipment to be included in quote.
- Tool Buyoff and Acceptance @ Camaco/Amvian facility (300-piece run) at a CPK 1.67.
    - Supplier is responsible for travel expenses for supplier personnel for interim progress meetings and acceptance runs.
    - Delivery – Supplier will quote firm delivery. In case of any delay, all costs incurred by Camaco/Amvian because of this delay shall be charged to the supplier.
    - Supplier must execute a Bailee Bond.
- PPAP –
    - Supplier is responsible for submittal of full level 3 PPAP package including short- and long-term capability studies as required by Camaco/Amvian and/or its customer's incl. 300 good parts and study for Gage R&R.
    - A 6-piece full layout and 30-piece CAP study required from 300-piece run.
    - 300-piece PPAP approved parts are to be submitted to Camaco/Amvian.
    - Supplier responsible for material lab testing, if required.

- Change Control – Supplier responsible for tracking & documentation of tool revisions including timing, cost and cost breakdowns. All costs related to changes shall be paid only and after payment is received from Camaco/Amvian customer and only up to the quoted amount.
- Camaco/Amvian shall have the right to an offset to the supplier invoices in order to recover for material, time and expenses incurred by Camaco/Amvian and any other costs associated with delivery and quality of the Tooling/Equipment/Fixture/Gage or Purchased items.

33 PRESS STANDARDS

33.1 Camaco/AMVIAN personnel to supply complete Global Press and Feed Line Excel sheet.

34. TOOL PROGRESS REPORT

34.1 The die build tooling source is to provide a timeline for each die set at Die Kick Off. Updated timeline will be provided every 15th and 30th (end of month) from the die build tooling source until die is delivered to home line.

34.2 The report must be given to the appropriate Camaco/Amvian Die Engineer (Single Point of Contact) providing tool progress from the die build tooling source.

35. IN-DIE LUBRICATION

Required for all dies with more than 25 strokes/minute.

35.1 In-die lubrication to be implemented prior to all forms and drawings.
35.2 The lube lines must be contained in either top or bottom of die shoes.
35.3 Quick connect type couplers to be mounted on the die shoe in areas to prevent any damage.
35.4 This is to be determined by tool source and Camaco/Amvian at final die design.
35.5 Tool pre buy off and buy off to be done without draw oil.

36. Standard Lifters Products

36.1 Use Standard Lifters Products where applicable. See catalog for available items.
https://www.standardlifters.com/products/

EXHIBIT A
VENDOR'S PRE-SHPPING CHECKLIST

Vendor Number:	
Die Number:	
Program:	
1	Check all strip guides and lids for proper lead ins and de-burred edges.
2	Check for lift holes in die shoe, strippers and manifolds.
3	Check for jackscrews in all removable parts.
4	Check and install scrap chutes where needed.
5	Check for buckle sensor bracket, to be installed in proper position.
6	Check for slug clearance in all parallels.
7	Check and make sure drain holes are not covered with parallels.
8	Check all strip lifters for easy removal in press.
9	Check all stripper windows, for jackscrews and to be fool proofed.
10	Check for loose screws on all components.
11	Check all heel blocks, they must have a slot for easy removal.
12	Check all form rads, must be polished.
13	Check and make sure oil lines are installed in proper position.
14	Check die #, material thickness, strip width, progression, shut height and die weight must be stamped on die shoe.
15	Check for stripper levelers.
16	Check for strip start.
17	Check for part off chutes, to ensure separating RH from LH parts.
18	Stamp holders present.
19	Check all pockets and cavities for drain holes.
20	Check receipt of approved Camaco/Amvian MSDS sheet for packaging materials.
Comments:	
Signed by Manager:	Toolroom Supervisor:
Returned copy to Camaco/Amvian/:	