

NADCA B152.1-2006 CHECKLIST

Location: _____	Inspector: _____ / _____
Machine Number: _____	Manager: _____ / _____
Manufacturer: _____	
Machine Serial Number: _____	
Date of Manufacture: _____	Control: _____
Inspection Date: _____	Revision/Version: _____

PURPOSE

The purpose of this checklist is to assist users of die casting machines and systems with the compliance requirements of the new NADCA B152.1-2006 Standard (B152.1). The new Safety Standard is entitled "Safety Requirements for the Design, Manufacture, Maintenance and Operation of Die Casting Machines."

IMPLEMENTATION DATE

The B152.1 standard is effective for all new or remanufactured machines produced for installation after April 25, 2001.
The B152.1 standard is effective for all existing machines after April 25, 2004..

AUDIT PROCESS

The audit process uses B152.1 as a roadmap for identifying safety requirements for Die Casting Machines.
The process is iterative, requiring the user of the die casting machines to repeat the audit process after corrective changes.

SAFETY STANDARD FORMAT

It is strongly recommended that this checklist be used in conjunction with the B152.1 document.
Checklist procedures that are specific to the standard clauses that are machine specific are identified as Clauses 4 through 9.
Clauses 1 through 3 provide additional information, as follows:

Clause 1 Scope, Purpose, and Application

Provides general requirements and information including the time frames required for compliance to the document.

Clause 2 Normative References

Provides information concerning other industry regulations and standards that apply to the safe use of die casting machines.

Clause 3 Definitions

Provides definitions for die casting and safety related terms.

RISK ASSESSMENT

This checklist was developed to assist the end user in reviewing its machines for compliance with the safety requirements for die casting machines. We have used our best efforts to create a checklist that addresses those safety requirements, but do not warrant that the checklist does so. Compliance with this checklist does not certify that the inspected machine is free from all hazards or risks which would relieve the end user from performing a risk assessment in accordance with applicable OSHA, NFPA, ANSI, or other standards as well as Clause 7.3 entitled "Risk Assessment" as set forth in these safety requirements.

TRAINING

This checklist should only be used by qualified personnel who are knowledgeable of B152.1 and die casting machines.

INSTRUCTIONS

- | | | | |
|---------------|--|---------------|---|
| Step 1 | Complete information at the top of this page.
Start with page two of the checklist, Clause 4. | Step 4 | Document areas of non compliance on the last page. |
| Step 2 | Answer each question -Yes, No, or N/A
Yes - The current installation complies with the requirements of the Sub Clause.
No - The current installation does not comply with the requirements of the Sub Clause
N/A- Not applicable to this installation | Step 5 | Take corrective action in accordance with the requirements of B152.1. |
| Step 3 | Fill in any explanatory information requested | Step 6 | Repeat the process after the corrective actions have been taken. |
| | | NOTE: | Repeat the process for each die casting machine in the facility. |

CLAUSE 4: DIE CASTING MACHINE REQUIREMENTS

4.1 Die Space

How is the die space guarded on the operator's side of the machine? (circle the one that applies)

Operator's Door Perimeter Guard

4.1.1 Operator's Door

Applies Does Not Apply (circle one)

- a) Does the operator's door provide a barrier against impact, pinch point and hot material hazards? **YES** **NO** ---
- b) Is a locking mechanism provided that prevents the operator's door from being opened during clamp closing, injection, including die close time, and until all pressure from injection forward has been removed from the biscuit? **YES** **NO** ---
- c) Is locking of the operators door achieved by using both an electrical interlock and an additional device? **YES** **NO** ---
Describe the mechanism, other than the electrical interlock, used to lock the operators door closed? _____
- d) Does some action, other than closure of the operator's door, initiate the machine cycle? **YES** **NO** ---
Describe what action initiates the machine cycle. _____
- e) If motion is required with the operator's door open during maintenance and/or set up operations, is this motion available only in manual mode? (Refer 4.7) **YES** **NO** **N/A**
- f) If this motion is required during maintenance and/or set up operations, does the motion require two hand control, and/or one hand control, remotely located? (Refer 4.7) **YES** **NO** **N/A**
- g) If one hand control, remotely located, is used, is it located within a clear view of the die area? (Refer 4.7) **YES** **NO** **N/A**
- h) Ancillary Equipment/Perimeter Guards (See Clause 6.1) Applies Does Not Apply (circle one)
 - 1) Does the perimeter guard provide a barrier against impact, pinch point and hot material hazards? **YES** **NO** ---
 - 2) Describe the action which initiates the machine _____

4.1.2 Powered Door

Applies Does Not Apply (circle one)

- a) When closing, does the door have a presence sensing device or other means to eliminate door motion hazards? What type of device is used? _____ **YES** **NO** ---
- b) If door opening motion causes a hazard, does the door have a presence sensing device, or other means to eliminate this door motion hazard? **YES** **NO** **N/A**
- c) Will failure of the presence sensing device(s) or circuit stop or reverse the door motion? **YES** **NO** ---

4.1.3 Rear Guard

How is the die space guarded on the rear side of the machine? (circle the one that applies)

	Rear Guard	Perimeter Guard				
Rear Guard	Applies	Does Not Apply	(circle one)			
a) Does the rear guard provide a barrier against impact, pinch points and hot material hazards?				YES	NO	N/A
b) Does the rear guard have two interlocks?				YES	NO	N/A
c) Will each interlock independently stop all machine movements if the guard is opened or removed?				YES	NO	N/A
d) With the rear guard open, is motion available only in manual mode?				YES	NO	N/A
e) When motion is required with the rear guard open, does the motion require two hand control, and/or one hand control, located on the rear side of the machine?				YES	NO	N/A
f) If one hand control, remotely located, is used, is it located with a clear view of the die area?				YES	NO	N/A
g) For motion to occur with the rear guard open, do both the operator's controls on the operator's side of the machine and the controls on the rear side of the machine have to be activated simultaneously and remain activated during any motion?				YES	NO	N/A

4.1.4 Top Guard

a) If it is possible to reach over guards and into a hazardous area, is a top guard provided?				YES	NO	N/A
b) If a top guard is provided, does it provide a barrier against impact, pinch points and hot material hazards?				YES	NO	N/A
c) When the top guard is movable, is an interlock provided?				YES	NO	N/A
d) When the top guard is movable, does the interlock prevent all motion when the guard is open or removed at any time other than in manual mode?				YES	NO	N/A

4.1.5 Ratchet Bar

a) Is a ratchet bar or equivalent device provided?				YES	NO	N/A
If an equivalent device is provided, identify the type of the device used. _____						
b) When the operator's door is opened, is the platen physically prevented from closing except when the machine is in manual mode?				YES	NO	N/A
c) When power is lost to the machine is the platen physically prevented from closing?				YES	NO	N/A
d) Is the ratchet bar or equivalent device monitored?				YES	NO	N/A
e) When improper operation of the ratchet bar or equivalent device is detected is the machine cycle inhibited?				YES	NO	N/A
f) When improper operation of the ratchet bar or equivalent device is detected, is an alarm activated?				YES	NO	N/A

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4.1.6 Hardwire Electrical Interlock(s)

- (circle one) Applies Does Not Apply (see clause 6 for perimeter guards)
- a) Does opening the operator's door prevent die closing except in manual mode? YES NO ---
 - b) Does opening the operator's door prevent injection forward? YES NO ---
 - c) Does opening the operator's door prevent core setting? YES NO ---
 - d) Does opening the operator's door prevent ejector reset without the use of either two hand control or a remote one hand control? YES NO ---
 - e) Is the electrical interlock(s) hardwired? YES NO ---
 - f) Is the interlock device located or protected to prevent accidental actuation? YES NO ---

4.1.7 Clamp Hydraulic or Pneumatic Interlock

- (circle one) Applies Does Not Apply (see clause 6 for perimeter guard)
- a) If the operator's door is opened, does the hydraulic or pneumatic interlock prevent die closure except in manual mode? YES NO ---
 - b) Is the hydraulic or pneumatic interlock independent of all other interlocks? YES NO ---
 - c) Circle how the hydraulic or pneumatic interlock is actuated. **Mechanically** **Electrically**
 - d) Is the hydraulic or pneumatic interlock monitored? YES NO ---
 - e) If improper operation of the hydraulic or pneumatic interlock is detected, is the machine cycle interrupted? YES NO ---
 - f) If improper operation of the hydraulic or pneumatic interlock is detected, is an alarm activated? YES NO ---

4.1.8 Timed Opening

- a) What initiates the dwell (or die close) timer? _____
- b) Is die opening inhibited until the independent timer has timed out? YES NO ---

4.1.9 Area Between The Rear Guard and the Die Space

- a) If it is possible to stand between the rear guard and the die space, is an emergency stop pushbutton readily accessible from this area? YES NO ---

4.1.10 Cycle Initiation Control Location

What view of the die space does the operator have when the cycle is initiated? (Circle One)
Clear View (4.1.10.1) Obstructed View (4.1.10.2)

4.1.10.1 Clear View

- a) Is a two hand or remote one hand control device used to initiate the cycle? YES NO ---
Circle the appropriate device. **Two Hand** **Remote One Hand**

4.1.10.2 Obstructed View

a) Which additional safety device is provided?

Circle the appropriate device. **Acknowledgement System** **Presence Sensing Device**

ACKNOWLEDGMENT SYSTEM

- | | | | |
|---|------------|-----------|------------|
| a) Is an acknowledgement pushbutton provided in a location that provides a full view of the die space? | YES | NO | N/A |
| b) Is the start of a cycle possible only after the following sequence of events has occurred within a prescribed time interval?
1) Acknowledgment pushbutton activated, then
2) Close operator's door, then
3) Two hand control device or one hand control device, remotely located; actuated. | | | |
| c) Does a monitoring system exist to check the operation of the pushbuttons? | YES | NO | N/A |
| d) Does a monitoring system exist to check that each pushbutton is depressed within a predetermined time interval? | YES | NO | N/A |
| e) If improper operation or sequencing is detected, is the die casting machine cycle inhibited? | YES | NO | N/A |
| f) If improper operation or sequencing is detected, is an alarm activated? | YES | NO | N/A |

PRESENCE SENSING DEVICE

- | | | | |
|--|------------|-----------|------------|
| a) Is a presence sensing device provided for the die space? | YES | NO | N/A |
| b) If the presence sensing device is activated does it prevent closing of the operator's door and stop or reverse the closing motion of the operator's door and in turn the movement of the die? | YES | NO | N/A |

4.2 Other Pinch Points

- | | | | |
|--|------------|-----------|------------|
| a) Is the toggle mechanism guarded? | YES | NO | --- |
| b) If the toggle mechanism guarding is movable are the movable sections interlocked to prevent hazardous motions when the guards are open or removed? | YES | NO | N/A |
| c) Is the die height mechanism guarded? | YES | NO | --- |
| d) If the die height mechanism guarding is movable, are the movable sections interlocked to prevent hazardous motion when the guards are removed? | YES | NO | N/A |
| e) Are guards present to prevent access to hazardous areas such as guides, slides, drive couplings, motor or piston shafts, or other areas containing pinch points, or shearing or crushing hazards. | YES | NO | N/A |

NOTE: List any un-guarded areas on the last page of this document

4.3 Powered Tie Bar Pulling Systems

- | | | | |
|---|------------|-----------|------------|
| a) Are hazardous motions that occur during tie bar movement safeguarded by guards or by operator control of slow speed movements? | YES | NO | N/A |
| b) Is the system interlocked to insure the tie bar is mechanically secure before the machine may cycle? | YES | NO | N/A |

4.4 Shot End

4.4.1 Cold Chamber		YES	NO	N/A
	How is the material delivered to the shot cylinder?			
	Circle the one that applies. Metal Delivery System Manually			
a)	If a metal delivery system is used, is the delivery mechanism safeguarded with a perimeter guard?	YES	NO	N/A
b)	If a metal delivery system is used, is the side opposite the delivery system safeguarded with physical barriers?	YES	NO	N/A
c)	If material is delivered manually, is the side of the machine opposite the operator safeguarded with physical barriers?	YES	NO	N/A
d)	If material is delivered manually, is access to the tail rod and piston rod guarded with physical barriers?	YES	NO	N/A
e)	If these physical barriers are movable, are they interlocked to prevent shot cylinder motion?	YES	NO	N/A
f)	If these physical barriers are movable, are they interlocked to prevent opening the barrier during shot cylinder motion?	YES	NO	N/A
g)	Is injection forward speed reduced to a slow speed while plunger passes the pour hole to safeguard against burns from metal splashing out the pour hole?	YES	NO	N/A
4.4.2 Hot Chamber		YES	NO	N/A
a)	Is the shot end guarded to protect against burn hazards and pinch point hazards associated with the shot end?	YES	NO	N/A
b)	If these guards are movable, are they interlocked to prevent shot cylinder motion with the guards open?	YES	NO	N/A
c)	Is a mechanical device provided that prevents plunger drift?	YES	NO	N/A
d)	Is this mechanical device interlocked and monitored to prevent plunger forward motion when the die is not locked?	YES	NO	N/A
4.4.3 Vertical Shot Cylinder		YES	NO	N/A
a)	Are guards provided around the vertical shot end?	YES	NO	N/A
b)	If these guards are movable, are they interlocked to prevent shot cylinder motion with the barriers open?	YES	NO	N/A
c)	If these guards are movable, do they prevent opening the guards during shot cylinder motion?	YES	NO	N/A
d)	Is the area below the shot cylinder guarded to protect against burn hazards caused by spilling or metal splash?	YES	NO	N/A
e)	If these guards are movable, are they interlocked to prevent shot cylinder motion with the barriers open?	YES	NO	N/A
f)	If these guards are movable, do they prevent opening the guards during shot cylinder motion?	YES	NO	N/A
g)	Is the potential energy stored in the mechanism used to move the shot cylinder assembly either automatically relieved or mechanically blocked to protect against impact or pinch point hazards resulting from the unintentional release of this potential energy?	YES	NO	N/A
h)	Is a mechanical device provided that prevents plunger drift?	YES	NO	N/A
l)	Is this mechanical device interlocked and monitored to prevent plunger forward motion when the die is not locked?	YES	NO	N/A
4.4.4 Injection Interlock		YES	NO	---
a)	Is the die casting machine interlocked to prevent injection of metal unless the machine is locked?	YES	NO	---

4.5 Electrical Controls

4.5.1 Two Hand Control Device

4.5.1.1 Unintentional Operation

a) Is each button protected against unintentional operation? YES NO N/A

4.5.1.2 Concurrent Control

a) Are buttons separated to require the use of both hands to operate the controls concurrently? YES NO N/A

4.5.1.3 Control Location

a) Are the buttons located to prevent exposure to the hazard? YES NO N/A

4.5.1.4 Concurrent Pressure

a) Do both buttons need to be held while the motion (hazard) occurs? YES NO N/A

4.5.1.5 Control Release

a) Does the motion (hazard) stop or reverse when either button is released? YES NO N/A

4.5.1.6 Next Cycle Initiation

a) Does each button need to be released and reactivated for motion to reoccur? YES NO N/A

4.5.2 Control interlock circuit

4.5.2.1 Fail-Safe Control

a) Are the control interlock circuits designed as fail-safe?
(Example: Is the limit switch or device for monitoring operator's door closed designed so that if the limit switch or the device fails or a wire is broken or a connection is broken, etc., the circuit will indicate the operator's door is not closed?) YES NO ---

4.5.2.2 Operator Intervention

a) Is automatic mode inhibited if all the safe conditions are not met?
(Examples: 1. Is automatic mode or cycle inhibited if the rear guard is not closed? 2. Is automatic mode or cycle inhibited if the operator's door is not closed or locked?) YES NO ---

b) Are operator initiated actions inhibited if all the safe conditions are not met?
(Example: Are operator initiated actions such as clamp closure inhibited if the rear guard is not closed except for maintenance and/or setup?) YES NO ---

4.5.2.3 Machine Suspension

a) Does the machine stop and notify the operator when any safety is not met?
(Example: If the clamp does not lock, does the cycle stop and alert the operator?) YES NO ---

4.5.2.4 Additional Actions

a) After an alarm has occurred, does the operator have to acknowledge the alarm before additional action can be taken? YES NO ---

4.5.3	EMERGENCY STOPS & 6.2 EMERGENCY STOP CIRCUITRY			
a)	Does each emergency stop (E-stop) device stop all die casting machine motion?	YES	NO	---
b)	Has the emergency stop circuitry been hardwired and does it act independently from the electronic control systems?	YES	NO	N/A
c)	Does each die casting machine emergency stop pushbutton shut off the ancillary equipment? (See Clause 6).	YES	NO	N/A
4.5.3.1	Unobstructed Emergency Stop Device			
a)	Is there an E-stop device at each operator control station?	YES	NO	---
4.5.3.2	Emergency Stop Button Design			
a)	Is each E-stop device red, maintained (manually reset), unguarded, and a palm or mushroom button with a yellow background?	YES	NO	---
4.5.3.3	Emergency Stop Button Restrictions			
a)	Are red palm or mushroom type buttons used only for E-stops?	YES	NO	---
4.5.3.4	Start-Up Procedure			
a)	Is a deliberate action required after resetting an E-stop to restart a machine?	YES	NO	---
4.5.4	Power Source			
a)	Is the power to the die cast machine clearly identified?	YES	NO	---
b)	Does the electrical enclosure have an operational lockable disconnect?	YES	NO	---
4.5.5	Power Loss			
a)	Does loss of power stop all motion?	YES	NO	---
4.5.6	Electrical Requirements			
a)	Does this machine comply with NFPA 79-1997?	YES	NO	---

4.6 Hydraulic Fluids and Compressed Gases

4.6.1 Nitrogen

- a) Is the compressed nitrogen system designed and maintained in accordance with applicable industry standards? **YES NO ---**
- b) If the bottle is over 152.4mm (6") inside diameter, is it ASME certified? **YES NO ---**

4.6.2 Air

- a) Is the compressed air system designed and maintained in accordance with applicable industry standards? **YES NO ---**
- b) If bottle is over 152.4 mm (6)" inside diameter, is it ASME certified? **YES NO ---**

4.6.3 Hose and Tubing

- a) Are hoses that could cause injury restrained to prevent whipping if they fail? **YES NO ---**
- b) Is tubing that could cause injury restrained to prevent whipping if it fails? **YES NO ---**
- c) Are hoses properly rated for the applications? **YES NO ---**

4.6.4 Accumulators

Type of Accumulator(s) Circle one Barrier Type Piston Accumulator Other

- a) Are all accumulators properly restrained per manufacturer's specifications? **YES NO ---**
- b) Is the accumulator charged in accordance with the manufacturer's specifications? **YES NO ---**
- c) For barrier type, is an automatic drain system provided? **YES NO N/A**
- d) For other type systems is a lockable manual energy isolating device provided? **YES NO N/A**

4.6.5 Hydraulic Fluids

- a) Is fire retarding fluid used in the die casting machine and ancillary equipment? **YES NO ---**
List type of fluid being used. _____

4.7 Manual Mode

- a) Are all motions in manual mode limited to a slow speed? **YES NO ---**
- b) Are all motions that create a hazard within the operator's reach controlled by two hand control? **YES NO ---**

4.8 Safety Signs

- a) Are all safety signs present and legible? (NADCA Technical Report #915, "Recommended Safety Signs for Die Cast Machines and Related Equipment" is a recommendation only and should be considered for replacement signs where the original signs are missing.) **YES NO ---**
- | | | | | | | | |
|-----------------------------------|------------|-----------|------------|--|------------|-----------|------------|
| Hi Voltage/Ground Machine (DC001) | YES | NO | N/A | Accumulator Hazards (DC010) | YES | NO | N/A |
| Don't Reach around Guards (DC002) | YES | NO | N/A | Entering Perimeter Guarded Area (DC011) | YES | NO | N/A |
| Hi Voltage/Hi Temperature (DC003) | YES | NO | N/A | Shot End Hot Material (DC012) | YES | NO | N/A |
| Hot Surfaces (DC004) | YES | NO | N/A | Requirement for Perimeter Guards (DC013) | YES | NO | N/A |
| Training (DC005 or DC006) | YES | NO | N/A | Overhead Robot (DC014) | YES | NO | N/A |
| Hazards in Die Area (DC007) | YES | NO | N/A | Perimeter Guard Interlocks (DC015) | YES | NO | N/A |
| Hazards at Shot End (DC008) | YES | NO | N/A | Vapors and Fumes (DC016) | YES | NO | N/A |
| Hazards Inside Die Area (DC009) | YES | NO | N/A | | | | |

CLAUSE 5: DIE REQUIREMENTS

5.1 Design, Construction, and Use

5.1.1 Size

a) Does the die fit within the machine or cell guarding? **YES NO ---**

5.1.2 Broken Parts

- a) For dies equipped with springs:
 - 1. Are die springs safeguarded to prevent flying projectiles if failures occur? **YES NO N/A**
 - 2. Is there appropriate signage affixed to the die? **YES NO N/A**
- b) Are all other die devices containing potential energy safeguarded? **YES NO N/A**

5.1.3 Weight

a) Is the weight of each die permanently inscribed on the die? **YES NO ---**

5.1.4 Mounting

a) Are die fastening provisions made in both die halves for securely mounting the die to the platens? **YES NO ---**

5.1.5 Handling

- a) Does the die have eyebolt holes or other means to facilitate handling? **YES NO ---**
- b) Is the die equipped with handling straps to keep the die halves together? **YES NO N/A**

5.2 Die Setting

- a) Are impact and pinch point hazards associated with die setting and handling safeguarded through training and procedures? **YES NO ---**
- b) Does the die setting procedure include the following:
 - 1) Lockout/tagout program? **YES NO ---**
 - 2) Selection and use of die handling equipment? **YES NO ---**
 - 3) Selection and use of personal safety equipment? **YES NO ---**

5.3 Flash or Die Spitting

- a) Are the die vents guarded or directed away from the operator? **YES NO ---**
- b) Are parting line guards used to prevent die spitting hazards? **YES NO ---**
- c) Is the process set up to properly prevent hazardous spitting? **YES NO ---**

5.4 Die Changing System

- a) Is a key-operated selector switch provided to enable the die changing process? **YES NO N/A**
- b) If a mobile die changer is used, is an electrical machine interlock provided to enable the die changing process? **YES NO N/A**
- c) If the die changer is fixed, does it act as a barrier to the die area? **YES NO N/A**
- d) If the die changer does not act as a barrier, does an interlocked perimeter guard restrict access to the die area? **YES NO N/A**

CLAUSE 6: SYSTEM REQUIREMENTS**6.1 Ancillary Equipment**

- | | | | |
|---|-----|----|-----|
| a) Is all ancillary equipment interlocked to achieve a safe, controlled operation and to prevent hazardous motion when the die casting machine is not in a predetermined ready state? | YES | NO | N/A |
| b) Has any die casting machine safety device that has been removed or altered for the use of ancillary equipment been replaced by one or more of the following: modified guard; additional guarding; presence sensing devices, or perimeter guarding? | YES | NO | N/A |
| c) Do these additional safety devices comply with all safeguard requirements as described in Clause 4? | YES | NO | N/A |

6.1.1 Metal Delivery System

- | | | | |
|--|-----|----|-----|
| a) Are safeguards being used to avoid pinch point, collision, burn, and other hazards when a metal delivery system is used? (Reference Clause 4.2) | YES | NO | N/A |
| b) If combustible liquids are used, have protective measures been taken to prevent the spraying of combustible liquids on exposed metal baths and heat sources in the event of a hose or pipe failure? | YES | NO | N/A |
| c) When using a metal delivery system, is there a perimeter guard in place to prevent burn hazards? | YES | NO | N/A |
| d) Are all access safeguards interlocked to stop hazardous motion of both the metal delivery system and the die casting machine? | YES | NO | N/A |

6.1.2 Plunger Lubrication System

- | | | | |
|--|-----|----|-----|
| a) Are safeguards being used to avoid pinch point, collision, burn, and other hazards when a plunger lubrication system is used? | YES | NO | N/A |
| b) If combustible liquids are used, have protective measures been taken to prevent the spraying of combustible liquids on exposed metal baths and heat sources in the event of a hose or pipe failure? | YES | NO | N/A |
| c) Are all access safeguards interlocked to stop hazardous motion of both the plunger lubrication system and the die casting machine? | YES | NO | N/A |

6.1.3 Die Lubrication System

- | | | | |
|--|-----|----|-----|
| a) Are safeguards being used to avoid pinch points, collisions, burns, and other hazards when a die lubrication system is used? | YES | NO | N/A |
| b) If combustible liquids are used, have protective measures been taken to prevent the spraying of combustible liquids on exposed metal baths and heat sources in the event of a hose or pipe failure? | YES | NO | N/A |
| c) Prior to the activation of a die lubrication system has one of the following conditions been achieved?
1) The rear guard and operator's door are closed.
2) Perimeter guarding is in place.
3) Motion is controlled through two hand control. The two hand control shall be located in a position which provides a clear line of sight to the die space. | YES | NO | N/A |
| d) Are all access safeguards interlocked to stop hazardous motion of both the die lubrication system and the die casting machine? | YES | NO | N/A |

6.1.4 Casting Extraction System

- | | | | |
|--|-----|----|-----|
| a) Are safeguards being used to avoid pinch points, collisions, burns, and other hazards when a casting extraction system is used? | YES | NO | N/A |
| b) If combustible liquids are used, have protective measures been taken to prevent the spraying of combustible liquids on exposed metal baths and heat sources in the event of a hose or pipe failure? | YES | NO | N/A |
| c) Prior to the activation of a casting extraction system has one of the following conditions been achieved?
1) Perimeter guarding is in place.
2) Motion has been controlled through two hand control. The two hand control shall be located at a position which provides a clear line of sight to the die space. | YES | NO | N/A |
| d) Are all access safeguards interlocked to stop hazardous motion of both the casting extraction system and the die casting machine? | YES | NO | N/A |

6.2 Emergency Stop Circuitry

- | | | | |
|--|-----|----|-----|
| a) Has the emergency stop circuitry been hardwired and does it act independently from the electronic control system? | YES | NO | --- |
| b) Does all ancillary equipment have a hardwired emergency stop circuit in series with the die casting machine emergency stop circuit? | YES | NO | --- |
| c) Does each ancillary equipment emergency stop pushbutton shut off the die casting machine? | YES | NO | --- |

6.3 Control Interlocks

6.3.1 Timers

- | | | | |
|--|-----|----|-----|
| a) During automatic or semi-automatic operation, do interlocks control the die casting machine or ancillary equipment without the use of timers? | YES | NO | --- |
| b) Is the initiation of interlocked guard motion accomplished without the use of timers? | YES | NO | --- |

6.3.2 Interlock Resets

- | | | | |
|---|-----|----|-----|
| a) Upon resetting the die casting machine does ancillary equipment require independent reset? | YES | NO | N/A |
|---|-----|----|-----|

CLAUSE 7: USER REQUIREMENTS

7.1	Training			
	a) Have appropriate personnel been trained in the safe operation and maintenance of the die casting machine and ancillary equipment?	YES	NO	---
	1) Has this training been documented?	YES	NO	N/A
	2) Have the personnel been assessed to verify the effectiveness of the training?	YES	NO	N/A
7.2	Lockout/Tagout			
	a) Has a program and a procedure been established for affixing lockout or tagout devices?	YES	NO	---
7.3	Risk Assessment			
	a) Has a risk assessment been performed on the die casting machine and ancillary equipment to determine the safeguarding necessary to achieve and maintain a safe work environment?	YES	NO	---
7.4	Work Area			
	a) Have adequate work areas for safe operation of machines, maintenance, and material handling been provided?	YES	NO	---
	b) Are all walkways and working surfaces kept in good condition and free from debris and fluids?	YES	NO	---
7.5	Personal Protective Equipment			
	a) Has a personal protective equipment program for personal safety been established?	YES	NO	---
	b) Has safety equipment been selected as a result of a risk assessment in compliance with applicable state, federal, and ANSI standards?	YES	NO	---
7.6	Ventilation			
	a) Has a means of ventilation been provided to vent hazardous vapors away from personnel work areas?	YES	NO	---

CLAUSE 8: MAINTENANCE REQUIREMENTS

8.1 Training

- a) Is a program in place to instruct personnel in the safe operation of the die casting machine and ancillary equipment? **YES NO ---**
- b) Is a program in place to instruct personnel in the maintenance of the die casting machine and ancillary equipment? **YES NO ---**
- c) Are appropriate maintenance personnel trained in electrical systems, hydraulic systems, and pneumatic systems? **YES NO ---**
- d) Is on-the-job training or specialized job training provided for mechanical operation of the die casting machine and ancillary equipment? **YES NO ---**

8.2 Lockout/Tagout

- a) Is there an established procedure for affixing lockout/tagout devices? **YES NO ---**

8.3 Maintenance Operations While Under Power

- a) When motion of the die casting machine is required for maintenance, can it only occur when the machine is in manual mode? **YES NO ---**
- b) Are speeds reduced to less than full speed in manual mode when the motion is exposed and creates a potential hazard? [Maximum recommended safe speed of 250 mm/s (10 inches/second) or less]. **YES NO ---**
- c) In manual mode, is a two hand control device, or a one hand control device remotely located, used to control hazardous motions? **YES NO ---**

8.4 Stuck Plunger - Cold Chamber Machine

- a) When freeing a cold chamber die casting machine stuck plunger, are personnel trained not to enter the die space unless the machine is locked out? **YES NO ---**
- b) When die casting machine motion is required for freeing a stuck plunger, can such motion only occur in manual mode and at a reduced speed? [Maximum recommended safe speed of 250 mm/s (10 inches/second) or less]. **YES NO ---**

8.5 Stuck Casting

- a) When freeing a stuck casting, are personnel trained not to enter the die space unless the machine is locked out? **YES NO ---**
- b) When hazardous die casting machine motion is required for freeing a stuck casting, can such hazardous motion only occur in manual mode and at a reduced speed? [Maximum recommended safe speed of 250 mm/s (10 inches/second) or less]. **YES NO ---**

CLAUSE 9: GENERAL INFORMATION

9.1 Equipment Identification

- a) Does the die casting machine have a sign that includes the following:
 - 1. Name and address of the Manufacturer? YES NO ---
 - 2. Type of machine? YES NO ---
 - 3. Serial number/machine number? YES NO ---
 - 4. Year the machine was manufactured? YES NO ---
 - 5. Electrical power requirements? YES NO ---
 - 6. Machine weight? YES NO ---
- b) Is the machine equipped with the necessary safety signage? (See Clause 4.8) YES NO ---

9.2 Machine Manual

- a) Is there an equipment manual for the die casting machine that includes the following:
 - 1. Equipment identification? YES NO ---
 - 2. Type of machine? YES NO ---
 - 3. Installation and transportation weight? YES NO ---
 - 4. Intended use of the machine? YES NO ---
 - 5. Identification and location of hazards? YES NO ---
 - 6. Instructions for the safe use and maintenance of the machine? YES NO ---
 - 7. Machine operating specifications? YES NO ---
 - 8. Operating procedures? YES NO ---
 - 9. Disclaimer concerning reconstruction and modification of the machine? YES NO ---
 - 10. Disclaimer concerning the use of properly trained personnel? YES NO ---
 - 11. Listing of alarms and their descriptions? YES NO ---
 - 12. Troubleshooting guide? YES NO ---
 - 13. Recommended lockout/tagout procedures? YES NO ---

