

*Recommended Practices
for Die Casting Machine
and Ancillary Equipment
Electrical Interface*



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and Ancillary Equipment
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FOREWORD

This technical report presents an electrical interface for die casting machines and ancillary equipment where the die casting machine controller is responsible for managing the interaction between it and the ancillary equipment.

1.0 PURPOSE

The purpose of this report is to provide guidelines for electrical interfaces between ancillary equipment and die casting machines.

2.0 OBJECTIVE

The objective of this report is to standardize electrical interfaces between the die casting machine and ancillary equipment as well as to specify electrical connections for those standard interfaces.

3.0 SCOPE

This report addresses interfaces between the die casting machine and ancillary equipment such as metal delivery systems, die lubrication systems, and casting extraction systems where the die casting machine controller manages interaction between the controller and the ancillary equipment.

This report does not address a communication protocol for the transfer of data between control devices.

4.0 DEFINITIONS

- 4.1 Casting Extraction System – device or devices used to remove a casting from the die area. The casting extraction system is utilized to remove (extract) a casting from the die area and also includes the sensing (part detection) that indicates that the casting has been successfully removed from the die area. All other functions of the casting extraction system are not covered by this technical report.
- 4.2 Category 0 stop - “stopping by immediate removal of power to the machine actuators” (ref. NFPA 79 section 9.5.2).
- 4.3 Data - Information transmitted by serial or parallel means using a specific protocol.
- 4.4 Die Casting Machine - Die casting machine shall mean all die casting machines that inject molten metal under pressure into a reusable die.
- 4.5 Die Lubrication System – device used to apply die release material to the casting die.
- 4.6 Dry Contacts - A contact closure or opening (i.e. relay, limit switch, etc.) that, when activated, will provide completion or interruption of a circuit. The source responsible for activating the dry contact must operate independently from the source that is being controlled via the contact of the relay, limit switch, etc.
- 4.7 Interfaces – Physical method of transferring process sequence signals between pieces of equipment using connectors with dedicated terminal assignments.
- 4.8 Metal Delivery System – a device used to transfer metal from the holding furnace to the cold chamber.
- 4.9 Short Duration Signal - This is a signal which has a duration of at least 0.5 seconds. The length of the pulse is application dependent.

5.0 ELECTRICAL INTERFACE

A separate interface connection (DIN #43652) 10A 600V double lever base and hood plug connection will act as the physical link between the auxiliary equipment and the die casting machine. Use a 32 pin assembly for the metal delivery system and 48 pin assemblies for the casting extraction system and die lubrication system.

Two sets of two inserts are required for each interface. There are 16 male and 16 female pins in each connector in the 32 pin assembly and 24 male and 24 female pins in each connector in the 48 pin assembly. It is intended the “hot” pins (having a potential of 24 Volts or greater) be enclosed within the female insert of each connector. There are unassigned pins to meet special requirements or to accommodate further developments. The connector pin assignments and the contact functions are described under specific sections within this document.

- The voltage of the signals must not exceed 120 VAC or 250 VDC.
- For short duration signals, the pulse width must not be less than 0.5 seconds.
- All signals are maintained signals unless otherwise noted.
- Circuitry, installation and wiring must comply with NFPA 79.

6.0 CASTING EXTRACTION SYSTEM

6.1 ELECTRICAL SIGNALS (DIE CASTING MACHINE TO CASTING EXTRACTION SYSTEM)

All functions shall be Dry Contacts.

<u>PINS</u>	<u>FUNCTIONS</u>
1/9	<p>EMERGENCY STOP (D.C.M.)</p> <p>The die casting machine emergency stop circuit should be hardwired with the casting extraction system emergency stop circuit. When the die casting machine emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the casting extraction system. This is a Category “0” stop.</p>
2/16	<p>CLAMP FULLY OPEN (D.C.M.)</p> <p>Contact closure indicates that the clamp is in a predetermined fully open position. Contact closure is maintained whenever the clamp is in the predetermined fully open position.</p>
3/11	<p>MOVABLE GATES, GUARDS & PERIMETER SAFE GUARDING CLOSED (D.C.M.)</p> <p>Contact closure indicates that the movable gates, guards & perimeter safe guarding that prevent access to the casting extraction system and clamp motions are closed. Contact closure is maintained as long as the movable gates and guards are closed.</p>
4/16	<p>EJECTOR(S) FULLY RETRACTED (D.C.M.)</p> <p>Contact closure indicates that the ejector(s) are fully retracted. Contact closure is maintained while the ejector(s) are fully retracted.</p>
5/16	<p>EJECTOR(S) FULLY FORWARD (D.C.M.)</p> <p>Contact closure indicates that the ejector(s) are fully forward. Contact closure is maintained while the ejector(s) are fully forward.</p>
6/16	<p>CORE(S) FULLY SET (D.C.M.)</p> <p>Contact closure indicates that the core(s) are fully set. Contact closure is maintained while the core(s) are fully set.</p>

- 7/16 CORE(S) FULLY PULLED (D.C.M.)
Contact closure indicates the core(s) are fully pulled. Contact closure is maintained while the core(s) are fully pulled.
- 8/16 REJECT CASTING (D.C.M.)
Contact closure indicates that the casting is not acceptable. Contact closure must be on or before the clamp fully open signal and the contacts must open on or before the clamp close signal.
- 10/16 SEMI-AUTOMATIC OR AUTOMATIC MODE (D.C.M.)
Contact closure indicates the mode of operation of the die casting machine is in semi-automatic or automatic mode. Contact closure is maintained when either mode is selected.
- 12/16 D.C.M. DIE AREA CLEAR (D.C.M.)
Contact closure indicates the die space is clear for the casting extraction system entry. Contact closure must be at or after the clamp fully open signal and the contacts must open on or before the clamp close signal.
- 13/16 CASTING EXTRACTION SYSTEM CYCLE START (D.C.M.)
Contact closure indicates the die casting machine is ready for casting removal. This contact closure is a short duration signal.
- 15/16 NO PART AVAILABLE (D.C.M.)
Contact closure indicates that no cast part is available. Contact closure must be before the start of clamp opening and contact opening at the start of clamp closing.
- 16 CASTING EXTRACTION SYSTEM REFERENCE VOLTAGE
- 17/18 SECOND EMERGENCY STOP, IF REQUIRED (D.C.M.)
The die casting machine emergency stop circuit should be hardwired with the casting extraction system emergency stop circuit. When the die casting machine emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the casting extraction system. This is a Category "0" stop.

6.2 ELECTRICAL SIGNALS - (CASTING EXTRACTION SYSTEM TO DIE CASTING MACHINE)

All functions shall be Dry Contacts

<u>PINS</u>	<u>FUNCTIONS</u>
25/40	<p>PERMIT CLAMP CLOSE (CASTING EXTRACTION SYSTEM)</p> <p>Contact closure indicates the casting extraction system is in a predetermined safe area and allows the die casting machine clamp to close. Clamp closing motion must be interrupted whenever the contacts are not closed. Contact closure is maintained as long as the casting extraction system is in the predetermined safe area.</p>
26/34	<p>PERMIT CLAMP MOTION (CASTING EXTRACTION SYSTEM)</p> <p>Contact closure indicates the casting extraction system is in a predetermined safe area and allows the die casting machine clamp motion. Both clamp closing and clamp opening motion must be interrupted whenever the contact is not closed.</p>
27/35	<p>EMERGENCY STOP (CASTING EXTRACTION SYSTEM)</p> <p>The casting extraction system emergency stop circuit should be hardwired with the die casting machine emergency stop circuit. When the casting extraction system emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die casting machine. This is a Category "0" stop.</p>
28/40	<p>CASTING EXTRACTION SYSTEM NON-OPERATIONAL (CASTING EXTRACTION SYSTEM)</p> <p>An open contact indicates the die casting machine is operated with the casting extraction system. Contact closure indicates the die casting machine is operated without the casting extraction system. When the contact is closed, the state of the contacts for PERMIT CLAMP CLOSE (25,40), PERMIT CLAMP MOTION (26,34) and EMERGENCY STOP (CASTING EXTRACTION SYSTEM)(27,35 & 38,39) are still monitored. All other contacts can be in an undetermined state.</p>

- 29/40 PERMIT EJECTOR(S) RETRACT (CASTING EXTRACTION SYSTEM)
Contact closure permits the ejector(s) to retract. Contact closure is maintained until the ejector(s) are fully retracted.
- 30/40 PERMIT EJECTOR(S) FORWARD (CASTING EXTRACTION SYSTEM)
Contact closure permits the ejector(s) to go forward. Contact closure is maintained until the ejector(s) are fully forward.
- 31/40 PERMIT CORE(S) PULL (CASTING EXTRACTION SYSTEM)
Contact closure permits the core(s) to pull. Contact closure is maintained until the core(s) are fully pulled.
- 32/40 PERMIT CORE(S) SET (CASTING EXTRACTION SYSTEM)
Contact closure permits the core(s) to set. Contact closure is maintained until the core(s) are fully set.
- 33/40 CASTING NOT SENSED (CASTING EXTRACTION SYSTEM)
Contact closure indicates the casting extraction system has not successfully sensed a complete casting. This contact closure is a short duration signal.
- 37/40 CASTING EXTRACTION SYSTEM FAULTED (ALARMED)
Contact closure indicates the casting extraction system is in a fault condition. Contact closure is maintained as long as the casting extraction system is faulted.
- 38/39 SECOND EMERGENCY STOP, IF REQUIRED (CASTING EXTRACTION SYSTEM)
The casting extraction system emergency stop circuit should be hardwired with the die casting machine emergency stop circuit. When the casting extraction system emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die casting machine. This is a Category "0" stop.
- 41/40 CASTING EXTRACTION SYSTEM I.D.
Contact closure verifies that the casting extraction system is connected to the proper interface receptacle.
- 40 D.C.M. REFERENCE VOLTAGE

6.3 UNUSED PINS

<u>PINS</u>	<u>FUNCTIONS</u>
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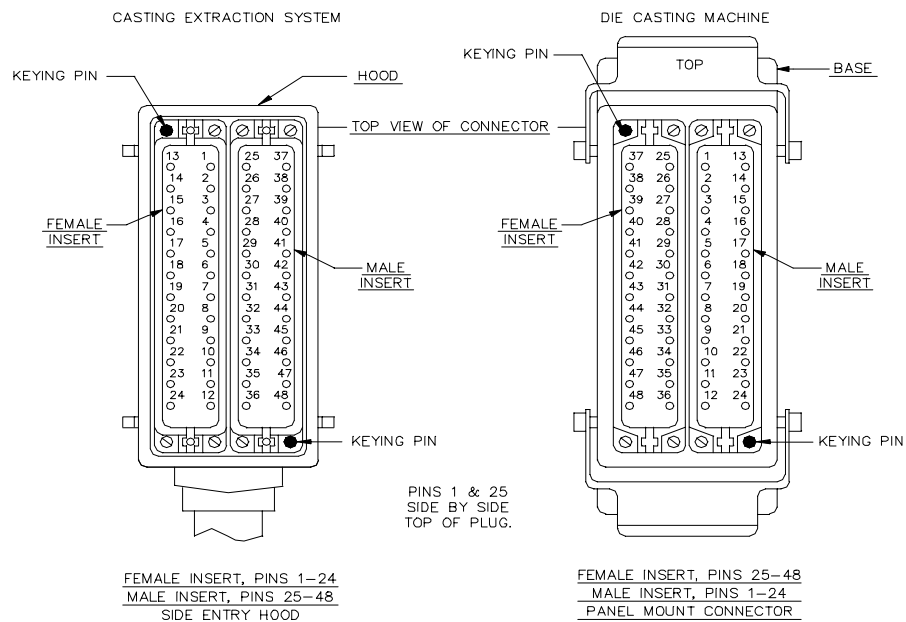
19,20,21, 22,23,24 41,42, 43 44,45, 46 47,48	SPARE
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14, 36	RESERVED FOR FUTURE USE
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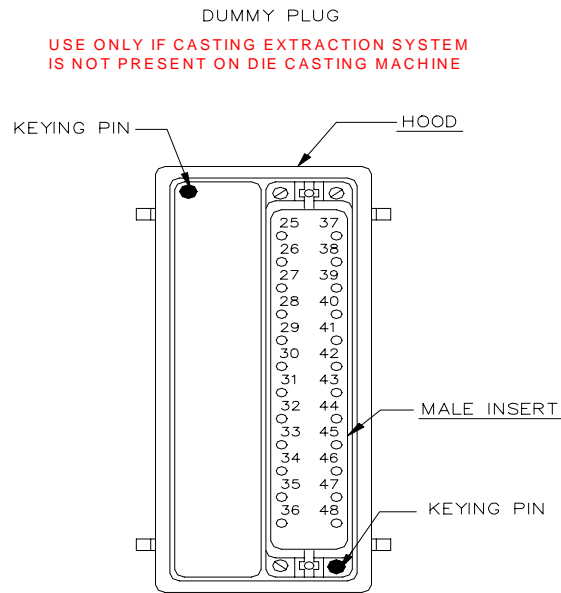
These pins are reserved for future additions to the Electrical Interface Guideline.

6.4 CASTING EXTRACTION SYSTEM INTERFACE CONNECTOR KEYING DIAGRAM

6.4.1 OPERATIONAL INTERFACE



6.4.2 "SYSTEM NOT PRESENT" INTERFACE



NOTE:

DUMMY PLUG PRE-WIRED WITH JUMPERS AS FOLLOWS;
Pin 25 to Pin 40 – Permit Clamp Close
Pin 26 to Pin 34 – Permit Clamp Motion
Pin 27 to Pin 35 – Emergency Stop
Pin 28 to Pin 40 – Casting Extraction System Non-Operational
Pin 38 to Pin 39 – Second Emergency Stop

6.5 CASTING EXTRACTION SYSTEM INTERFACE CONNECTOR PIN ASSIGNMENTS

Pin	D.C.M. Controlled Contacts	Pin	Description
1	— —	9	Emergency Stop - D.C.M.
2	— —	16	Clamp Fully Open
3	— —	11	Movable Gates, Guards & Perimeter Safe Guarding Closed
4	— —	16	Ejector(s) Fully Retracted
5	— —	16	Ejector(s) Fully Forward
6	— —	16	Core(s) Fully Set
7	— —	16	Core(s) Fully Pulled
8	— —	16	Reject Casting
9			Emergency Stop - D.C.M. See pin 1
10	— —	16	Semi-Automatic or Automatic Mode
11			Movable Gates, Guards & Perimeter Safe Guarding Closed. See pin 3
12	— —	16	D.C.M. Die Area Clear
13	— —	16	Casting Extraction System Cycle Start
14			Reserved
15	— —	16	No Part Available
16			Casting Extraction System Reference Voltage
17	— —	18	Second Emergency Stop – D.C.M.
18		17	Second Emergency Stop – D.C.M. see pin 17
19			Spare
20			Spare
21			Spare
22			Spare
23			Spare
24			Spare

Recommended Practices for Die Casting Machine and Ancillary Equipment Electrical Interface

Pin	Casting Extraction System Controlled Contacts	Pin	Description
25	— —	40	Permit Clamp Close
26	— —	34	Permit Clamp Motion
27	— —	35	Emergency Stop - Casting Extraction System
28	— —	40	Casting Extraction System Non-Operational
29	— —	40	Permit Ejector(s) Retract
30	— —	40	Permit Ejector(s) Forward
31	— —	40	Permit Core(s) Pull
32	— —	40	Permit Core(s) Set
33	— —	40	Casting Not Sensed
34			Permit Clamp Motion Casting Extraction System See pin 26
35			Emergency Stop -Casting Extraction System See pin 27
36			Reserved
37	— —	40	Casting Extraction System Faulted
38	— —	39	Second Emergency Stop - Casting Extraction System
39		38	Second Emergency Stop – Casting Extraction System see pin 38
40			D.C.M. Reference Voltage
41	— —	40	Casting Extraction System I.D.
42			Reserved DO NOT USE
43			Spare
44			Spare
45			Spare
46			Spare
47			Spare
48			Spare

7.0 DIE LUBRICATION SYSTEM

7.1 ELECTRICAL SIGNALS (DIE CASTING MACHINE TO DIE LUBRICATION SYSTEM)

All functions shall be Dry Contacts.

<u>PINS</u>	<u>FUNCTIONS</u>
1/9	EMERGENCY STOP (D.C.M.) The die casting machine emergency stop circuit should be hardwired with the die lubrication system emergency stop circuit. When the die casting machine emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die lubrication system. This is a Category "0" stop.
2/16	CLAMP FULLY OPEN (D.C.M.) Contact closure indicates that the clamp is in a predetermined fully open position. Contact closure is maintained whenever the clamp is in the predetermined fully open position.
3/11	MOVABLE GATES, GUARDS & PERIMETER SAFE GUARDING CLOSED (D.C.M.) Contact closure indicates that the movable gates, guards & perimeter safe guarding that prevent access to the die lubrication system and clamp motions are closed. Contact closure is maintained as long as the movable gates and guards are closed.
4/16	EJECTOR(S) FULLY RETRACTED (D.C.M.) Contact closure indicates that the ejector(s) are fully retracted. Contact closure is maintained while the ejector(s) are fully retracted.
5/16	EJECTOR(S) FULLY FORWARD (D.C.M.) Contact closure indicates that the ejector(s) are fully forward. Contact closure is maintained while the ejector(s) are fully forward.
6/16	CORE(S) FULLY SET (D.C.M.) Contact closure indicates that the core(s) are fully set. Contact closure is maintained while the core(s) are fully set.
7/16	CORE(S) FULLY PULLED (D.C.M.) Contact closure indicates the core(s) are fully pulled. Contact closure is maintained while the core(s) are fully pulled.

- 8/16 DIE LUBRICATION SYSTEM CONTINUE (D.C.M.)
 Contact closure indicates the die casting machine, ejector(s), core(s), plunger, etc. is ready for the die lubrication system sequence to continue. This contact closure is a short duration signal.
- 10/16 SEMI-AUTOMATIC OR AUTOMATIC MODE (D.C.M.)
 Contact closure indicates the mode of operation of the die casting machine is in semi-automatic or automatic mode. Contact closure is maintained when either mode is selected.
- 12/16 D.C.M. DIE AREA CLEAR (D.C.M.)
 Contact closure indicates the die space is clear for the die lubrication system entry. Contact closure must be at/or after the clamp fully open signal and the contacts must open on/or before the clamp close signal.
- 13/16 DIE LUBRICATION SYSTEM CYCLE START (D.C.M.)
 Contact closure indicates the die casting machine is ready for the die lubrication system to spray the die. This contact closure is a short duration signal.
- 15/16 NO PART AVAILABLE (D.C.M.)
 Contact closure indicates that no cast part is available. Contact closure must be before the start of clamp opening and contact opening at the start of clamp closing
- 16 DIE LUBRICATION SYSTEM REFERENCE VOLTAGE
- 17/18 SECOND EMERGENCY STOP, IF REQUIRED (D.C.M.)
 The die casting machine emergency stop circuit should be hardwired with the die lubrication system emergency stop circuit. When the die casting machine emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die lubrication system. This is a Category "0" stop.

7.2 ELECTRICAL SIGNALS - (DIE LUBRICATION SYSTEM TO DIE CASTING MACHINE)

All functions shall be Dry Contacts

<u>PINS</u>	<u>FUNCTIONS</u>
25/40	<p>PERMIT CLAMP CLOSE (DIE LUBRICATION SYSTEM)</p> <p>Contact closure indicates the die lubrication system is in a predetermined safe area and allows the die casting machine clamp to close. Clamp closing motion must be interrupted whenever the contact is not closed. Contact closure is maintained as long as the die lubrication system is in the predetermined safe area.</p>
26/34	<p>PERMIT CLAMP MOTION (DIE LUBRICATION SYSTEM)</p> <p>Contact closure indicates the die lubrication system is in a predetermined safe area and allows the die casting machine clamp motion. Both clamp-closing and clamp-opening motion must be interrupted whenever the contact is not closed.</p>
27/35	<p>EMERGENCY STOP (DIE LUBRICATION SYSTEM)</p> <p>The die lubrication system emergency stop circuit should be hardwired with the die casting machine emergency stop circuit. When the die lubrication system emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die casting machine. This is a Category "0" stop.</p>
28/40	<p>DIE LUBRICATION SYSTEM NON-OPERATIONAL (DIE LUBRICATION SYSTEM)</p> <p>An open contact indicates the die casting machine is operated with the die lubrication system. Contact closure indicates the die casting machine is operated without the die lubrication system. When the contact is closed, the state of the contacts for PERMIT CLAMP CLOSE (25,40), PERMIT CLAMP MOTION (26,34) and EMERGENCY STOP (DIE LUBRICATION SYSTEM)(27,35 & 38,39) are still monitored. All other contacts can be in an undetermined state.</p>
29/40	<p>PERMIT EJECTOR(S) RETRACT (DIE LUBRICATION SYSTEM)</p> <p>Contact closure permits the ejector(s) to retract. Contact closure is maintained until the ejector(s) are fully retracted.</p>

- 30/40 PERMIT EJECTOR(S) FORWARD (DIE LUBRICATION SYSTEM)
 Contact closure permits the ejector(s) to go forward. Contact closure is maintained until the ejector(s) are fully forward.
- 31/40 PERMIT CORE(S) PULL (DIE LUBRICATION SYSTEM)
 Contact closure permits the core(s) to pull. Contact closure is maintained until the core(s) are fully pulled.
- 32/40 PERMIT CORE(S) SET (DIE LUBRICATION SYSTEM)
 Contact closure permits the core(s) to set. Contact closure is maintained until the core(s) are fully set.
- 33/40 DIE LUBRICATION SYSTEM WAITING (DIE LUBRICATION SYSTEM)
 Contact closure indicates the die lubrication system is waiting for the die casting machine ejector(s), core(s), plunger, etc. sequence to be completed. This contact closure is a short duration signal.
- 37/40 DIE LUBRICATION SYSTEM FAULTED (ALARMED) (DIE LUBRICATION SYSTEM)
 Contact closure indicates the die lubrication system is in a fault condition. Contact closure is maintained as long as the die lubrication system is faulted.
- 38/39 SECOND EMERGENCY STOP, IF REQUIRED (DIE LUBRICATION SYSTEM)
 The die lubrication system emergency stop circuit should be hardwired with the die casting machine emergency stop circuit. When the die lubrication system emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die casting machine. This is a Category "0" stop.
- 42/40 DIE LUBRICATON SYSTEM I.D.
 Contact closure verifies that the die lubrication system is connected to the proper interface receptacle.
- 40 DCM REFERENCE VOLTAGE

7.3 UNUSED PINS

<u>PINS</u>	<u>FUNCTIONS</u>
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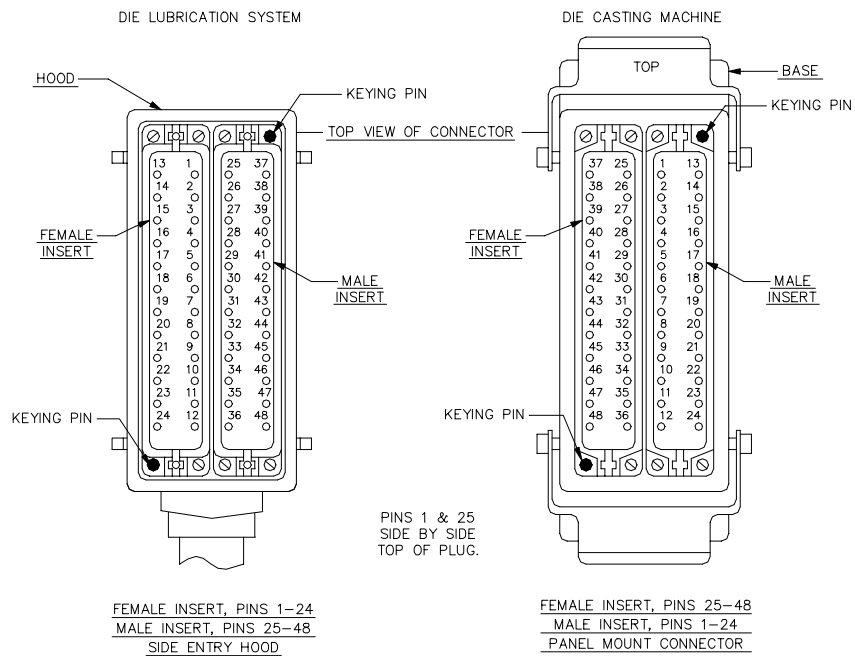
19,20,21	SPARE
22,23,24	
41,42,43	
44,45,46	
47,48	

14, 36	RESERVED FOR FUTURE USE
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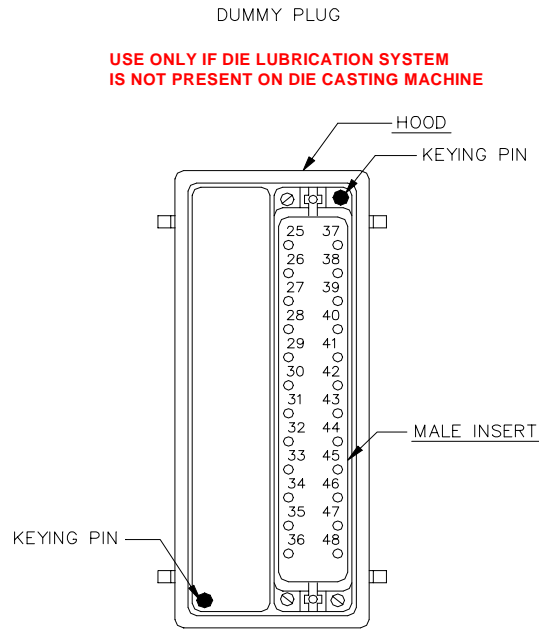
These pins are reserved for future additions to the Electrical Interface Guideline.

7.4 DIE LUBRICATION SYSTEM INTERFACE CONNECTOR KEYING DIAGRAM

7.4.1 OPERATIONAL INTERFACE



7.4.2 "SYSTEM NOT PRESENT" INTERFACE



NOTE:

DUMMY PLUG PRE-WIRED WITH JUMPERS AS FOLLOWS;
Pin 25 to Pin 40 - Permit Clamp Close
Pin 26 to Pin 34 - Permit Clamp Motion
Pin 27 to Pin 35 - Emergency Stop
Pin 28 to Pin 40 - Die Lubrication System Non-Operational
Pin 38 to Pin 39 - Second Emergency Stop

7.5 DIE LUBRICATION SYSTEM INTERFACE CONNECTOR PIN ASSIGNMENTS

Pin	D.C.M. Controlled Contacts	Pin	Description
1	— —	9	Emergency Stop - D.C.M.
2	— —	16	Clamp Fully Open
3	— —	11	Movable Gates, Guards & Perimeter Safe Guarding Closed
4	— —	16	Ejector(s) Fully Retracted
5	— —	16	Ejector(s) Fully Forward
6	— —	16	Core(s) Fully Set
7	— —	16	Core(s) Fully Pulled
8	— —	16	Die Lubrication System Continue
9			Emergency Stop - D.C.M. See pin 1
10	— —	16	Semi-Automatic or Automatic Mode
11			Movable Gates, Guards & Perimeter Safe Guarding Closed. See pin 3
12	— —	16	D.C.M. Die Area Clear
13	— —	16	Die Lubrication System Cycle Start
14			Reserved
15	— —	16	No Part Available
16			Die Lubrication System Reference Voltage
17	— —	18	Second Emergency Stop-D.C.M
18		17	Second Emergency Stop-D.C.M see pin 17
19			Spare
20			Spare
21			Spare
22			Spare
23			Spare
24			Spare

Recommended Practices for Die Casting Machine and Ancillary Equipment Electrical Interface

Pin	Die Lubrication System Controlled Contacts	Pin	Description
25	— —	40	Permit Clamp Close
26	— —	34	Permit Clamp Motion
27	— —	35	Emergency Stop - Die Lubrication System
28	— —	40	Die Lubrication System Non-Operational
29	— —	40	Permit Ejector(s) Retract
30	— —	40	Permit Ejector(s) Forward
31	— —	40	Permit Core(s) Pull
32	— —	40	Permit Core(s) Set
33	— —	40	Die Lubrication System Waiting- Die Lubrication System
34			Permit Clamp Motion See pin 26
35			Emergency Stop -Die Lubrication System See pin 27
36			Reserved
37	— —	40	Die Lubrication System Faulted
38	— —	39	Second Emergency Stop-Die Lubrication System
39		38	Second Emergency Stop – Die Lubrication System see pin 38
40			D.C.M. Reference Voltage
41			Reserved DO NOT USE
42	— —	40	Die Lubrication System I.D.
43			Spare
44			Spare
45			Spare
46			Spare
47			Spare
48			Spare

8.0 METAL DELIVERY SYSTEM

8.1 ELECTRICAL SIGNALS (DIE CASTING MACHINE TO METAL DELIVERY SYSTEM)

All functions shall be Dry Contacts.

<u>PINS</u>	<u>FUNCTIONS</u>
1/9	EMERGENCY STOP (D.C.M.) The die casting machine emergency stop circuit should be hardwired with the metal delivery system emergency stop circuit. When the die casting machine emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the metal delivery system. This is a Category “0” stop.
3/11	MOVABLE GATES, GUARDS & PERIMETER SAFE GUARDING CLOSED (D.C.M.) Contact closure indicates that the movable gates, guards & perimeter safe guarding that prevent access to the metal delivery system and clamp motions are closed. Contact closure is maintained as long as the movable gates and guards are closed.
4/16	SHOT ROD FULLY RETRACTED (D.C.M.) Contact closure indicates that the shot rod is fully retracted. Contact closure is maintained while the shot rod is are fully retracted.
5/16	START POUR (D.C.M.) Contact closure indicates that the die casting machine is ready to make a casting. Contact closure is maintained while the die casting machine is ready to make a casting.
6/7	SECOND EMERGENCY STOP, IF REQUIRED (D.C.M.) The die casting machine emergency stop circuit should be hardwired with the metal delivery system emergency stop circuit. When the die casting machine emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the metal delivery system. This is a Category “0” stop.

- 10/16 SEMI-AUTOMATIC OR AUTOMATIC MODE (D.C.M.)
Contact closure indicates the mode of operation of the die casting machine is in semi-automatic or automatic mode. Contact closure is maintained when either mode is selected.
- 13/16 METAL DELIVERY SYSTEM CYCLE START (D.C.M.)
Contact closure indicates the die casting machine is ready for the metal delivery system to start its cycle. This contact closure is a short duration signal.
- 16 METAL DELIVERY SYSTEM REFERENCE VOLTAGE

8.2 ELECTRICAL SIGNALS - (METAL DELIVERY SYSTEM TO DIE CASTING MACHINE)

All functions shall be Dry Contacts

<u>PINS</u>	<u>FUNCTIONS</u>
17/32	<p>METAL DELIVERY SYSTEM POUR COMPLETE (METAL DELIVERY SYSTEM)</p> <p>Contact closure indicates the metal delivery system has completed pouring metal. This contact closure is a short duration signal.</p>
19/27	<p>EMERGENCY STOP (METAL DELIVERY SYSTEM)</p> <p>The metal delivery system emergency stop circuit should be hardwired with the die casting machine emergency stop circuit. When the metal delivery system emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die casting machine. This is a Category "0" stop.</p>
20/32	<p>METAL DELIVERY SYSTEM NON-OPERATIONAL (METAL DELIVERY SYSTEM)</p> <p>An open contact indicates the die casting machine is operated with the metal delivery system. Contact closure indicates the die casting machine is operated without the metal delivery system. When the contact is closed, the state of the contacts for EMERGENCY STOP (METAL DELIVERY SYSTEM)(19,27 & 30,31) are still monitored. All other contacts can be in an undetermined state.</p>
29/32	<p>METAL DELIVERY SYSTEM FAULTED (ALARMED)(METAL DELIVERY SYSTEM)</p> <p>Contact closure indicates the metal delivery system is in a fault condition. Contact closure is maintained as long as the die lubrication system is faulted.</p>
30/31	<p>SECOND EMERGENCY STOP, IF REQUIRED (METAL DELIVERY SYSTEM)</p> <p>The metal delivery system emergency stop circuit should be hardwired with the die casting machine emergency stop circuit. When the metal delivery system emergency stop circuit is activated, the contact will open and will activate the emergency stop circuit of the die casting machine. This is a Category "0" stop.</p>
32	<p>D.C.M. REFERENCE VOLTAGE</p>

8.3 UNUSED PINS

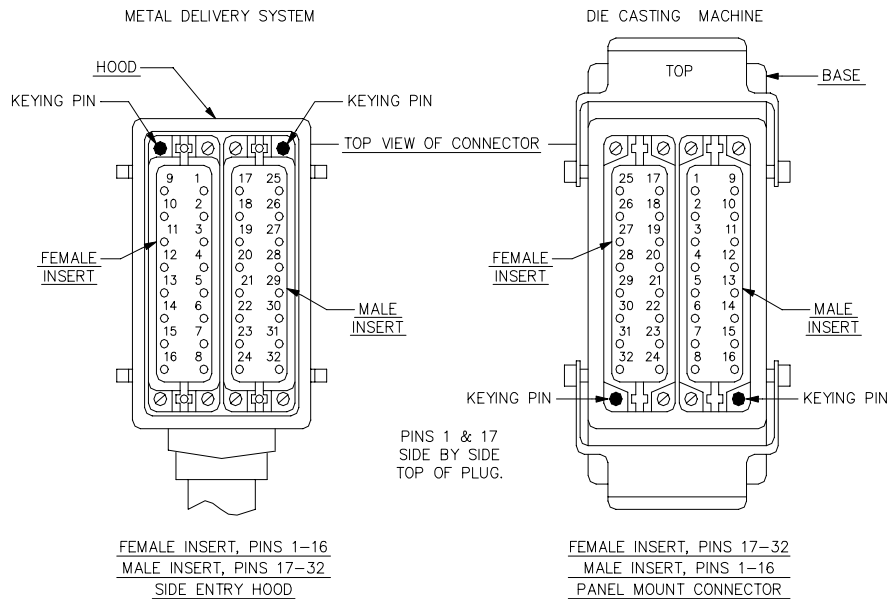
<u>PINS</u>	<u>FUNCTIONS</u>
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2, 8, 12, 15, 18, 21, 22, 23, 24	SPARE
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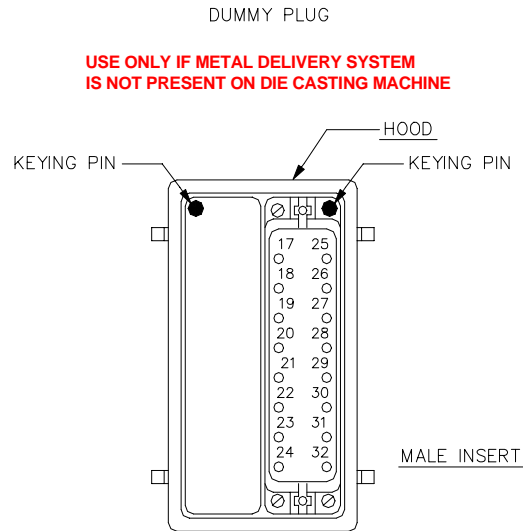
14, 25, 26, 28	RESERVED FOR FUTURE USE These pins are reserved for future additions to the Electrical Interface Guideline.
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8.4 METAL DELIVERY SYSTEM INTERFACE CONNECTOR KEYING DIAGRAM

8.4.1 OPERATIONAL INTERFACE



8.4.2 "SYSTEM NOT PRESENT" INTERFACE



NOTE:

DUMMY PLUG PRE-WIRED WITH JUMPERS AS FOLLOWS;
Pin 17 to Pin 32 – Pour Complete
Pin 19 to Pin 27 – Emergency Stop
Pin 20 to Pin 32 – Metal Delivery System Non-Operational
Pin 30 to Pin 31 – Second Emergency Stop

8.5 METAL DELIVERY SYSTEM INTERFACE CONNECTOR PIN ASSIGNMENTS

Pin	D.C.M. Controlled Contacts	Pin	Description
1	— —	9	Emergency Stop - D.C.M.
2			Spare
3	— —	11	Movable Gates, Guards & Perimeter Safe Guarding Closed
4	— —	16	Shot Rod Fully Retracted
5	— —	16	Start Pour
6	— —	7	Second Emergency Stop – D.C.M.
7		6	Second Emergency Stop – D.C.M see pin 6
8			Spare
9			Emergency Stop - D.C.M. See pin 1
10	— —	16	Semi-Automatic or Automatic Mode
11			Movable Gates, Guards & Perimeter Safe Guarding Closed. See pin 3
12			Spare
13	— —	16	Metal Delivery System Cycle Start
14			Reserved
15			Spare
16			Metal Delivery System Reference Voltage

Pin	Metal Delivery System Controlled Contacts	Pin	Description
17	— —	32	Metal Delivery System Pour Complete
18			Spare
19	— —	27	Emergency Stop - Metal Delivery System
20	— —	32	Metal Delivery System Non-Operational
21			Spare
22			Spare
23			Spare
24			Spare
25			Reserved
26			Reserved
27			Emergency Stop -Metal Delivery System See pin 19
28			Reserved
29	— —	32	Metal Delivery System Faulted
30	— —	31	Second Emergency Stop - Metal Delivery System
31		30	Second Emergency Stop – Metal Delivery System see pin 30
32			D.C.M. Reference Voltage

9.0 REFERENCED DOCUMENTS

- DIN 43652 - German Standard

10.0 RELATED DOCUMENTS

- ANSI/NADCA B 152.1-2000 “Safety Requirements for the Design, Manufacture, Maintenance and Operation of Die Casting Machines”
- NFPA 79-1997 “Electrical Standard for Industrial Machinery”
- ANSI/RIA 15.06 - 1999 “Safety Requirements for Industrial Robots”