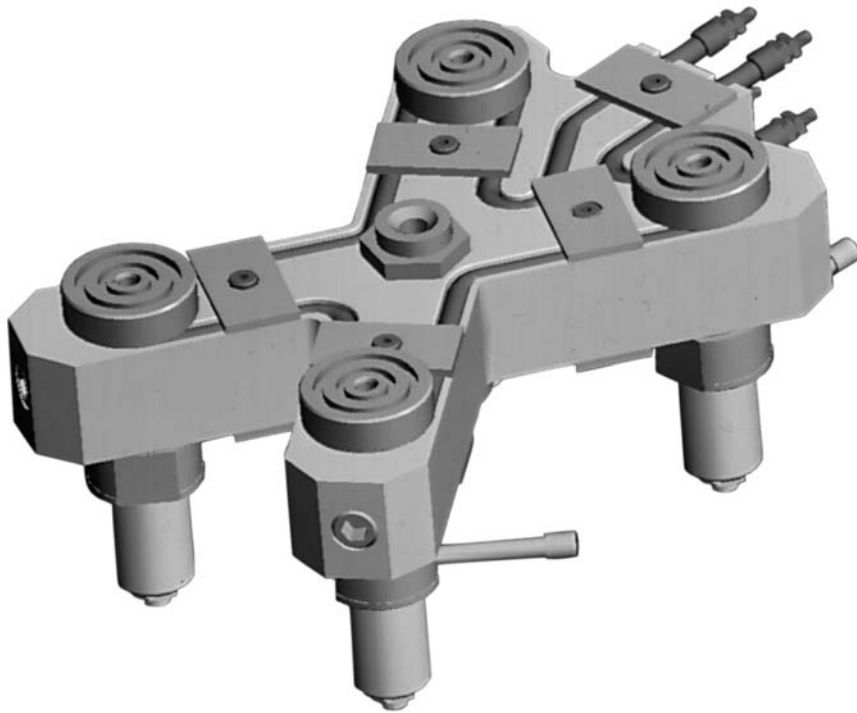


D-M-E Tubular Manifold & Components System



Every step of the way

Customer Reference Information

To our customers:

D-M-E created this manual to assist you in the installation of our Tubular Manifold and Components System into your mold base.

The contents of your tubular manifold and components system is simply the machined manifold and its supporting components (nozzles, tips, support pads, etc.). No other plates or work will be supplied with this package.

If during setup and installation you have questions that are not answered in the enclosed guide, please contact our Technical Service Department toll-free at: 888-4DME-HOT (888-436-3468).

D-M-E Company
29111 Stephenson Highway
Madison Heights, Michigan 48071

8am - 5pm EST
(800) 626-6653 (U.S.)
(248) 398-6000
Fax (248) 544-5707

Customer Reference Information

Please review the following information and determine if it is correct. If the information is not correct, please phone D-M-E Technical Service toll-free at 888-4DME-HOT (888-436-3468). This will better assist us in troubleshooting and providing correct replacement parts, should they ever be needed.

CUSTOMER REFERENCE CHART

Customer Name _____

Customer Purchase Order Number _____

End-User Name _____

Drawing Number _____

(Found in the title block on D-M-E supplied drawings.)

Contact Number _____

(Found in the title block on D-M-E supplied drawings.)

Inasmuch as D-M-E has no control over the use to which others may put this material, it does not guarantee that the same results as those described herein will be obtained. Nor does D-M-E guarantee the efficacy or safety of any possible or suggested design for articles of manufacture as illustrated herein by any photographs, technical drawings, and the like.

Each user of the product or design should make his/her own tests to determine the suitability of the product or any product, for the design, as well as the suitability of the product, or design, or both for his/her own particular use.

Statements concerning possible or suggested use of the products or designs described herein are not to be construed as constituting a license under any D-M-E patent covering such use or as recommendation for use of such materials or designs in the infringement of any patents.

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Guidelines

To ensure success of each hot runner application, it is important that mold designers take the following factors into consideration:

1. Selection of proper steel for the nozzle gate area.
2. Proper machining of gate detail to supplied print.
3. Proper cooling of the gate area to ensure proper gate vestige and to minimize drool or stringing of the material.
4. Adequate cooling in the nozzle plate, manifold retainer plate and/or support blocks (used to enclose the system), and the top clamp plate (items not included).
5. Use of the proper number and size assembly screws to provide required system support (customer to supply).
6. Allowance for adequate system cold clearance to permit later thermal expansion.

NOTE: Please treat these suggestions as guidelines only. Always follow standard mold making industry practices to ensure the proper function of the mold and hot runner system.

Inspection of the Tubular Manifold & Components

Prior to system assembly, we strongly suggest you complete the following checks and establish the procedures that will facilitate proper system assembly.

1. **Check the parts list** to ensure that all components are of the proper part numbers, and that correct quantities are supplied.
2. **Check all supplied heaters** for proper resistance in ohms (Ω) and for excessive resistance to ground conditions by doing the following:
 - a. Refer to table supplied in the design package for each heater used in your system.
 - b. Note the resistance.
 - c. Measure each corresponding heater's resistance and determine if they are equivalent. (Excessive resistance to ground is defined as a reading to ground of 20,000 Ω or less.)
 - d. Heater resistance should be +10% of listed rating.
3. **Manifold:**
Confirm that the nozzle locations are correct. Use the supplied manifold drawing to establish the shape of the clearance pocket needed in the manifold retainer plate.

NOTE: The system design package sent to you by the Applications Engineering Department should be used to establish the correct installation dimensions for your system.

Nozzle Plate

(Customer to supply)

Note the dowel pin locations on your D-M-E-supplied print and transfer this information to your nozzle plate design.

Provide the adequate number and size water lines around nozzle locations and under the manifold shape.

Confirm the nozzle plate thickness is as specified on the supplied drawings. **This dimension is important because a change in plate thickness will affect the total stack up of the system and alter the machining dimensions of the nozzle counterbore (c-bore).**

Note the nozzle c-bore depth and transfer this value to your design. The nozzle plate should be specified in D-M-E #2 steel or an equivalent.

Provide a wire channel to protect and properly route wiring to the terminal box.

DO NOT run wire channels under the manifold, because manifold temperatures may cause wire damage.

► Operational Hint

To prevent rotation during installation, key the nozzles before starting. This procedure will facilitate tip removal for replacement or clearing of foreign material from the nozzle tips once the system is assembled. The preferred method for keying nozzles used in D-M-E Package System Designs is included in the system design package supplied by the Applications Engineering Department. An alternate method may be used if the cavity contour is machined onto an extended length sprue-gate-style tip. We also strongly recommend that all systems incorporate the use of wire channels to properly route, as well as protect, system wiring.

Manifold Retainer Plate

(Customer to supply)

The manifold retainer plate should encompass the entire manifold.

Provide adequate number and size water lines around manifold pocket.

The supplied drawing should be used to establish proper clearance around the manifold.

AGAIN, PROPER CLEARANCE IS CRITICAL.

Location of the terminal mounting box must be determined. Attach the terminal mounting box to the mold following the directions given in the D-M-E catalog.

A slot (vent) should be cut from the clearance pocket located toward the bottom side of the manifold retainer plate. (Recommended size: 0.060 in. deep and 1.00 in. wide.)

The manifold retainer plate should be specified in D-M-E #2 steel or equivalent.

Finally, if necessary, provide proper clearance for nozzle heater leads in the underside of the manifold retainer plate.

CHECK AND MACHINE CLEARANCE FOR LOCATING RING FLANGE IF NECESSARY.

Clamp Plate

(Customer to supply)

Identify locations of upper support pads on the D-M-E-supplied print and transfer this information to your clamp plate design. These support pads will be mounted to the underside of the clamp plate.

Provide adequate number and size water lines over the manifold shape.

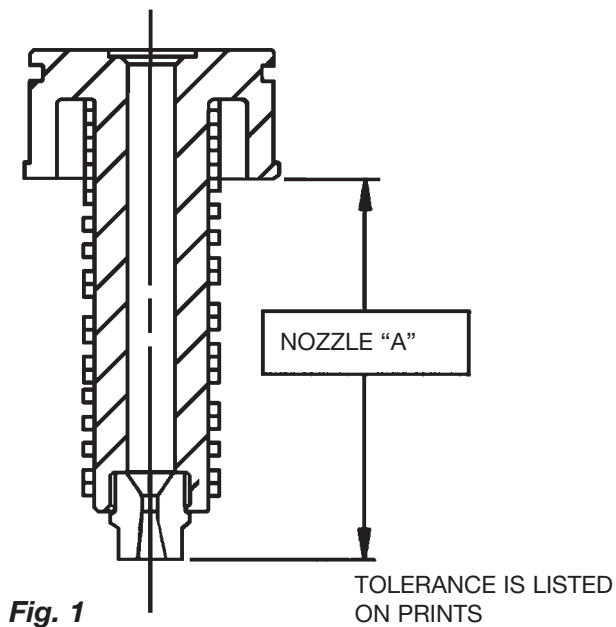
Transfer the matching machining dimension for the locating ring pocket from the supplied prints.

The clamp plate should be specified D-M-E #1 steel or equivalent.

Follow the steps and procedures outlined on the following pages to ensure proper system assembly. All dimensional checks should be recorded on the Master Inspection Sheet, on page 19, to assist documentation for quality control and quality assurance programs. This information also will help facilitate final assembly and future questions regarding this system. Use the charts on the following pages to record the system dimensions as assembled.

STEP 1. Nozzle Measurements

Check the “A” dimension of the nozzle assemblies to ensure this dimension is within specification and to establish a base for all other dimensions. Record the value (Figure 1) on the **Master Inspection Sheet** on page 19.



Nozzle Plate

STEP 2. C-Bore Depth Measurement

Inspect the nozzle plate that will house the nozzle bodies for flatness. Ensure the wire channels are free of any burrs and that all directional changes incorporate generous radii. All nozzle head counterbore depths (Figure 2) are to be $+0.001$ to -0.000 in. from the design dimension. Measure the counterbore in three locations to ensure flatness. Record this number as the “B” dimension on the **Master Inspection Sheet** on page 19.

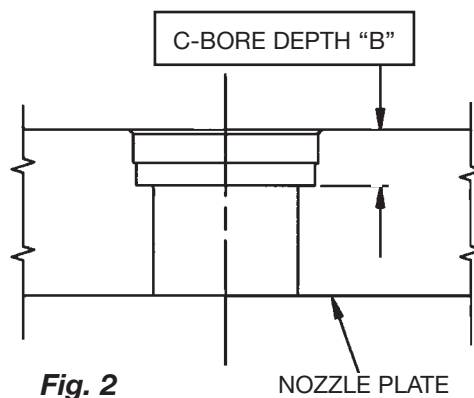


Fig. 2

NOZZLE PLATE

STEP 3. Head Height

Install the nozzles into their respective counterbores. **DO NOT INSTALL THE NOZZLE SEAL RINGS AT THIS TIME.** Check the height from the top of the nozzle head to the plate in which the nozzles are installed. Record these dimensions as “C” on the **Master Inspection Sheet** on page 19 (Figure 3).

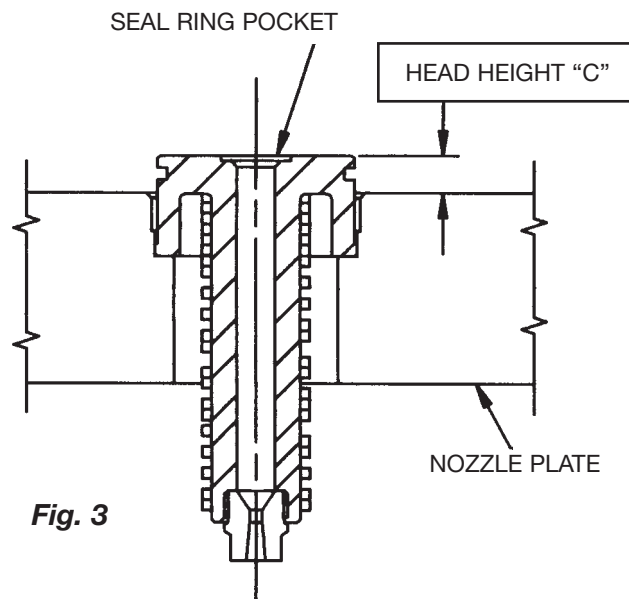


Fig. 3

NOZZLE PLATE

Helpful Hints

STEP 4. Grinding Support Pads

If needed, size the **manifold center support** to a dimension of +0.000 to -0.001 in. to the height of the nozzle heads found in Step #4. Grind both sides of the center support pad to ensure parallelism. **(PLEASE NOTE: The support pads are manufactured from a non-magnetic material. Fabricate a fixture plate to the grinder.)** Record this dimension where indicated on the **Master Inspection Sheet** on page 19.

NOTE: Mark the nozzle bodies on their outer diameter with the location in which they will be installed. Pay particular attention to systems that utilize different length nozzles. On multi-cavity molds, the marked number will normally reflect the cavity number, which in turn will match the temperature control zone number. Each nozzle counterbore should be numbered with its appropriate location. Use the “0” corner as a location reference.

With each manifold and component system, D-M-E supplies a wiring diagram indicating probable locations. If the supplied diagram does not suit your needs, it is important that the diagram be remarked or a new diagram be made. A copy of the revised wiring diagram should be forwarded to the Applications Engineering Department to keep the system file current. This will facilitate troubleshooting any problems that might arise at a later time.

STEP 5. Properly Position the Manifold using Two Dowel Pins

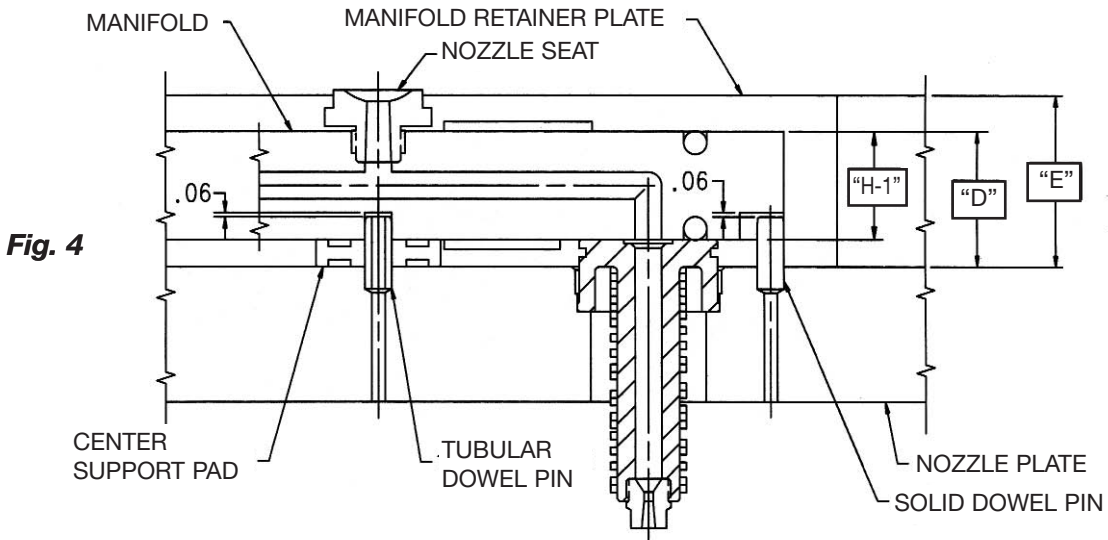
The first dowel will be located at the center of the manifold. Install this tubular dowel through the center support pad. The second dowel location normally will be positioned at one of the manifold ends. The end location will be machined in the form of a slot, which will allow for expansion of the manifold when it reaches operating temperature. The length of these dowel pins should be 0.060 in. less than the combined depths of their installation holes in the nozzle (or “A” plate) and the manifold, plus the height of the center support pad determined in Step #6. The 0.060 in. dimension ensures that the dowels do not hold the manifold off the nozzles. **The use and proper location of these dowels is important to ensure nozzle drop locations line up accurately with the nozzle flow channel holes.** Install dowel pins and check that their height meets the above criteria.

STEP 6. Check the Manifold Thickness

Record this dimension as “H-1” on the **Master Inspection Sheet** on page 19. *(Do not include the heater cover plates in this measurement.)* Next, test-fit the manifold block over the nozzles and dowel pins, making sure that the manifold lies flat across the nozzles with no rocking motion.

STEP 7. Establish the “D” Dimension

Establish the “D” dimension by adding the average “C” dimension to the “H-1” manifold thickness. Record this dimension on the **Master Inspection Sheet** on page 19 (Figure 4).



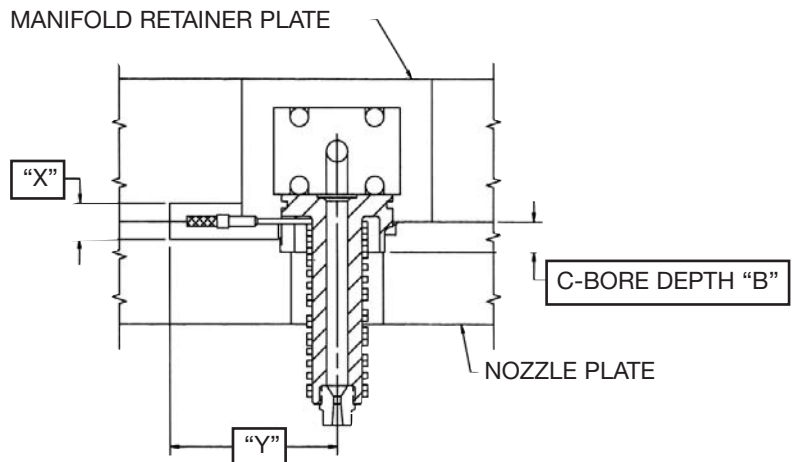
STEP 8. Check the Retainer Plate Thickness

Before installing the manifold retainer plate, check and record the thickness of the retainer plate. Record this dimension as “E” on the **Master Inspection Sheet** on page 19. Carefully install the manifold retainer plate taking care not to pinch any wiring. Check for proper clearance around the perimeter of the manifold to the manifold retainer plate, and also around the manifold heater termination areas.

NOTE: If the c-bore depth “B” is less than “X” it will be necessary to machine a slot the difference between “B” and “X” in the manifold retainer plate to clear the nozzle heater leads.

Fig. 4a

NOZZLE SERIES	“X” DIM	“Y” DIM
250	.500	3.500
375	.625	
625	.625	
GATE MATE 4	.500	4.250
JUMBO GATE MATE	.625	



Questions? Call D-M-E toll-free at 888-4DME-HOT

Preparing for Final Assembly

STEP 9. Size and Install Upper Support Pads

Size and install the upper support pads into the underside of the clamp plate. **(PLEASE NOTE: The upper support pads are manufactured from a non-magnetic material. Fabricate a fixture to the grinder to hold the support pad.)** This dimension will be the difference between the “E” dimension minus the “D” dimension minus cold clearance. Record this as dimension “SP” (Figure 5) on the **Master Inspection Sheet** on page 19.

NOTE: Use the following formula to determine cold clearance:

“H-1” x .000063 x (process temp. – 68°F) – .003 = Total Cold Clearance

“H-1” = manifold thickness. Do not include heater covers in this measurement.

STEP 10. Test Fit Clamp Plate

Test fit the clamp plate to check interference between upper support pads and any manifold components or wiring. Check and record the “Z” dimension (Figure 5) on the **Master Inspection Sheet** on page 19. **THIS DIMENSION SHOULD FALL WITHIN ±0.001 in. OF EACH OTHER.** Remove the clamp plate and inspect the manifold area. Remove the retainer plate and set it aside temporarily.

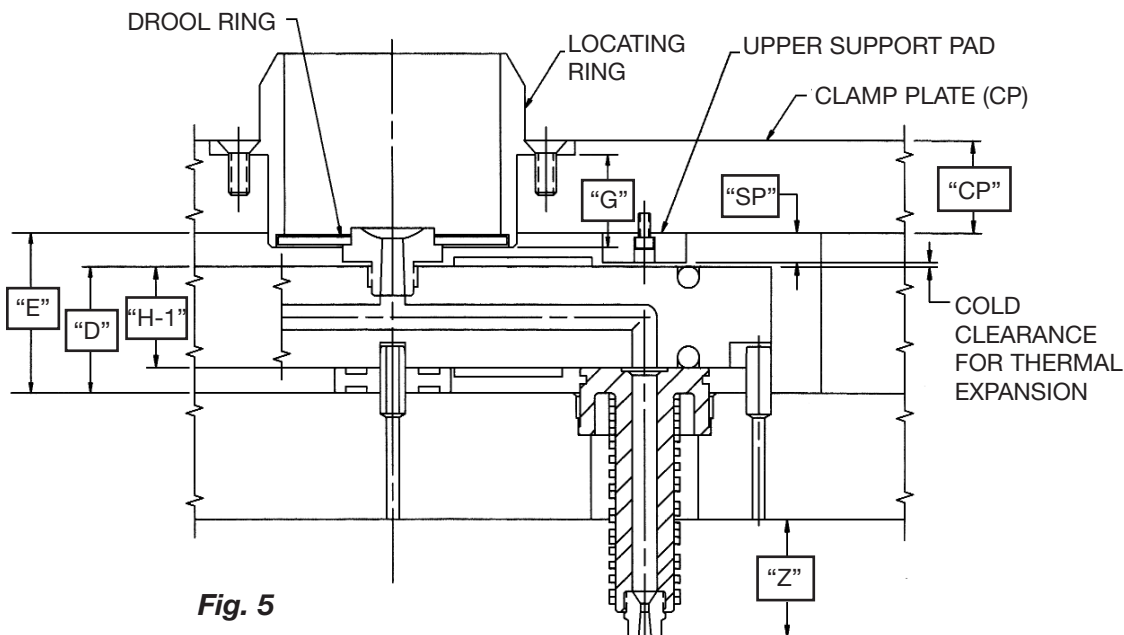


Fig. 5

STEP 11. Prepare to Install Seal Rings

Next remove the manifold, taking care to protect wiring, and prepare to install seal rings into the head of the nozzles. Check to see that all nozzles and their locations are properly marked. Mark all nozzles, manifold power, and thermocouple leads to ensure proper connection into the system terminal box. At this time, it is possible to wire-up the nozzle assemblies to the power and thermocouple connectors. Refer to the **Wiring Guidelines** provided in this manual (beginning on page 14) for further assistance.

STEP 12. Install Seal Rings and Manifold

Clean seal ring counterbores, **INSTALL SEAL RINGS**, and then carefully install the manifold into position without displacing the seal rings from their locations. It is now time to wire-up the power and thermocouple leads to the proper connectors. Clean and install the manifold retainer plate. **DO NOT PINCH WIRING**. Clean and install the top clamp plate. Then torque down the bolts that tie the top clamp plate to the nozzle plate using the torque values specified on the system design drawing.

STEP 13. Install Drool Ring and Locating Ring

Determine the locating ring cut-off dimension “**G**” (Figure 5). Measure down from the surface of the locating ring flange to the nozzle seat flange on which the drool ring rests. Subtract 0.010 in. and record this dimension as “**G**” on the **Master Inspection Sheet** on page 19. Machine the locating ring skirt length to this dimension. Finally, install the drool ring and locating ring onto the top clamp plate. **Check and machine for locating ring flange if necessary.**

Final Assembly

STEP 14. Fasten Clamp Plate to Mold

Carefully assemble the clamp plate to the remainder of the mold. **USE CAUTION** to avoid pinching any of the system wiring.

- Install all assembly screws and torque down as required.
- Recheck all wiring for continuity.
- Bench test the unit.

Tubular Manifold & Components Wiring Guidelines

1. Ground Connection

A ground connection must exist between the hot runner system (mold base) and the temperature control system. This is accomplished via the D-M-E mold power cable, which contains a ground wire (green) provided on the connector.

TO PREVENT ELECTRICAL SHOCK AND ENSURE PERSONAL SAFETY, THE GROUNDING WIRE SHOULD BE CONNECTED TO THE MOLD BASE OR THE TERMINAL BOX ITSELF.

2. Power and Thermocouple Connector Placement

Do not place the mold's power or thermocouple plugs in any area where they will be exposed to extreme temperature or humidity.

3. Confirm Zone Numbering with Respect to Cavity Numbers

4. Wire Channels

Use wire channels to ensure that wiring for nozzle and manifold (including thermocouples) is routed away from the manifold. Use retainer clips to hold the wiring in the channels to prevent wires from being cut or pinched during final assembly.

5. Recheck Resistances of Heaters and T/Cs

Compare to previous results. If values are different, troubleshoot the system. Record these values on the **Master Inspection Sheet** on page 19, and compare to those values provided on your design.

6. Adding Additional Wire to Nozzle Heater Leads

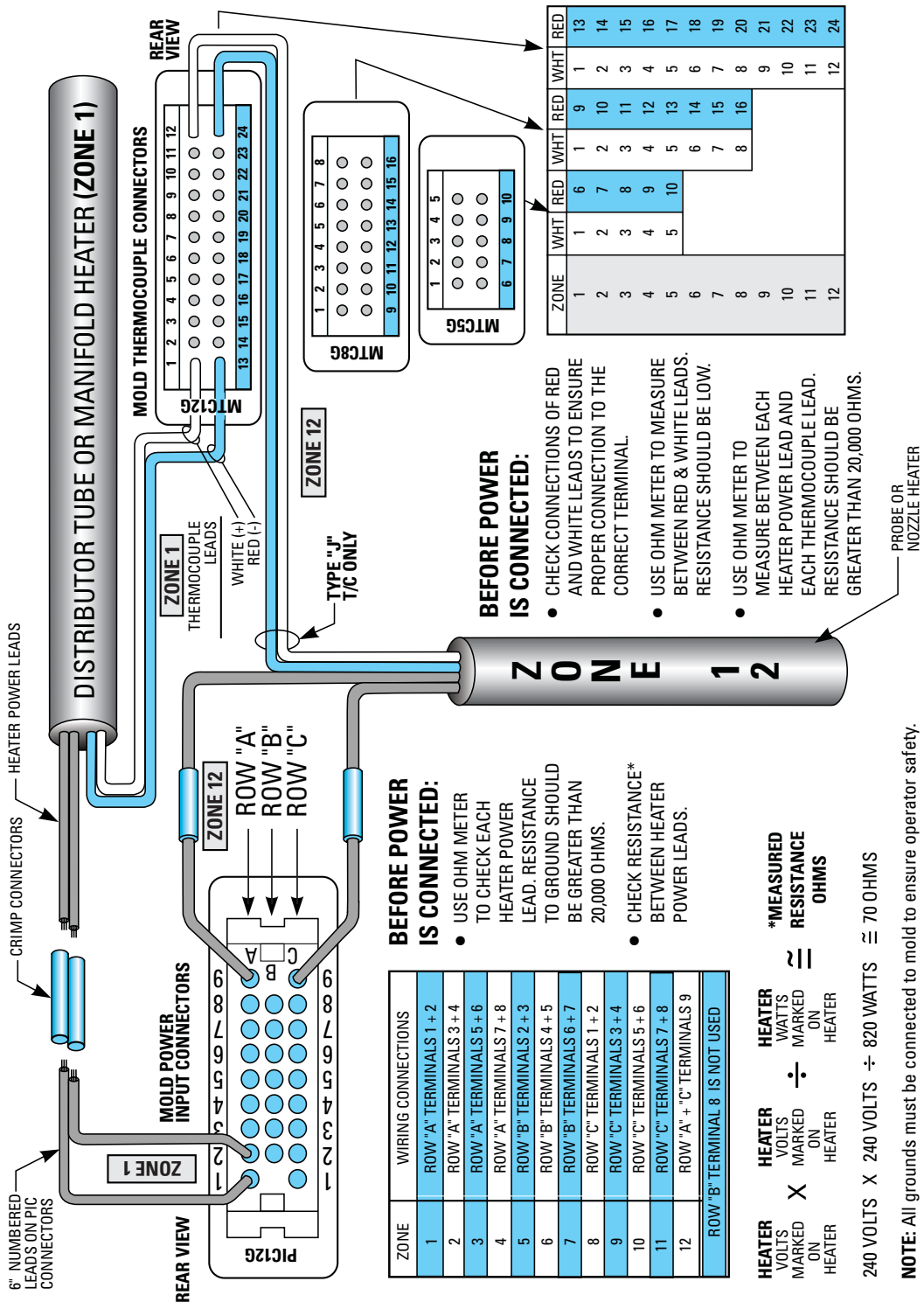
If additional lead length is required, use the same type of wire. Where the connection is made, a non-insulated butt connector should be used and taped over with a high-temperature insulating tape. Be sure to test all connections before final assembly.

7. Adding Additional Wire to Thermocouple Leads

If additional lead length is required, use only type "J" thermocouple wire (positive [+] white, negative [-] red). The wire should be double-length stripped, folded for proper silver-solder connection, and taped over with a high-temperature insulating tape.

NOTE: In the event that multiple zones are ganged together to minimize the required number of control zones, it will be necessary to use one pair of thermocouple wires per ganged set of nozzles. Run other thermocouple leads into the terminal box, insulating and identifying each for use as spares if required at a later date.

Wiring Diagram for the D-M-E Hot Runner System & Smart Series®/G-Series Mold Connectors



Questions? Call D-M-E toll-free at 888-4DME-HOT

Instructions Prior to Installation of the Hot Runner System

Perform the following checks before installing the hot runner system into the press.

1. With the system properly grounded, execute an electrical check of each control zone for both power and thermocouple connections. Check the heater leads for continuity. The resistance checked to ground of all heater leads must be greater than 20,000 ohms (20 KW).
2. Check each thermocouple circuit for continuity. It is also important to check for continuity between thermocouples and heater elements. **There should be no circuit between the heater element and the thermocouple.**
3. Bench test the unit with the temperature controller set at 300°F. Ensure all heaters come up to the desired set point. If desired set point is not reached, troubleshoot the system.
4. When the mold is installed in the press and all water connections are made, plug the power and thermocouple cables into the mold terminal box.
5. Set the temperature controller to the correct processing temperature for the material being molded. This value is usually 25 – 50°F higher than front barrel temperature setting.

► **Operational Hint**

Allow all heaters to go through a moisture dryout process.

6. Bring the system up to the correct processing temperature. Turn on mold water (cooling) and close the mold. Extremely cold water is not necessary. Water temperature of 100°F should keep the “A” side of mold from expanding at a different rate than the “B” side of the mold.
7. When the hot runner system has reached set point and is normalized, the D-M-E temperature controllers will show a green light in the center of the deviation light display.
8. Make sure that the machine nozzle orifice is as large as, but not larger than, the nozzle seat orifice on the manifold. This will allow maximum throughput to the hot runner molding system and the mold cavities.
9. Be certain that the nozzle radius on the machine barrel matches the nozzle seat radius on the manifold to prevent drooling. This should ensure a leak-proof seal.
10. Purge the barrel to ensure stable material enters the manifold.
11. Move the machine nozzle into position against the manifold nozzle seat.

Manifold Filling Procedures

1. Ensure that the machine's nozzle tip is properly seated on the manifold nozzle seat.
2. Set machine back pressure to 300–500 psi.
3. Run the extruder until material flows through all nozzle orifices (gates). Run for an additional 5–15 seconds. Then clear gates and all mold surfaces of material. If the machine nozzle will not stay against the tool, see “**Notes & General Comments**” following these instructions.
4. Move the sled back and decrease back pressure to normal setting.
5. Set decompression/suck back at a minimum 0.500 in. to control drool.
6. Set molding parameters.
7. Move sled forward.
8. Start the molding process.
9. Check the system for leaks.

Notes & General Comments

- If the system will not start up, throttle down or shut off water to the “**A**” plate. Water to the nozzle plate should remain on.
- If the machine will not extrude with the tool open, close the tool, jog the screw forward, open the tool, close the tool, and jog the screw forward again.
- If the machine nozzle will not stay against nozzle seat, **PROCEED WITH CAUTION**. Set injection forward pressure to 200 psi. Set injection speed to slow, making sure the system is up to temperature. Move the sled into the tool and cautiously jog injection forward until material flows through gates. If necessary, raise the injection pressure in steps up to, but not exceeding, 500 psi. Clear gates and all mold surfaces of material. Finally, start the molding process.

NOTE: *Never inject plastic through the hot runner system with the mold open.*

Front-load Wrenches

ITEM NO.	SERIES
GATE MATE 4	WRE 0007
250	WRE 0010
375	WRE 0013

Questions? Call D-M-E toll-free at 888-4DME-HOT

CAUTIONS!!!

MAKE SURE YOU WEAR PROPER SAFETY EQUIPMENT SUCH AS GLOVES AND FACE SHIELD AT ALL TIMES.

NEVER USE A TORCH TO OPEN FROZEN-OFF GATES. THIS MAY DAMAGE TIPS, GATE DETAIL, OR THE MOLD ITSELF.

IF YOU INSERT ANYTHING INTO THE GATE OR TIP TO CLEAR IT, YOU MUST FIRST BACK THE MACHINE NOZZLE AWAY FROM THE TOOL. CHECK FOR DROOL OUT THE BACK OF THE MANIFOLD BEFORE YOU START. DROOL HERE WILL INDICATE LITTLE OR NO PRESSURE IN THE MANIFOLD.

NEVER INJECT ANY HOT RUNNER SYSTEM WITH HIGH INJECTION PRESSURE WHEN THE MOLD IS OPEN.

DURING THE FIRST 15 MINUTES OF OPERATION, CHECK SYSTEM FOR LEAKS. **LOSS OF SHOT SIZE COULD BE AN INDICATION OF LEAKAGE.**

CHECK TO SEE THAT ALL COOLING FANS ARE OPERATING IN TEMPERATURE-CONTROL MAIN FRAMES.

INPUT VOLTAGE TO THE MAIN FRAME SYSTEM **MUST NOT BE LESS THAN 208 VAC.**

VOLTAGES LESS THAN 240 VAC WILL REQUIRE AN EXTENDED TIME TO BRING THE SYSTEM UP TO ITS PROPER OPERATING TEMPERATURE. LOWER VOLTAGES DECREASE EFFECTIVE WATTAGE. **FOR EXAMPLE: AT 208 VAC, THE EFFECTIVE WATTAGE IS 28% LESS THAN THAT AT 240 VAC.**

Master Inspection Sheet for the D-M-E Tubular Manifold & Components System

ONCE THIS FORM IS COMPLETED, PLEASE FAX TO D-M-E AT (248) 544-5707

DROPS	NOZZLE DIMENSIONS					HEATER & THERMOCOUPLE (T/C) OHM MEASUREMENT:	
	A	B	C*	D**	Z	Heater	T/C
Nozzle #1	_____	_____	_____	_____	_____	_____	_____
Nozzle #2	_____	_____	_____	_____	_____	_____	_____
Nozzle #3	_____	_____	_____	_____	_____	_____	_____
Nozzle #4	_____	_____	_____	_____	_____	_____	_____
Nozzle #5	_____	_____	_____	_____	_____	_____	_____
Nozzle #6	_____	_____	_____	_____	_____	_____	_____
Nozzle #7	_____	_____	_____	_____	_____	_____	_____
Nozzle #8	_____	_____	_____	_____	_____	_____	_____
Nozzle #9	_____	_____	_____	_____	_____	_____	_____
Nozzle #10	_____	_____	_____	_____	_____	_____	_____
Nozzle #11	_____	_____	_____	_____	_____	_____	_____
Nozzle #12	_____	_____	_____	_____	_____	_____	_____
Nozzle #13	_____	_____	_____	_____	_____	_____	_____
Nozzle #14	_____	_____	_____	_____	_____	_____	_____
Nozzle #15	_____	_____	_____	_____	_____	_____	_____
Nozzle #16	_____	_____	_____	_____	_____	_____	_____

* Head Height

** Average "C" plus "H-1" dimension

ASSEMBLY DATE _____ D-M-E QUOTE NO. _____ ASSEMBLED BY _____

MANIFOLD "H-1" THICKNESS _____ CENTER SUPPORT HEIGHT _____

MANIFOLD RETAINER PLATE THICKNESS "E" _____ DIMENSION "SP" _____

LOCATING RING CUT-OFF DIMENSION "G" _____

Questions? Call D-M-E toll-free at 888-4DME-HOT

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Every step of the way