Midland Technologies, Inc.

Valve-Less Vacuum Blocks

WWW.MIDLANDTECHNOLOGIES.COM

Vacuum-Assist Die Casting

WHY VACUUM-ASSIST

The two leading causes for rejection of high pressure castings are poor fill and excessive porosity. Vacuum-assist is an effective tool to combat both poor fill and air porosity when casting aluminum, zinc, magnesium or brass parts that are difficult to fill or have low porosity requirements.

DIFFICULT TO FILL

Thin walls or ribs
Sharp angles
Standing posts

LOW POROSITY REQUIREMENTS

Pressure sensitive components
Structural castings
Cosmetic parts

VACUUM-ASSIST AS A PRODUCTION PROCESS

Incorporating vacuum-assist when first quoting a part can help to **maximize job profitability** and **minimize potential loss** by ensuring proper air and gas evacuation from the start.

PROMOTE

Higher casting yields
Faster job completion with less press time
More efficient casting processes

AVOID

High fallout rates due to porosity or poor fill
Downtime while troubleshooting
Resources spent troubleshooting

VACUUM-ASSIST AS A CORRECTIVE PROCESS

Vacuum-assist can be a highly effective remediation tool when a casting presents unacceptable or undesirable fallout rates due to poor fill or excessive air and gas porosity. Midland Technologies provides the service of reviewing specific casting porosity and fill issues to evaluate applicability of vacuum-assist.

GETTING STARTED WITH VACUUM-ASSIST

STEP 1: Complete and submit a Vacuum Block Sizing Form (found on our website). If available, please send us a 3D model of the part and shot. If you have an existing casting with porosity or fill issues, please include a picture of the problem where possible.

STEP 2: Midland will calculate the required evacuation area for the casting and then recommend the correct Valve-Less Vacuum Blocks. If it is an existing casting, Midland will first evaluate the casting issue to determine if vacuum-assist is likely to help.

STEP 3: Provide a 3D layout of the die with a purchase order for the recommended Valve-Less Vacuum Blocks. Midland will provide you with a recommended vacuum block exit runner layout to help ensure optimal function.

Vacuum-Assist Die Casting

BASIC PRINCIPLE OF VACUUM-ASSIST CASTING

Vacuum-assist operates by means of a pressure differential. A vacuum pump creates a vacuum atmosphere within a receiver tank that will contain less matter than the ambient atmosphere. The volume of air that is present within the cavity and shot sleeve (V_C) will move to fill the lower pressure receiver tank at a theoretical maximum speed (v_s) of 340 m/s. The exit flow rate of air (R_v) from the die is limited by the smallest area of the exit orifice (A) in the mold set. If the volumetric flow rate of air is assumed to be constant, then the time required to evacuate the cavity (t_e) can be approximated as:

$$t_e \approx \frac{V_C}{R_V} \approx \frac{V_C}{A \cdot v_s}$$

When utilizing Valve-Less Vacuum Blocks, the pathway between the vacuum receiver tank and the die is governed by a solenoid valve. The solenoid valve is opened using a PLC, limit switch or timer when the pour hole of the shot sleeve is covered by the plunger. Valve-Less Vacuum Blocks allow the pathway to remain open throughout solidification to simplify process planning.

SIZING VACUUM PUMPS AND RECEIVER TANKS

Correctly sizing vacuum pumps and receiver tanks for specific applications is critical to proper function. Vacuum pumps generate the vacuum level within a defined volume that is the receiver tank. Vacuum level is measured in relation to ambient atmospheric pressure and reported in units such as Torr, inches of mercury (“Hg), Pascals (Pa) or millibar (mb).

The critical feature of the pump is the speed at which it can evacuate a volume of air down to a particular vacuum level as measured by average cubic feet per minute. If the pump is too small, it will not be able to achieve sufficient vacuum within the shot cycle. If the tank is too small, it will not provide a sufficient reservoir to evacuate air from the cavity. Midland Technologies can calculate the required pump and tank size for your specific casting application.

CHECKLIST WHEN UTILIZING VACUUM

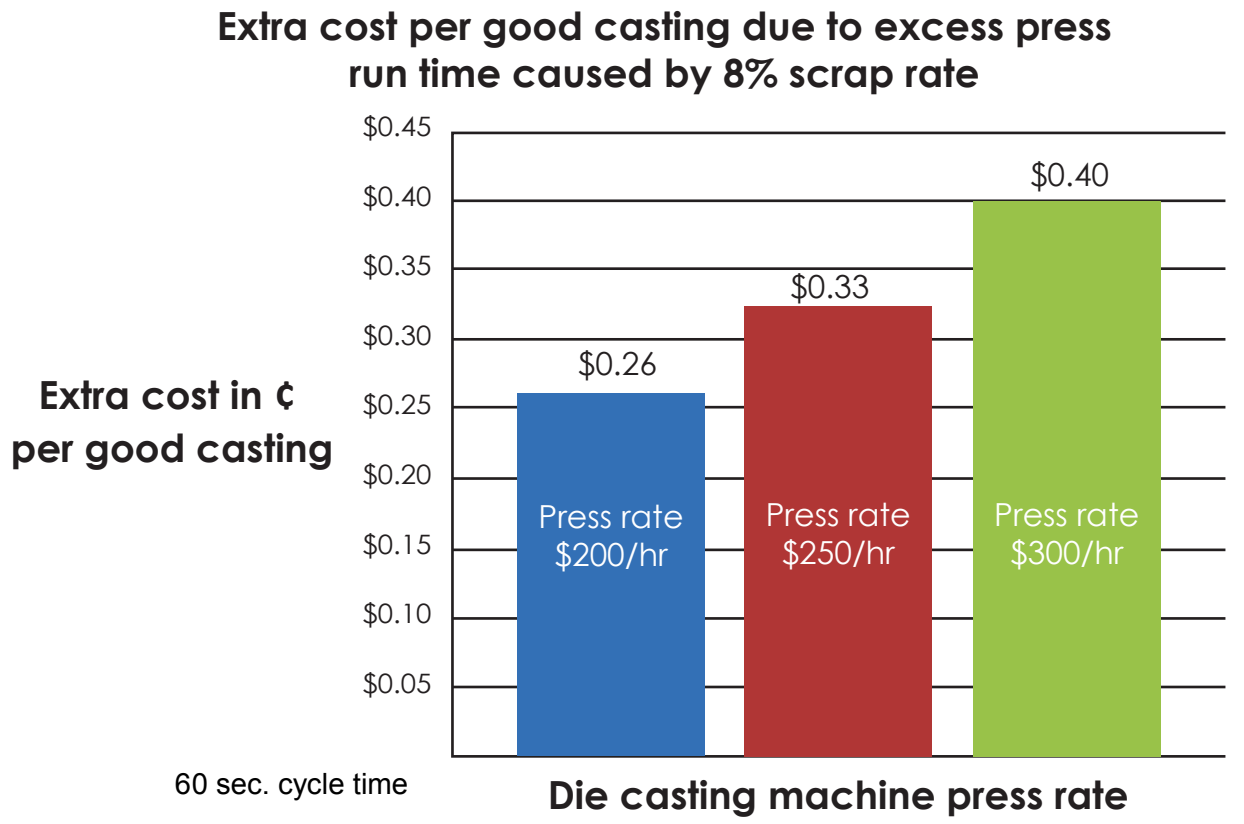
__ Vacuum pump is properly sized for the casting application
__ Correct size and quantity of vacuum blocks to provide sufficient area for evacuation
__ Proper vacuum block runner design from the cavity to manage velocity
__ Vacuum blocks are correctly installed in the die
__ Proper filtration between the press and the vacuum pump
__ Proper maintenance is performed on vacuum blocks, pump, filters and hoses
__ Floor operators understand how to turn the vacuum process on and off

Cost of Porosity-Related Scrap

THINK ABOUT YOUR CURRENT JOBS WITH SCRAP RATES… WHAT ARE THE COSTS OF SCRAP?

- Additional press run time
- Additional alloy usage
- Extra labor costs
- Faster press and die wear
- Missed quotas
- Troubleshooting expenses
- Increased peripheral costs (i.e. more electricity, hydraulic fluid, die lube)

HOW MUCH DOES IT COST TO RUN SCRAP ON YOUR CASTING PRESS?

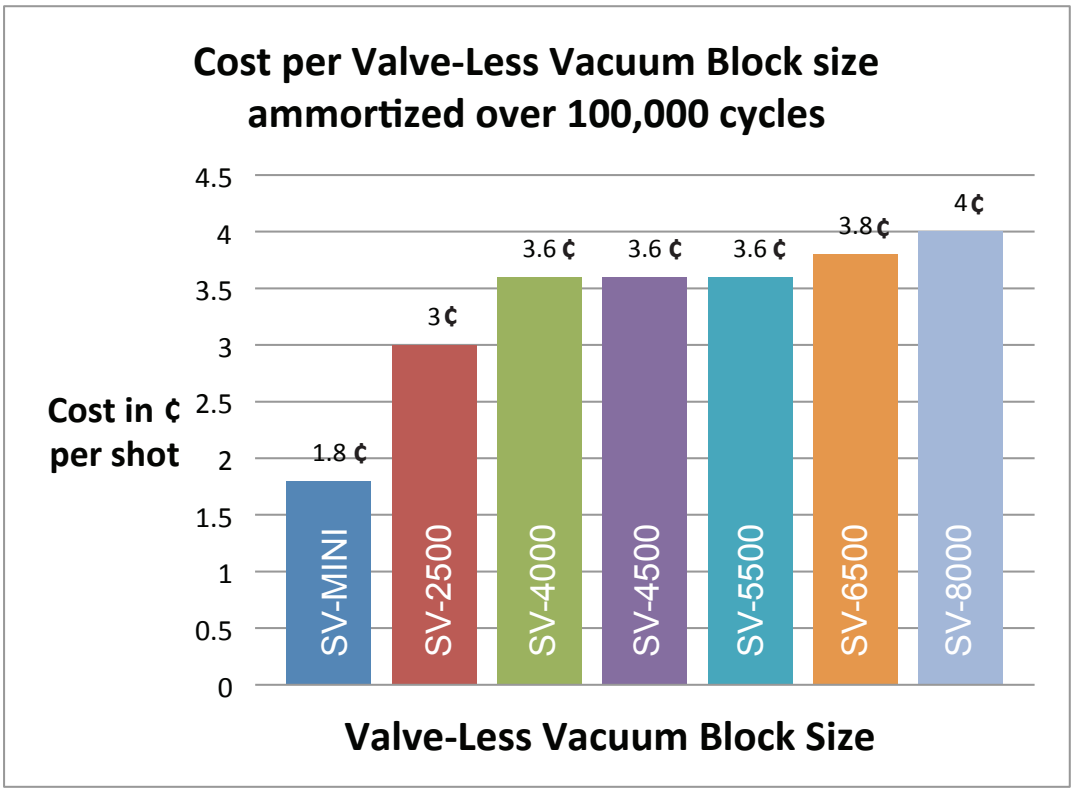


WHEN RUNNING 8% SCRAP RATE ON A 10,000 PART JOB WITH A 60 SECOND CYCLE YOU WILL SPEND:*

- An extra 13.3 hours of press run time to produce 10,000 good parts
- An extra $2,660 - $3,990 in extra press time depending on press rate
- An extra $0.26 - $0.40 per good part in extra press time depending on press rate

*Calculated using sample press rate per hour values in chart above

Vacuum Blocks Cost Pennies Per Shot But Help You Save Big!



VALVE-LESS VACUUM BLOCKS OFFER A NET POSITIVE RETURN TO DIE CASTERS

- Increase casting yields
- Reduce porosity-related scrap
- Complete quotas with less press time
- Reclaim more material
- Reduce wear on casting press
- Reduce wear on die
- Reduce peripheral costs

VALVE-LESS VACUUM BLOCKS SUPPORT GREATER PROCESS PREDICTABILITY, EFFICIENCY AND PROFITABILITY!

Valve-Less Vacuum Blocks

REDUCE POROSITY, INCREASE PROFITS

- No moving parts means little or no maintenance and down time
- Use multiple blocks for increased air evacuation

PRODUCT OVERVIEW

The Valve-Less Vacuum Block is a highly durable insert designed to connect a vacuum system to the high pressure die for active vacuum evacuation of air and gas from the cavity. Valve-Less Vacuum Blocks can be utilized in aluminum, zinc, and magnesium high pressure casting applications. Because there are no moving parts to fail, Valve-Less Vacuum Blocks support a low maintenance vacuum-assist process within automated casting cells. Most existing dies can be modified to accept Valve-Less Vacuum Blocks.

OPERATION

The Valve-Less Vacuum Block is installed into a pocket cut directly into the die set or is mounted to the outside of the die using outboard support blocks. Locating pucks are utilized to ensure critical alignment between the stationary and moveable sides of the Valve-Less Block. Vacuum hose is connected to the Valve-Less Vacuum Block via a clamp or threaded barb. A runner system is cut from the die cavity insert and tied into the Valve-Less Vacuum Block to provide a highly efficient means for evacuating air and gas from the cavity. When utilizing a Valve-Less Vacuum Block, the vacuum system may be kept in the “on” or “open” condition throughout solidification.

APPLICATION

The Valve-Less Vacuum Block is ideal for any die cast application that will utilize vacuum-assist to achieve low porosity levels.

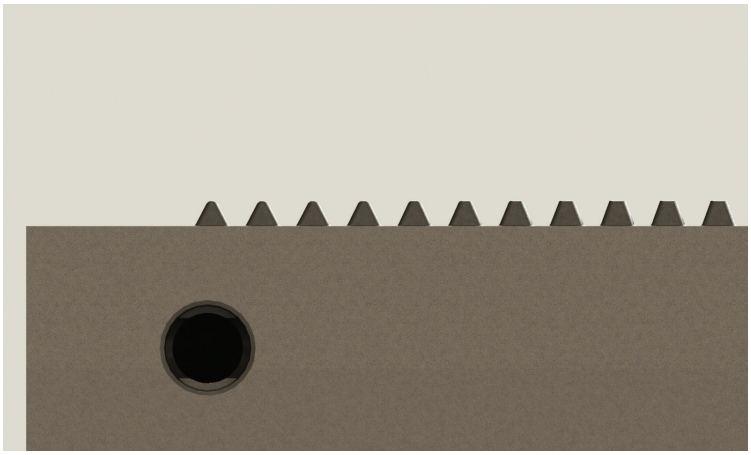
FEATURES

- No moving parts to fail or replace
- Seven standard sizes available or we can customize to your specifications
- Available in premium H-13 steel or pre-hard H-13 steel
- Can be used when casting aluminum, zinc or magnesium
- Can be water cooled
- Most existing dies can be retrofitted to accept Valve-Less Vacuum Blocks

Patent #. 7,134,637

Optional Variable Pattern™

- Teeth on the input end of the pattern have radii while teeth on the output end have a flat profile
- Increased draft of side angles on the teeth assists with release of metal



PRODUCT OVERVIEW

The Variable Pattern provides an option for applications where excessive sticking or breaking of the metal in the Valve-Less Block flow area is an issue. The Variable Pattern can be requested by adding –Variable to the end of any Valve-Less Block catalog number.

OPERATION

Radii on the teeth near the input end of the pattern allow for thicker material build-up to prevent breaking during release. Flat geometry on the top of teeth near the output end of the pattern help to prevent blow-through of material. Increased draft of the side angles of the teeth assists with release of the solidified metal.

APPLICATION

The Variable Pattern is ideal for all die casting applications that can benefit from reduced porosity and where sticking of metal within the flow pattern is of concern.

FEATURES

- Flow pattern designed to facilitate release of solidified metal
- Interchangeable with all Standard Valve-Less Vacuum, Ultimate Vent and Super Chill Blocks

Patent # 8,424,587B1

Midland Materials

QUALITY MATERIALS FOR VARIOUS APPLICATIONS

ULTIMATE VENT AND STANDARD VACUUM BLOCKS (PREMIUM H-13 STEEL)

Valve-Less Blocks made from premium H-13 steel are ideal for dies used in long production runs of aluminum castings. Heat-treated to 44-46 HRC, premium H-13 steel Valve-Less Blocks have higher resistance to heat-check, cracking, and wear caused by thermal shock.

FEATURES:

- Durable for long production runs
- Heat-treated to 44-46 HRC
- High resistance to thermal shock

E-SERIES VENT AND VACUUM BLOCKS (PRE-HARD H-13 STEEL)

Valve-Less Blocks made from pre-hard H-13 steel with Melonite surface treatment are ideal for dies to be used in production of zinc or magnesium castings, or may be used for short production runs of aluminum castings, typically up to 50,000 shots. To order E Blocks add –E to the end of a Standard Vacuum Block or Ultimate Vent Block part number. (i.e. UVS-2500-E)

FEATURES:

- Ideal for casting with zinc or magnesium
- Can be utilized for casting aluminum in short production runs
- Pre-hard H-13 steel is 35-36 HRC
- Melonite treatment offers surface hardness of 60-65 HRC

UVC VENT AND SUPER CHILL VACUUM BLOCKS (BERYLLIUM-FREE COPPER)

Beryllium-free copper is ideal for repeated heating and cooling cycles in situations where very high thermal conductivity is required. Beryllium-free copper has the same cooling characteristics as beryllium copper but without the toxicity or environmental concern.

FEATURES:

- No reactivity with aluminum means less sticking
- High thermal conductivity
- No toxicity when machining

Valve-Less Vacuum Block Flow Areas

FLOW AREAS

Model	Block Width	Flow Area
Mini	2.250	.035 in^2
2500	2.500	.040 in^2
4000	3.938	.070 in^2
4500	4.566	.080 in^2
5500	5.512	.100 in^2
6500	6.500	.120 in^2
8000	8.000	.140 in^2

RUNNER INFORMATION

Model	Angle	Depth	Bottom	Top Width	Runner Area
Mini	20°	0.203	0.241	0.3125	0.0560
2500	20°	0.203	0.241	0.3125	0.0560
4000	20°	0.277	0.328	0.4260	0.1044
4500	20°	0.298	0.352	0.4570	0.1205
5500	20°	0.375	0.375	0.5070	0.1653
6500	20°	0.369	0.436	0.5660	0.1848
8000	20°	0.472	0.537	0.6200	0.2730

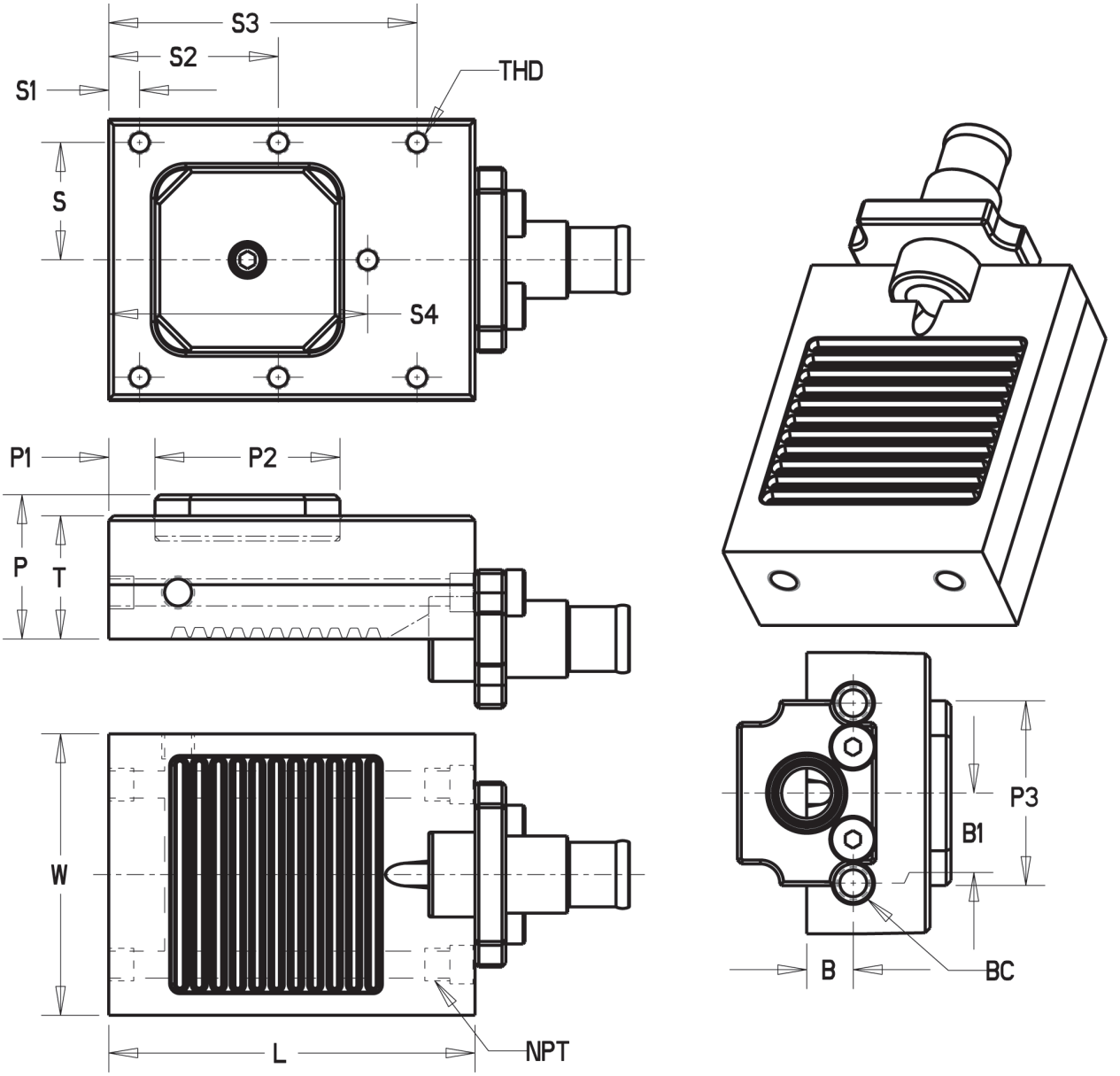
Size and Placement of Vacuum Blocks

Midland Technologies will calculate the required evacuation area for a casting and provide recommended vacuum block sizes when a Block Sizing Form is received. The Block Sizing Form can be downloaded or filled out online at www.midlandtechnologies.com.

Consideration of vacuum block placement in relation to the cavity is important for achieving the best result. Vacuum blocks are often placed near last area to fill in the casting. Midland Technologies can assist with selection of placement for vacuum blocks in relation to the die cavity and provide a suggested vacuum block runner layout when a 3D layout of the tool is provided.

Valve-Less Vacuum Block Dimensions

STATIONARY



Model No.	W	L	T	P	P1	P2	P3	S	S1	S2	S3	S4	THD	NPT	B	B1	BC
	±.001	±.001	+.001 -.000	±.005	±.0005	±.001	±.005	±.02	±.02	±.02	±.02	±.02		Optional Water	±.02	±.02	SHCS Bolt Clearance
SV-Mini	2.250	3.540	1.000	1.250	0.625	1.500	1.246	0.875	0.313	—	—	2.375	1/4-20	1/8	0.438	0.750	—
SV-2500	2.500	5.940	2.000	2.340	0.750	3.000	1.496	1.000	0.500	2.250	4.000	—	1/4-20	1/4	1.125	0.625	3/8
SV-4000	3.938	5.940	2.000	2.340	0.750	3.000	2.996	1.250	0.375	4.250	—	—	3/8-16	1/4	0.755	1.460	3/8
SV-4500	4.566	5.940	2.000	2.340	0.750	3.000	2.996	1.905	0.500	3.500	—	—	3/8-16	1/4	0.755	1.460	3/8
SV-5500	5.512	5.940	2.000	2.340	0.750	3.000	2.996	2.375	0.500	3.500	—	—	3/8-16	3/8	0.835	1.772	1/2
SV-6500	6.500	5.940	2.000	2.340	0.750	3.000	2.996	2.375	0.500	3.500	—	—	3/8-16	3/8	0.835	1.772	1/2
SV-8000	8.000	6.440	2.000	2.340	0.875	3.000	2.996	2.875	0.625	3.625	—	—	1/2-13	3/8	0.835	1.772	1/2

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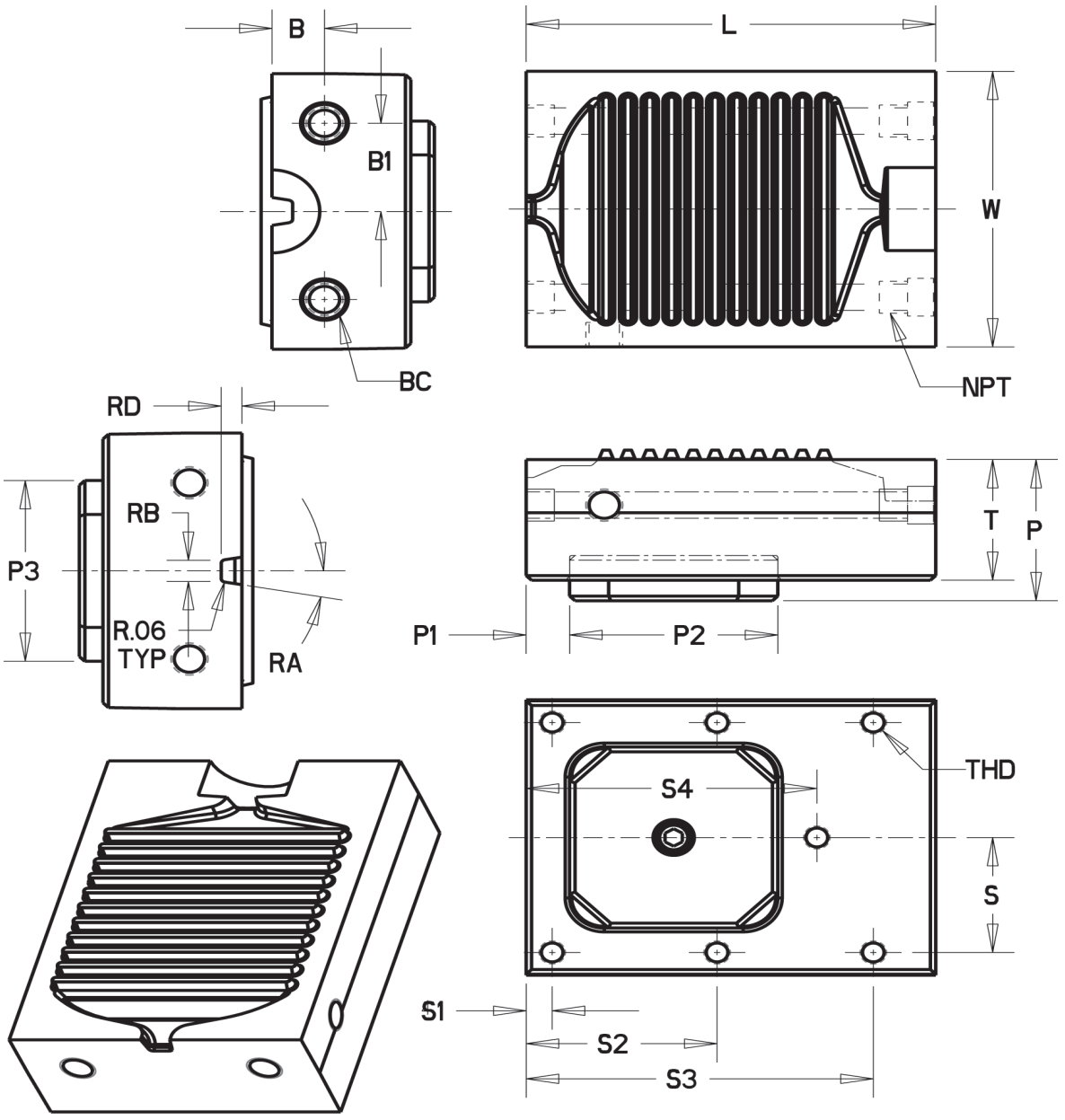
Valve-Less Vacuum Block Dimensions

EJECTOR



Model No.	W	L	T	P	P1	P2	P3	S	S1	S2	S3	S4	THD	NPT	RD	RB	RA	B	B1	BC
	±.001	±.001	+.001 -.000	±.005	±.0005	±.001	±.005	±.02	±.02	±.02	±.02	±.02		Optional Water	±.005	±.005	±1°	±.02	±.02	SHCS Bolt Clearance
SV-Mini	2.250	3.500	1.000	1.250	0.500	1.500	1.246	0.875	0.313	—	—	2.375	1/4-20	1/8	0.203	0.241	10°	0.438	0.750	—
SV-2500	2.500	5.900	2.000	2.340	0.625	3.000	1.496	1.000	0.500	2.250	4.000	—	1/4-20	1/4	0.203	0.241	10°	0.755	0.625	3/8
SV-4000	3.938	5.900	2.000	2.340	0.625	3.000	2.996	1.250	0.375	4.250	—	—	3/8-16	1/4	0.277	0.328	10°	0.755	1.460	3/8
SV-4500	4.566	5.900	2.000	2.340	0.625	3.000	2.996	1.905	0.375	3.375	—	—	3/8-16	1/4	0.298	0.352	10°	0.755	1.460	3/8
SV-5500	5.512	5.900	2.000	2.340	0.625	3.000	2.996	2.375	0.375	3.375	—	—	3/8-16	3/8	0.375	0.375	10°	0.835	1.890	1/2
SV-6500	6.500	5.900	2.000	2.340	0.625	3.000	2.996	2.375	0.375	3.375	—	—	3/8-16	3/8	0.369	0.436	10°	0.835	1.890	1/2
SV-8000	8.000	6.400	2.000	2.340	1.000	3.000	2.996	3.000	0.625	3.625	—	—	1/2-13	3/8	0.472	0.537	5°	0.835	1.890	1/2

Patent # 7,134,637

Vacuum and Vent Block Sizing Form

The following information is utilized to calculate the necessary evacuation area for the casting application and to suggest an appropriate vacuum or vent block size. The accuracy of the information provided can affect results of the calculation. Where possible, providing a 3D part model will help to confirm needed data. Please note your units of measure.

UNITS OF MEASURE ◯ English ◯ Metric

CUSTOMER AND TOOL INFORMATION

Date:

Company:

Contact Name:

Contact Phone:

Contact Email:

Part ID:

Tool Condition: ◯ New ◯ Retrofit

System Requested: ◯ Vacuum ◯ Venting

CASTING INFORMATION

No. of cavities:

Part weight (lbs.) (g):

Through gate weight (part weight and overflows) (lbs. /g):

Shot weight (lbs.) (g):

Gate thickness (in.) (mm):

Total gate area (in^2) (mm^2):

Slow shot speed (in/s) (m/s):

Fast shot speed (in/s) (m/s):

Cavity fill time (ms):

Casting alloy:

DIE CAST MACHINE INFORMATION

Manufacturer:

Model:

Tonnage:

Shot cylinder diameter (in.) (mm):

Hydraulic system pressure (psi) (bar):

Fast shot accumulator pressure (psi) (bar):

Dry shot speed (in.) (mm):

HOT CHAMBER

Plunger diameter (in.) (mm):

Plunger stroke (in.) (mm):

Goose neck length (in.) (mm):

Nozzle diameter (in.) (mm):

COLD CHAMBER

Diameter (in.) (mm):

Length (in.) (mm):

ADDITIONAL NOTES:

Midland Technologies utilizes PQ^2 methodology along with proprietary calculations to determine the required evacuation area for vacuum-assist or venting in a specific tool. Midland will provide a recommended exit runner design at no cost with the purchase of Midland Valve-Less Vacuum or Ultimate Vent Blocks and the provision of a 3D tool layout.

Super Chill Blocks

FASTER COOLING, LONGER BLOCK LIFE

Beryllium-free copper inserts provide higher thermal conductivity than H-13 steel which can allow for a larger evacuation area than steel within the same size footprint.

- The H-13 steel holder of the Valve-Less Super Chill Block provides longer effective block life than a block manufactured completely from copper.

PRODUCT OVERVIEW

The Valve-Less Super Chill Block utilizes a replaceable beryllium-free copper insert within an H-13 steel holder to provide high thermal conductivity and long block life. There are no moving parts to fail or replace, reducing downtime and maintenance costs. Seven stock sizes are available or custom designs can be quickly produced to meet your needs.

OPERATION

The Super Chill Block is installed into a pocket cut directly into the die set or is mounted to the outside of the die using outboard support blocks. Locating pucks are utilized to ensure critical alignment between the stationary and moveable sides of the Super Chill Block. Vacuum hose is connected to the Super Chill Block via a clamp or barb. A runner system is cut from the die cavity insert and tied into the Super Chill Block to provide a highly efficient means for evacuating air and gas from the cavity. When utilizing a Super Chill Block, the vacuum system may be kept in the “on” or “open” condition throughout solidification.

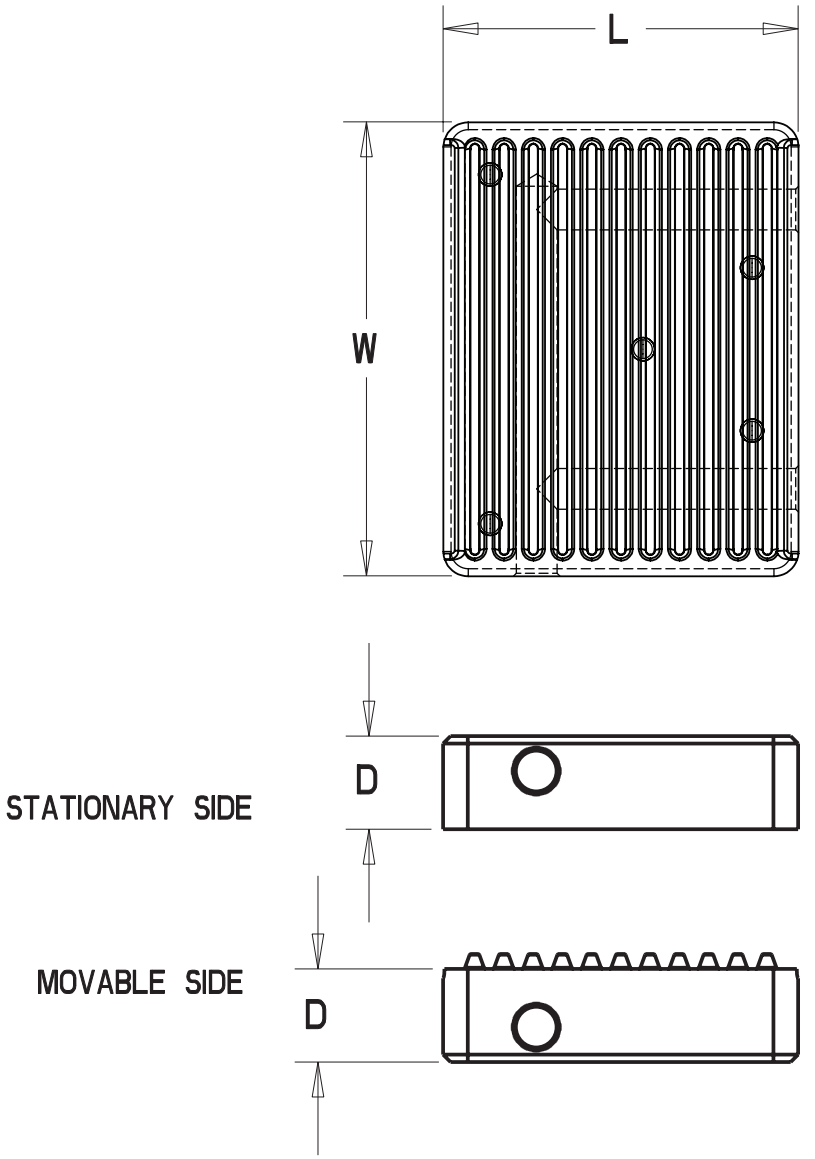
APPLICATION

The Valve-Less Super Chill Block is the best choice when your application requires high thermal conductivity for fast cooling under repeated heating and cooling cycles.

FEATURES

- Beryllium-free copper inserts are replaceable to reduce costs
- Holder block is made from premium H-13 steel for long block life
- Same cooling characteristics as beryllium copper without the toxicity or environmental concerns
- Seven sizes available or we can customize to your specifications
- Can be water cooled
- H-13 steel inserts are available offering the flexibility to switch between copper and steel

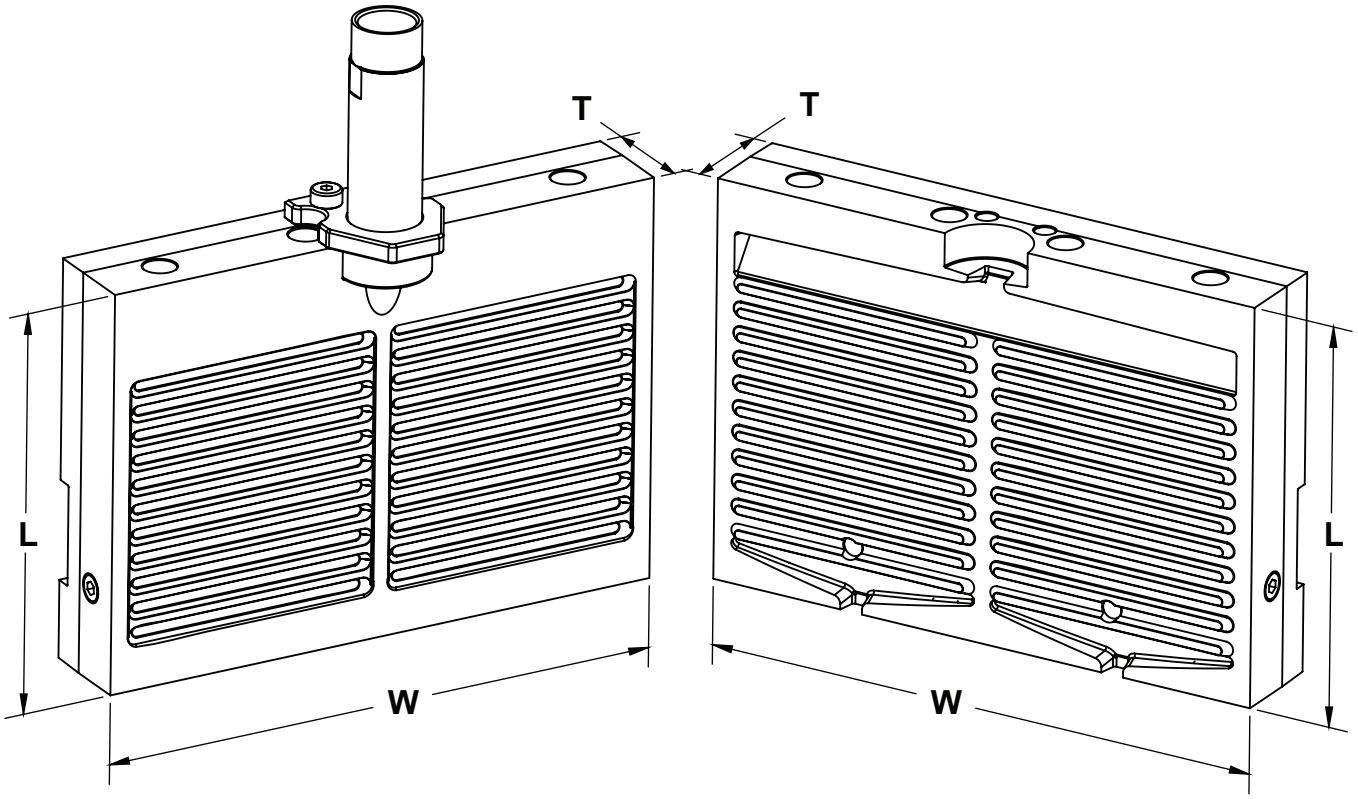
Valve-Less Super Chill Insert



Model No.	W	L	D
SC-2500RI	1.812	3.812	1.000
SC-4000RI	3.250	3.812	1.000
SC-4500RI	3.875	3.812	1.000
SC-5500RI	4.875	3.812	1.000
SC-6500RI	5.875	3.812	1.000
SC-8000RI	7.375	4.125	1.000

SOLD IN SETS OF ONE STATIONARY SIDE INSERT AND ONE EJECTION SIDE INSERT

Auto Block For Large Casting



Part No.	W	L	T	Evacuation Area (in2)
SV-10000	10.433	10.236	2.559	0.180
SV-12000	12.795	10.236	2.559	0.225
SV-14000	14.567	10.236	2.559	0.270
SV-16000	16.339	10.236	2.559	0.315

Requests for modifications to base design are welcomed

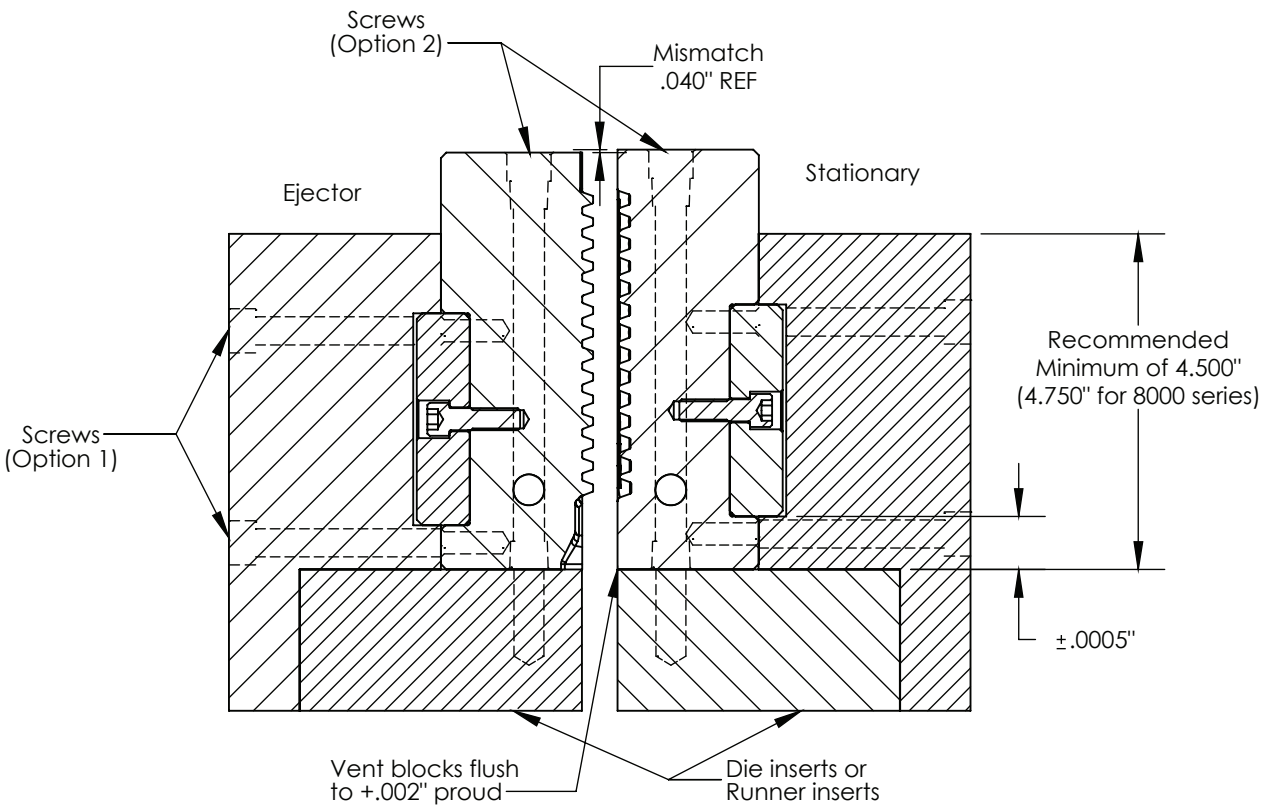
Installing Valve-Less Vacuum Blocks

CORRECT INSTALLATION OF VALVE-LESS VACUUM BLOCKS IS CRITICAL TO PROPER FUNCTION.

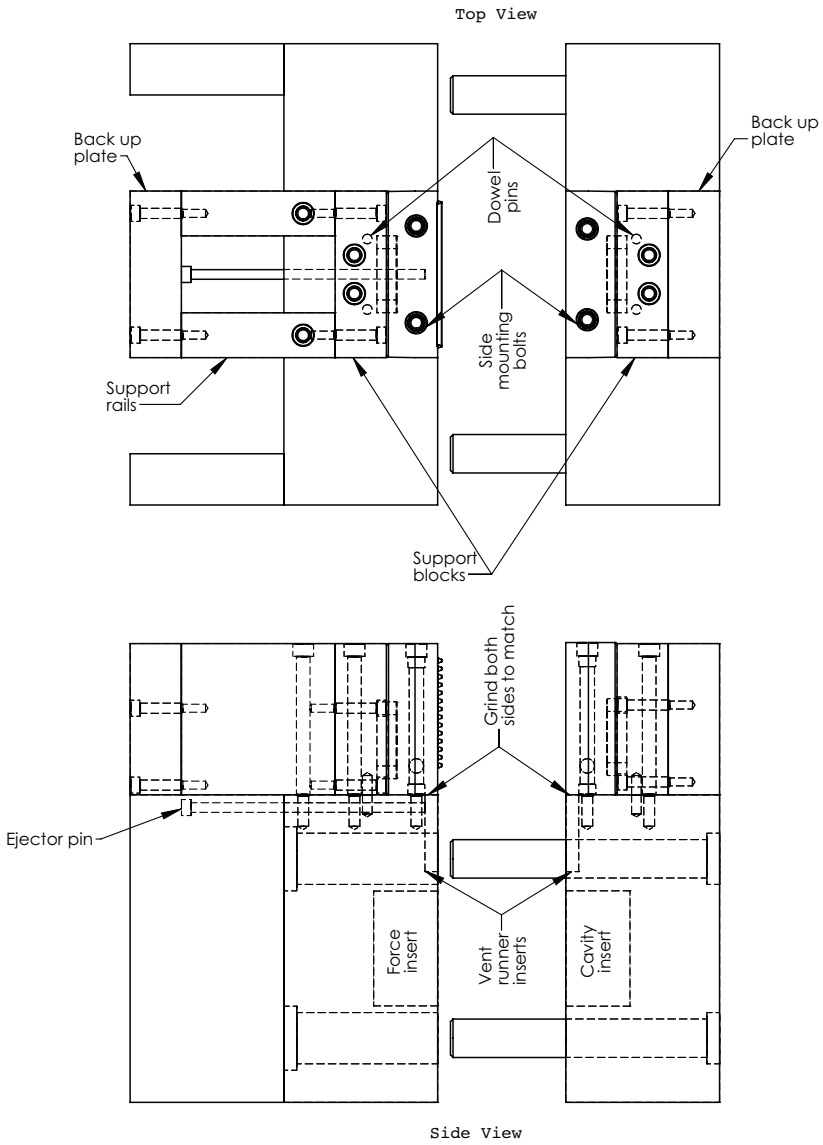
It is optimal to install Valve-Less Vacuum Blocks directly into the mold base whenever possible. Valve-Less Vacuum Blocks should be inserted at least 4.50” from the edge of the mold base. The inlet sides of both halves of the Valve-Less Vacuum Block must be flush to the die cavity insert and mate evenly with each other when in the closed condition. **There should be approximately a .040” mismatch in height between the stationary and ejector halves of the Valve-Less Vacuum Block when installed correctly.** The parting line of the Valve-Less Vacuum Block halves should be positioned flush to, or .001” - .002” proud to the die cavity insert.

Keys are provided in each block to ensure alignment between the stationary and ejector halves. If pockets are not correctly machined to tolerance, the key may not hold and shift in block could occur. This can result in shut off of the flow path for evacuation.

Water is provided in the blocks using the horizontal mounting holes. If water is used, the vertical holes will be used to retain the blocks.



Installing Valve-Less Vacuum Blocks Using Outboard Support



- Square and grind flats on mold base for mounting outboard supports and Valve-Less Vacuum Blocks
- Install locating dowels between the mold base and outboard support blocks
- Use adequate bolts to connect outboard supports to mold base
- Install H-13 vacuum runner insert or cut runner pattern into the mold set to connect the Valve-Less Vacuum Block with the die cavity insert
- Ensure that the Valve-Less Vacuum Blocks are positioned at a minimum of flush to, or .001” - .002” proud to the die cavity insert

Considerations for Vacuum Block Runners

Valve-Less Vacuum Blocks allow for more efficient air evacuation than conventional passive venting. Not only is more air evacuated and risk of flash reduced, but the vacuum runners that tie the Valve-Less Vacuum Block to the die cavity insert also do not oxidize during remelt as severely as conventional vents. This allows the caster to reclaim more casting alloy contributing to overall job profitability while at the same time reducing porosity through improved air evacuation.

Correctly designing vacuum runners from the cavity to the vacuum block is critical to proper evacuation. Vacuum runners should be designed to control velocity of the exiting metal while providing sufficient area for air and gas evacuation. This is achieved by designing a vacuum runner system which creates a pressure drop and provides sufficient resistance to slow the metal. Proper ejection of the runners must also be taken into consideration.

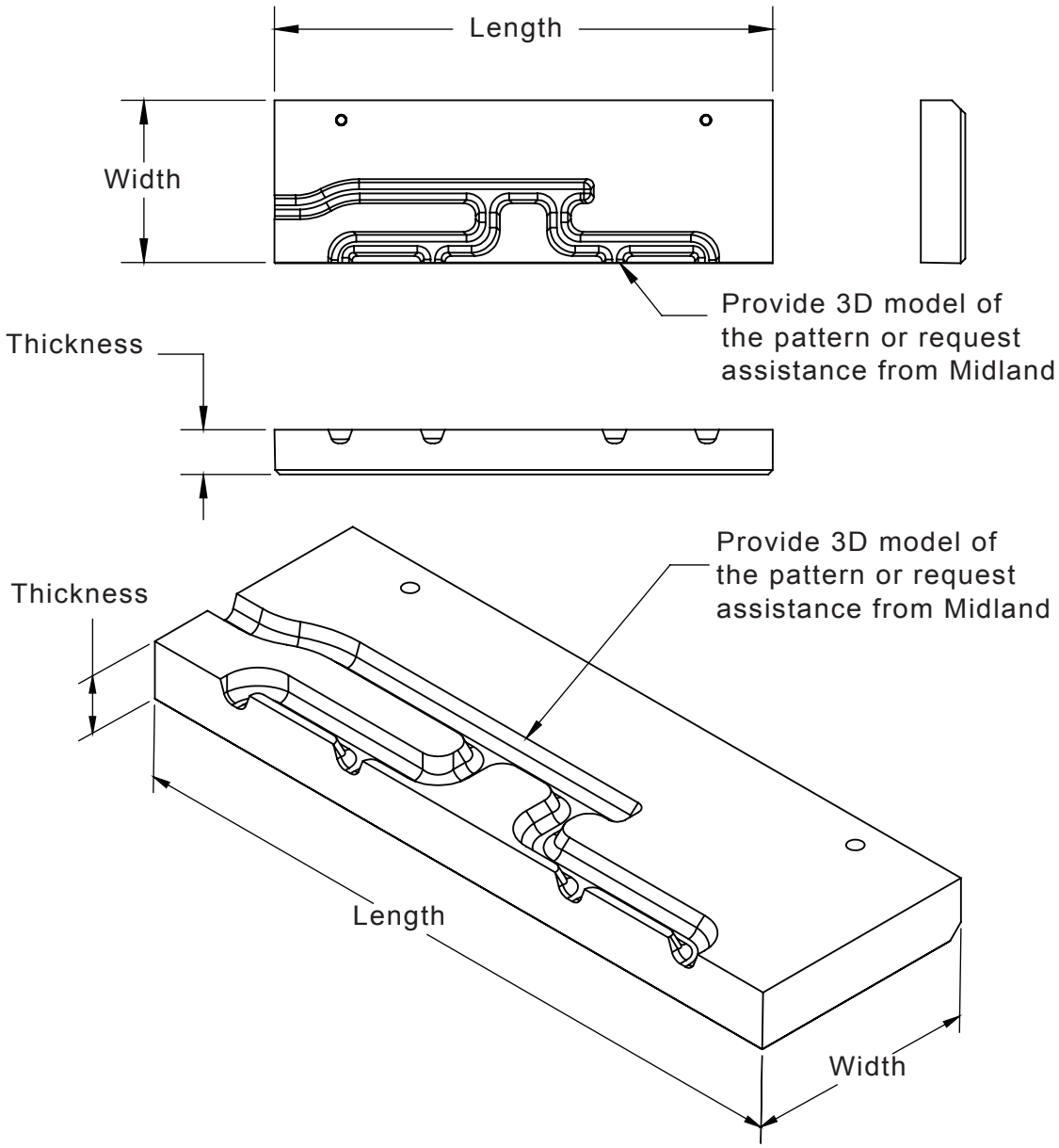
Need Assistance with Vacuum Runners?

Midland Technologies will offer a suggested vacuum block runner layout specific to a die when Midland Valve-Less Vacuum Blocks are purchased and a 3D layout of the tool is provided.

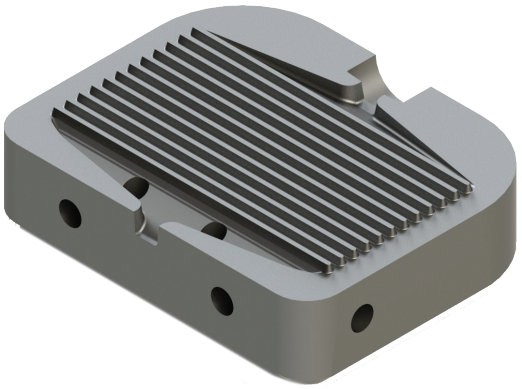
Custom H-13 Vacuum Runner Inserts

Midland can manufacture H-13 runner inserts with your custom vacuum runner pattern to connect the die cavity insert to Valve-Less Vacuum Blocks. H-13 runner inserts can be installed quickly and easily. Runner inserts are also useful as a common tie-in point when utilizing Valve-Less Vacuum Blocks in Unit Dies that will run multiple different cavity inserts.

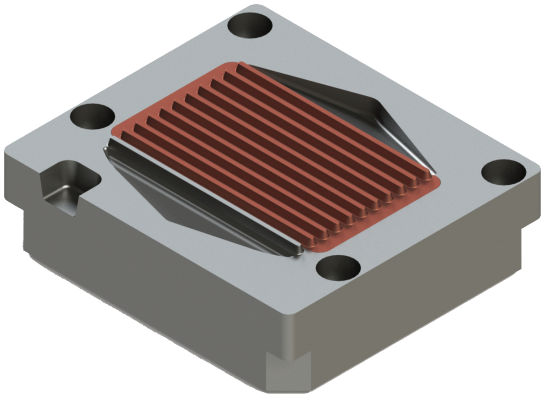
Specify the outer dimensions for your insert and provide a 3D model of the required runner pattern. Midland can also provide technical assistance for designing vacuum runner layouts upon request.

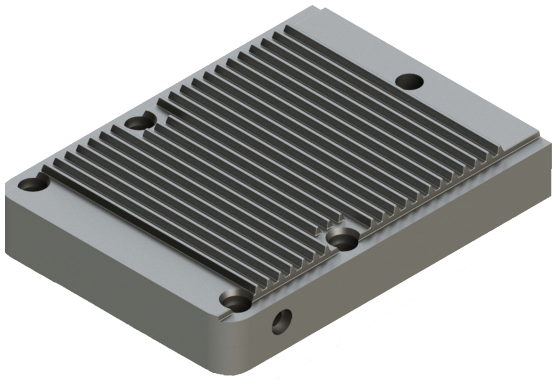


Custom Vacuum Blocks



- Custom Dimensions
- Corner Radii
- Double Flow Areas
- Ejection Pins
- Custom Water Lines
- Steps



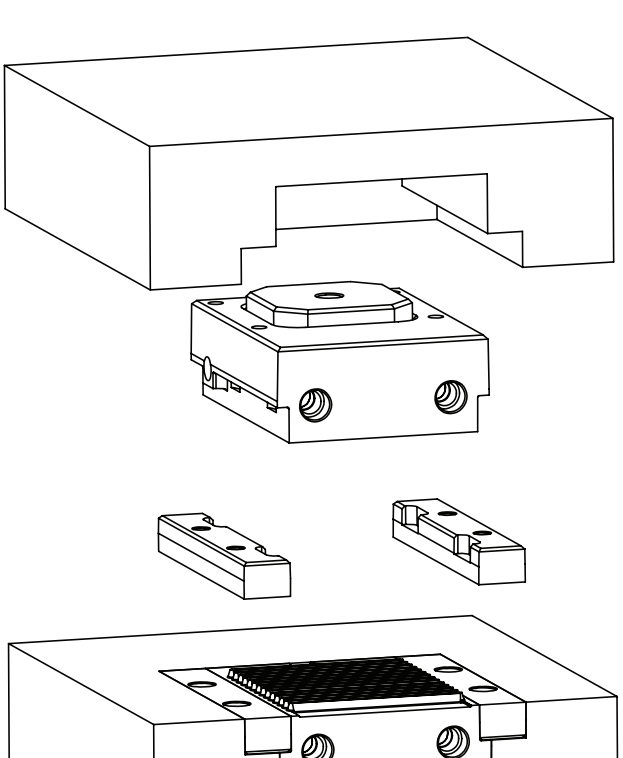


Alternative Formats

PICTURE FRAME BLOCK

The Picture Frame format is a front loading design for applications where it is desirable to install or remove the Valve-Less Vacuum or Ultimate Vent Block without removing the die from the die casting machine.

The Block is secured in its pocket by two retainer bars that are bolted from the front. Slots are cut into the Valve-Less Block to provide for easy removal from the pocket. The Picture Frame format also provides increased shut off area on the sides of the Valve-Less Block.



SEMI-CUSTOM BLOCKS

At times it may be desirable to have a larger shut off area than that of standard Valve-Less Blocks. It is possible to order the flow area from a smaller standard Valve-Less Block on the footprint of a larger Valve-Less Block.

Specify the catalog number of the Valve-Less Block from which flow area you require and which larger Valve-Less Block footprint you would like to order. As opposed to full custom designs, there is no programming and design charge for these semi-custom requests.

Model	Flow Area	Overall Width
Mini	.035in^2	2.250 in.
2500	.040in^2	2.500 in.
4000	.070in^2	3.938 in.
4500	.080in^2	4.566 in.
5500	.100in^2	5.512 in.
6500	.120in^2	6.500 in.
8000	.140in^2	8.000 in.

CUSTOM VALVE-LESS BLOCKS FOR LARGE CASTINGS

Midland can design and manufacture your custom Valve-Less Vacuum or Vent Blocks for large casting applications.

With full design and programming capabilities, and decades of experience calculating correct evacuation areas for venting or vacuum of high pressure dies, Midland can help deliver effective Valve-Less Blocks for your specific application.

Additionally, our technical experts can suggest an optimal Valve-Less Vacuum or Ultimate Vent Block runner layout for your application.

Retrofitting Vacuum Valves

If your die is currently running vacuum valves you may be able to switch to Valve-Less Vacuum Blocks to reduce maintenance issues associated with valves. Midland will work with you to determine whether a Valve-Less Block of the same size as the valve will provide sufficient evacuation area. The first step is to fill out and submit a Block Sizing form found at www.midlandtechnologies.com so that we can calculate the area needed for sufficient air and gas evacuation of the specific casting.

Retrofitting existing tools to utilize Valve-Less Vacuum Blocks requires special consideration of alignment of each half of the die. A check of the clearance between leader pins and bushings should be performed, and if not to original dimensions, new pins and bushings are recommended to ensure proper clearance in Valve-Less Vacuum Blocks.

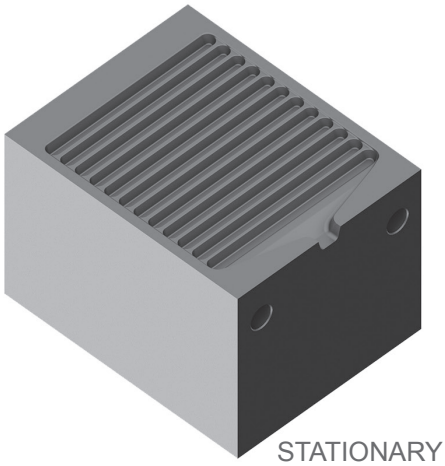
SPACER BLOCKS

Spacer blocks can be utilized to install Valve-Less Vacuum Blocks into a pre-existing pocket for vacuum valves. Ensure that the outlet runner from the die insert is mated to the correct block half when retrofitting.

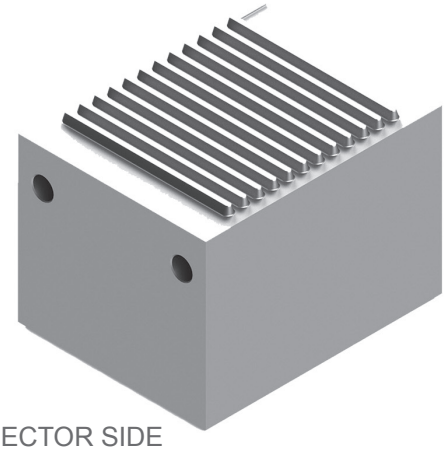
CUSTOM BLOCKS

Midland can supply custom Valve-Less Vacuum Blocks to fit the pre-existing pocket of your former vacuum valve. Provide us with pocket dimensions, bolt locations and a 3D model of your tool layout to begin utilizing low-maintenance Valve-Less Vacuum Blocks.

OVERSIZED VACUUM BLOCKS TO FIT VACUUM VALVE POCKET



STATIONARY SIDE



EJECTOR SIDE

Cost Advantage of Valve-Less

COST COMPARISON STUDY BETWEEN MIDLAND VALVE-LESS VACCUM BLOCK AND HYDRAULIC VACUUM VALVES CONDUCTED BY A TIER 1 DIE CASTING SUPPLIER TO A MAJOR AUTOMOTIVE MANUFACTURER

Common Items	
40,000	Shots per Year
5,000	Rebuild Shots
80	Rebuilds per Year (every 5,000 Shots)
$35	Labor Wage per Hour
12	Emergency Repairs per Year
4	Labor Hours for Emergency Repair of Hydraulic Valve
2	Labor Hours for Emergency Repair of Valve-Less Vacuum Blocks

COST COMPARISON

Item #	Description	COST		
		Standard Valve	1st yr. Midland Valve-Less	2nd Yr. Midland Valve-Less
1	Downtime - # of Die Pulls (2/1 - 6/1)	21	0	0
2	Preventative Maintenance Labor Cost (2.5 hrs for hyd. valve, 1.0 hour for Valve-Less)	$7,000	$2,800	$2,800
3	Preventative Maintenance Parts Cost	$286,899	$125,320	$125,320
4	Emergency Repair Labor Cost (4 hrs for hyd. valve, 1 hr for Valve-Less)	$1,680	$420	$420
5	Emergency Repair Parts Cost	$112,796	$35,920	$35,920
6	Valve-Less Conversion (6 Dies Total)	$0	$177,874	$0
TOTAL YEARLY COST		**408,396**	**342,334**	**$164, 460**
7	Remelt* Savings (Hyd Valve Weighs 0.25 kg more than Valve-Less)	$0	-$11,200	-$11,200
1st year savings after converting dies to use Valve-Less Vacuum Blocks			$77,262	
2nd year savings after converting dies to use Valve-Less Vacuum Blocks				$255,136

*Remelt Savings: 0.25 kg (.55 lb) reduction to pouring weight = $0.028/lb. x 400,000 shots/year = $11,200/year

Notes:
The calculation for the 1st and 2nd year Midland Valve-Less PM Parts of $125,320 is based upon use of copper inserts.

Midland Vacuum Pumps

PORTABLE AND CENTRAL VACUUM SYSTEMS ARE AVAILABLE IN THE FOLLOWING SIZES. MIDLAND CAN HELP YOU TO SELECT THE PUMP SIZE APPROPRIATE FOR YOUR CASTING APPLICATIONS.

PORTABLE SYSTEMS – OIL-SEALED, ROTARY VANE PUMPS

Part No.	Pump Horse Power	Evacuation Capacity (Average Cubic Ft./Min.)	Tank Size (gallon)
MVSP-10	1	14	30
MVSP-15	1.5	18	60
MVSP-20	2	26	80
MVSP-30	3	36	80
MVSP-50	5	56	120

CENTRAL SYSTEMS – DRY CLAW VACUUM PUMPS

Part No.	Pump Horse Power	Evacuation Capacity (Average Cubic Ft./Min.)	Tank Size (gallon)
MVSC-23	2.3	44	120
MVSC-32	3.2	57	120
MVSC-46	4.6	79	200
MVSC-64	6.4	103	200

Pumps are available with 208, 230 or 460 volt starters

Oil-sealed, rotary vane pumps can be ordered customized to be H_2O cooled

Focus on your most value-added activities and let Midland take care of the rest!

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