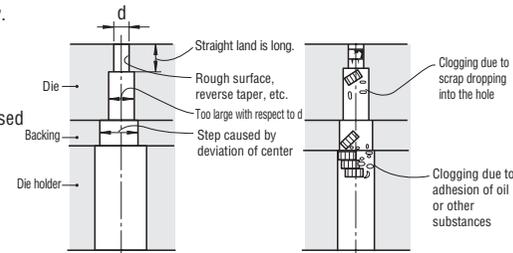


Causes of scrap clogging

In general, the causes of scrap clogging are considered to be the points listed below.

- Straight part of the die tip is too long.
- Rear relief shape is unsuitable (reverse taper shape).
- Inside surface of the die is rough.
- Mis-centering of the holes in the die, backing plate, and die holder has caused steps to form.
- Punching scrap piles up and forms a bar shape, then falls in and clogs the relief hole.
- Scrap has become magnetized.

With thin sheet materials and small punching holes in particular, because the scrap is lightweight, scrap clogging can occur easily when even a slight obstruction exists.



[Fig. 1] Causes of scrap clogging
1) "Presswork Troubleshooting" by Hiromi Yoshida, Fumio Ymaguchi

Non-clogging button dies (SV series)

1) Principle and characteristics of non-clogging button dies

One concept for the prevention of scrap clogging is the following.

$$\text{Scrap discharge resistance (cause of scrap clogging)} < (\text{Scrap discharge force} + \text{Weight of scrap})$$

Because MISUMI non-clogging button dies have an air inlet hole near the tip, when they are used in combination with vacuum equipment, a downward flow of air is generated inside the die. This airflow boosts the scrap discharge force, thus reducing the incidence of scrap clogging.

For the vacuum equipment, please use a vacuum pump, vacuum cleaner (pail cleaner), or scrap vacuum unit. [Fig. 2]

2) Applicability

| M | Shape of relief hole | Shank diameter | | Tip diameter | | Page |
|-------------------------|---------------------------|----------------|---------|--------------|-------------|----------------|
| | | Regular | Angular | D | P | |
| Steel | Equivalent to D2 | ○ | — | 6~10 | 1.00 ~ 6.00 | P. 275 |
| | M2 | ○ | — | 3~ 5 | 0.50 ~ 2.50 | |
| | Powdered high-speed steel | ○ | — | 6~10 | 1.00 ~ 6.00 | |
| Carbide | V40 | ○ | ○ | 3~10 | 0.50 ~ 6.00 | P. 519, P. 525 |
| Precision grade carbide | V40 | — | ○ | 3~10 | 0.500~6.000 | P. 448 |
| | Super fine grain | — | ○ | 3~10 | 0.500~6.000 | |

3) Use as a scrap retention countermeasure

It is possible to prevent scrap lifting by applying an additional BC alteration to shorten the tip length (length of the straight part), and by increasing the punch penetration in order to use the airflow to separate the scrap from one sheet at a time.

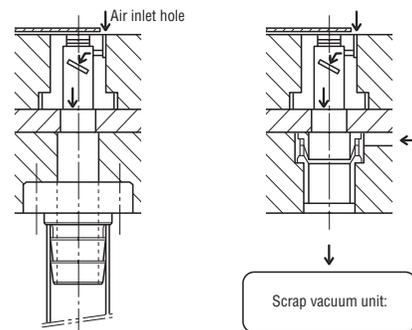
[Fig.3]

Previous button dies used as scrap retention required shaving at a following process, or else were unusable when workpiece material thickness was less than 0.1 mm and clearance was small. However the MISUMI non-clogging button dies can be used as scrap retention in cases such as these.

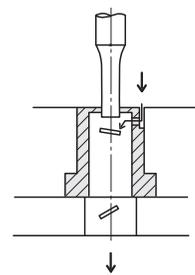
(The additional BC alteration can only be applied to the angular type hole shape.)

4) Precautions

- The non-clogging button dies are intended to be used in combination with a vacuum pump or other vacuum equipment. A button die used on its own will not prevent scrap clogging.
- If the air inlet hole at the top of the button die becomes clogged with lubricating oil, cutting chips, dirt, or other substances, the die will not function to full effectiveness. Therefore perform maintenance of the die regularly. After the die was stored for a long period, remove any solidified lubricating oil, dirt, or other substances clogging the air inlet hole before using the die.
- If the die is insufficiently airtight, it may not be possible to achieve the full suction effects.
- This product is designed primarily for punching of thin sheet material. If used with thick sheets, the full performance may not be achieved.



[Fig. 2] Examples of combinations with different vacuum devices



[Fig. 3] When used for scrap retention

Scrap vacuum unit (SVBN)

1) Principle and characteristics of the scrap vacuum unit

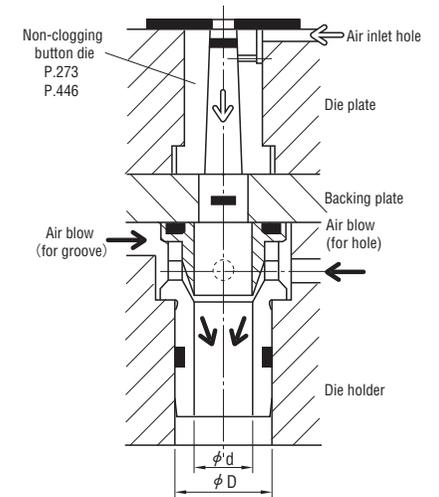
- The scrap vacuum unit uses an air blow (compressed air) to create negative pressure inside the die, pushing the punching scrap (product) downward, and preventing scrap clogging and scrap lifting.
- Greater effectiveness can be achieved by using a non-clogging button die that includes an air inlet hole.
- Two air supply paths to the die holder can be selected: a machined groove, or a machined hole.
- Because the unit is recessed within the die holder, it can be installed as a scrap retention and non-clogging after die completion without requiring any major design changes.
- It is not necessary to machine an inclined hole to the die plate, die holder, or other parts.

2) Applicability

- Hole diameter d : ϕ 3 mm~16 mm
- Outer diameter D : ϕ 6 mm~20 mm

3) Precautions

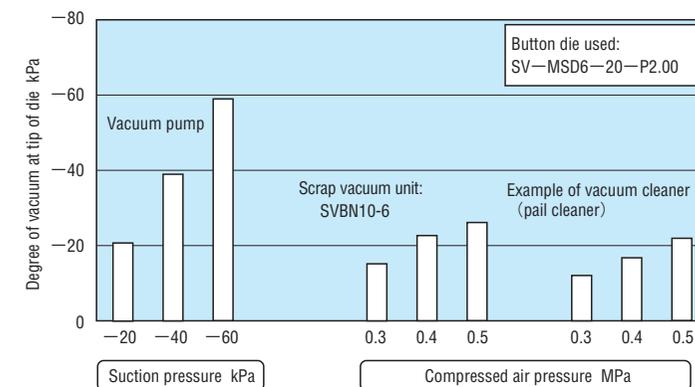
- The magnitude of the suction force generated by the scrap vacuum unit varies depending upon the supplied air pressure, hose diameter, cross-sectional area and length of the plate air supply path, and the size of the unit.
- If the die is insufficiently airtight, it may not be possible to achieve the full suction effects.
- When multiple scrap vacuum units are used together, take steps to ensure that the airflow paths are equal. Note that in this case the airflow velocity will fall, causing the vacuum to decrease as well. The vacuum is proportional to the pressure of the compressed air and to the cross-sectional area of the flow path, and inversely proportional to the diameter of the vacuum unit and to the length of the flow path.
- Use a hose with a minimum outer diameter of ϕ 6 and a minimum inner diameter of ϕ 4.
- Although this unit can be used to prevent scrap lifting and clogging, it may not be able to resolve these problems under all conditions.
- Dimensions not listed in this catalog may be changed for the purpose of performance improvements.



[Fig. 4] Example of use of a scrap vacuum unit

Test data (reference values)

- Scrap suction performance (the degree of vacuum at the die tip) is maximized when suction is applied using a vacuum pump.
- The suction performance of the scrap vacuum unit or a vacuum cleaner (pail cleaner) is inferior to that of a vacuum pump, however because it is possible to drive the scrap vacuum unit using an existing compressor or other device, there is almost no need to purchase new equipment.
- Suction performance varies depending upon the size of the button die, the hose diameter and length, and other factors. The values presented here are intended only as an approximate guide.



[Fig. 5] Comparison of different suction units

Note: The suction performance of the vacuum cleaner varies greatly depending on the model.