

Flow Rates for Flexsil® & CerraFlex® Filter Material

The following molten metal flow rates were calculated using a 10 inch (255 mm) metal head and all filter cloth used was resin-coated “C” stage.

Type of Metal	Flow Rate with 1.0mm Mesh	Flow Rate with 1.5mm Mesh	Flow Rate with 2.0mm Mesh
White Iron	1.50 lb/sec/in ²	1.65 lb/sec/in ²	3.62 lb/sec/in ²
Gray Iron	1.50 lb/sec/in ²	1.65 lb/sec/in ²	3.62 lb/sec/in ²
Malleable Iron	1.50 lb/sec/in ²	1.65 lb/sec/in ²	3.62 lb/sec/in ²
Compacted Graphite Iron	1.44 lb/sec/in ²	1.57 lb/sec/in ²	3.40 lb/sec/in ²
Ductile Iron	* See note below	1.5 lb/sec/in ²	3.52 lb/sec/in ²
Carbon Steel	1.65 lb/sec/in ²	2.26 lb/sec/in ²	3.66 lb/sec/in ²
Stainless Steel	1.65 lb/sec/in ²	2.3 lb/sec/in ²	3.66 lb/sec/in ²
Brass	1.65 lb/sec/in ²	2.75 lb/sec/in ²	3.20 lb/sec/in ²
Bronze	1.46lb/sec/ in ²	1.40 lb/sec/in ²	1.57 lb/sec/in ²
Aluminum	0.18 lb/sec/in ²	0.23 lb/sec/in ²	0.34 lb/sec/in ²

** Use 1.5 lb/sec/in² , and increase the filtration area by 30%*

General Filter Cloth Mesh Size Recommendations for the most common Alloys

Alloy	Recommended Mesh Size(s)
White Iron	2.0mm & 1.5mm
Gray Iron	2.0mm & 1.5mm
Malleable Iron	2.0mm & 1.5mm
Compacted Graphite Iron	2.0mm, 1.5mm, 2.0mm
Ductile Iron	1.5mm, 2.0mm
Carbon Steel	2.0mm & 1.5mm
Stainless Steel	2.0mm & 1.5mm
Brass	2.0mm, 1.5mm, 2.0mm
Bronze	1.5mm & 2.0mm
Aluminum	2.0mm, 1.5mm, 2.0mm

Mesh Size Considerations for Filtration:

Regardless of the recommended mesh size(s) for your particular alloy/application, the two key performance variables to consider are; the desired molten metal flow-rate and the level of metal filtration required. Logically, a smaller mesh size will result in higher filtration as more slag, dross and other impurities are captured when forced through a smaller orifice. Conversely, the smaller the mesh size, the longer it takes the molten metal to flow through. Thus, higher filtration slows down the throughput rate. Therefore, it's critical for foundry production personnel to test a variety of mesh sizes in order to determine the optimal balance of *flow rate/filtration level* for their specific application & alloy.

Key Calculations:

Determining Metal "Flow Rate" –

Pouring Weight (lbs) / Pouring Time (seconds) = Flow Rate (lbs/second)

Example 1: Using **Ductile Iron**, with a pouring weight of **150lbs** and a pouring time of **20** seconds, you end up with a Flow Rate of **7.5lbs per second**.

Determining The Required Filter Cloth "Filtration Area" for a given Mesh Size–

(Calculated Metal Flow Rate) / (Alloy Mesh Size Flow Rate) = Required Filter Cloth "FILTRATION AREA"

Example 2: Using the data from Example 1 above, you would calculate the required "filtration area" by the following:

If using **1.5mm Mesh** - $(7.5 \text{ lbs per second}) / (1.5 \text{ lbs per second per square inch}) = \underline{5.0 \text{ square inches of Live Area will be required.}}$

If using **2.0mm Mesh** - $(7.5 \text{ lbs per second}) / (3.52 \text{ lbs per second per square inch}) = \underline{2.13 \text{ square inches of Live Area will be required.}}$

Determining Metal "Pouring Time" –

- using the same size "Filtration Area" but a different mesh size

Step 1. (Calculated Filtration Area) *(New Mesh Size Flow Rate) = New Flow Rate

Step 2. (Pouring Weight) / (New Flow Rate) = New Pouring Time

Example 3: Using the data from Example 2 above, you would calculate the new flow rate for different mesh sizes as follows:

Starting with a Filtration Area of **5.0 Square Inches**, and switching from 1.5mm Mesh to **2.0mm** Mesh -

Step 1. (5.0 square inches * 3.52 lbs per second per square inch) = **17.6 lbs per second**, which is your new flow rate.

Step 2. (150 lbs) / (17.6 lbs per second) = **8.5 Seconds**, which is your new pour time for the same sized filtration area but using a larger mesh size.

Considerations for use of Flexsil & CerraFlex in Runner Segmentation

One of the most cost-effective uses for cut pieces of Flexsil or CerraFlex is in helping break-up the runner systems in a mold after the metal has cooled and the shakeout/clean-up process begins. CerraFlex is the preferred material for runners that directly contact the casting itself due to its high rigidity (no deflection into the casting). Recommended mesh sizes for runner segmentation are 2.0mm and 2.5mm.

Considerations for use of Flexsil & CerraFlex in Breaker-Core Applications

The common foundry practice of using either Flexsil or CerraFlex filter fabric as an integrated component of a breaker-core fitted riser sleeve is primarily focused on making riser *removal* easier during the cleanup phase. Removing a riser from a casting during the clean up phase often requires the use of a cutting saw or torch by a dedicated individual which in turn adds considerable time and expense to the casting facility as a whole, not to mention the ever-present risk of possibly damaging the casting itself through the use of the cutting saw or torch.

Riser sleeves fitted with Flexsil or CerraFlex breaker-cores commonly fall off on their own during shakeout or can easily be “knocked off” by production line personnel often by using only a hammer. This is significantly faster, less expensive, and safer for both the line personnel and the casting.

Breaker-Core applications should utilize a **2.0mm** or **2.5mm** Mesh fabric, with **CerraFlex** being the preferred material to use due to its superior rigidity (ability to resist deflection into the casting) and higher temperature threshold.

In determining the size of the contact area for a given breaker-core fitted riser sleeve, the ***Washburn formula*** is usually employed to first calculate the required opening size of the breaker-core itself.

Washburn Formula – “The breaker-core opening is generally **50%** of the inside diameter of the riser sleeve being fitted.”

Once the diameter of the breaker-core opening has been calculated, the same formula can be used again to determine the size of the center-punched hole to be made in the Flexsil or CerraFlex cut disc to aid metal feedback from the riser sleeve back into the casting. Thus, the center punched hole should be **50%** of the diameter of the breaker-core opening.

Still have questions? Please contact our technical service team at:

PH: **866-925-6750**, ext. **704**

Email: JayRHitchings@comanchetechnologies.com