



SELEE® CS-W™ Aluminium Cast House Filter

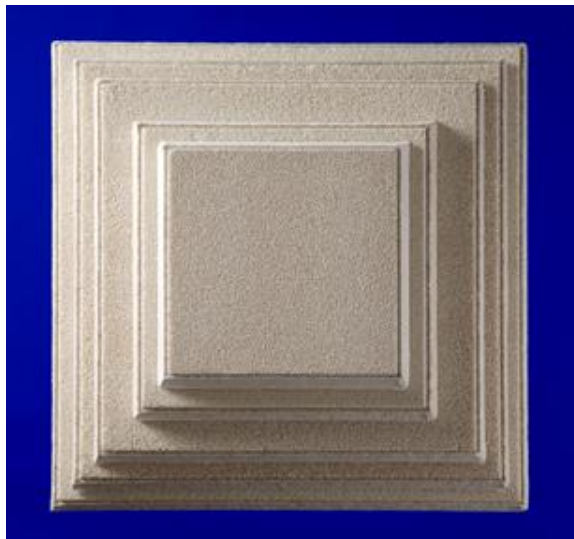
SELEE Corporation developed and introduced reticulated continuous open-pore ceramic foam filters (CFF) for aluminium cast house filtration in 1974. During the 1980's there was widespread market acceptance of SELEE® ceramic foam filtration technology for a broad range of fabricated aluminium products including rigid packaging materials, lithographic sheet, aerospace products (sheet, plate, forgings and extrusions), bright finish trim, condenser tubing, foil, architectural extrusions, foundry alloys and electrical conductor cable and wire.

The subsequent rapid market acceptance and growth of SELEE® CFF technology into aluminium cast houses of all types and levels of sophistication was due to the following reasons:

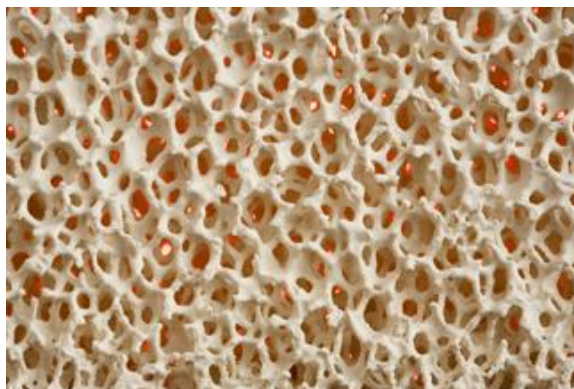
- 1) Ease of use and operator acceptance
- 2) Operational flexibility—drain after every cast
- 3) Low variable operating cost
- 4) Effective inclusion removal
- 5) Small footprint requirements (minimal floor space required for installation)

The SELEE® CS-W™ filter is designed specifically for billet casting of low magnesium (<1.20 wt.%) 6XXX series extrusion alloys where the metal contact time is less than 90 minutes and the maximum filter bowl metal temperature is 725°C. The SELEE CS-W™ filter is a significant technical advancement over phosphate bonded alumina filters from competitive suppliers. The CS-W™ filter has the following advantages over the traditional phosphate bonded alumina filters:

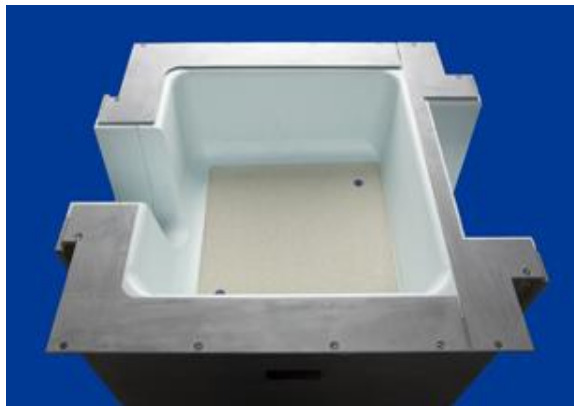
- 1) Improved molten metal corrosion resistance
- 2) Improved thermal-mechanical properties
- 3) Improved thermal shock resistance
- 4) No lateral compressive edge crushing during use
- 5) Phosphate-free filter (less reactive, environmentally more “green” filter after use); no phosphine gas release after use



SELEE® CS-W™ Filters



SELEE® CS-W™ Filter Structure



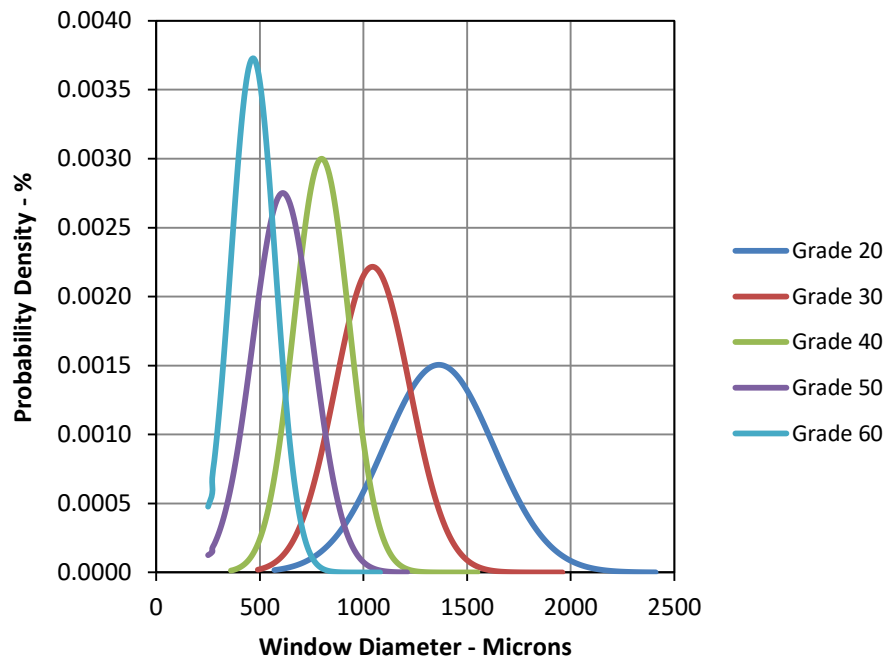
SELEE® offers a complete line of standard filter bowls as well as turnkey custom designed filter bowls and preheat systems

SELEE® CS-W™ Filter Description and Specification

| | |
|--|---|
| Filter Material: | Glass bonded aluminosilicate grain |
| Apparent Density: | 2.95 grams/cm ³ |
| Thermal Expansion Coefficient: | 5.33 X 10 ⁻⁶ dl/l°C (heating to 750°C) |
| Macro-porosity: | 70 – 80% |
| Standard Gasket: | SURESEAL™ |
| | Expandable above 480°C |
| Gasket Thickness: | 2.97 – 4.06 mm |
| Filter Length/Width Tolerances: | Nominal \pm 2.4 mm |
| Filter Thickness: | 50 \pm 2.4 mm |
| Bevel Angle: | 17.5° \pm 1.5 |
| SELEE Quality Systems: | ISO 9001 |

CS-W™ Filter Window Size Distribution Graph Showing \pm 2 Standard Deviation Spread

| SELEE® Window Size Specification Limits | CS-W™ Filter Pore Size Grade | | | | |
|--|------------------------------|-------|-----|-----|-----|
| | 20 | 30 | 40 | 50 | 60 |
| Minimum Average - Microns | 1,218 | 932 | 713 | 545 | 417 |
| Maximum Average - Microns | 1,510 | 1,115 | 883 | 676 | 517 |



Window Diameter Distribution for SELEE® CS-W™ filters

Filter Application Information

Filter Sizing: The filter sizing information below should be used as a guideline only. The optimum filter sizing will be dependent on incoming metal cleanliness, metal flow rate and cast duration.

| SELEE® Part Number* | Nominal Filter Size, mm | Effective Filter Area, mm ² | Recommend Flow Rate Range, Kilograms/Minute |
|---------------------------|----------------------------|---|---|
| CSW09YYZ | 229 X 229 X 50 | 38,950 | 27 - 82 |
| CSW12YYZ | 305 X 305 X 50 | 74,834 | 53 - 158 |
| CSW15YYZ | 381 X 381 X 50 | 122,331 | 86 - 258 |
| CSW17YYZ | 432 X 432 X 50 | 160,447 | 113 - 338 |
| CSW20YYZ | 508 X 508 X 50 | 227,298 | 160 - 479 |
| CSW23YYZ | 584 X 584 X 50 | 305,763 | 215 - 645 |
| CSW26YYZ | 660 X 660 X 50 | 395,840 | 278 - 835 |

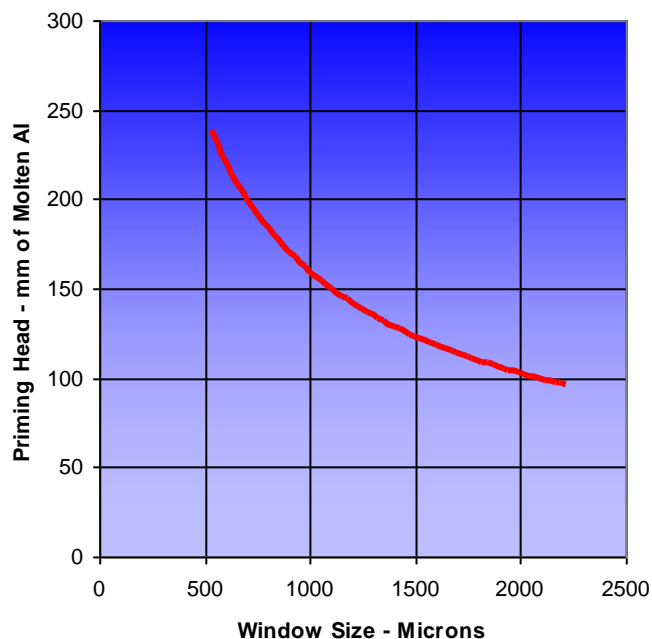
* YY = Pore Size Grade

Filter Priming Head:

A critical metallostatic priming head is required to initiate metal flow through the porous CS-W™ filter structure. The critical priming head is dependent on the alloy surface tension, the alloy wetting angle on the filter and filter window size. The table below shows the recommended priming head for standard pore size filters:

Recommended Priming Head

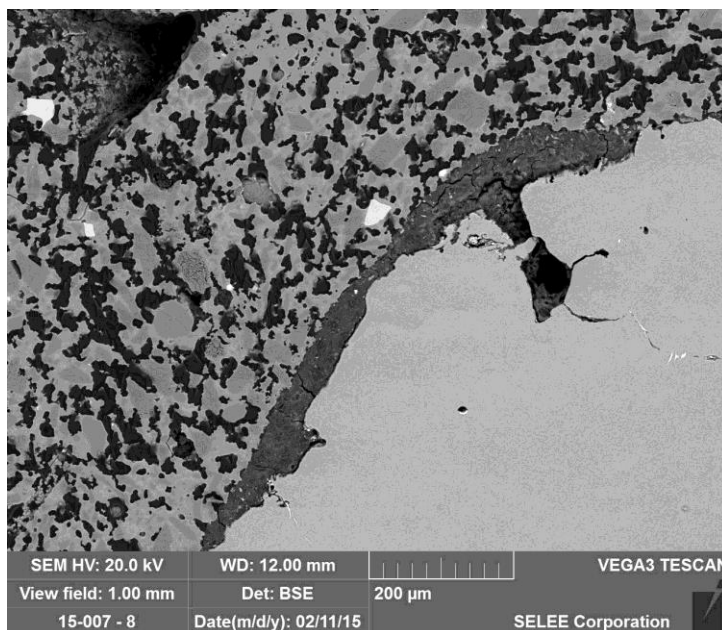
| Filter Pore Size | Metallostatic Priming Head - mm |
|---------------------|------------------------------------|
| Grade 20 | 183 |
| Grade 30 | 208 |
| Grade 40 | 233 |
| Grade 50 | 257 |
| Grade 60 | 282 |



CS-W™ filter priming head as a function of window size.

Filtration Efficiency:

SELEE® ceramic foam filters remove inclusion particles using a deep bed filtration process. The size of inclusions typically present in molten aluminium are usually significantly smaller (<100-microns) than the window size of the filter (500 to 2,200 microns) and therefore are removed within the filter structure. The CS-W™ inclusion removal efficiency is dependent on filter pore size (grade), inclusion size, inclusion type (density, wetting characteristic), and metal velocity through the filter.



Backscattered electron image showing liquid chloride salts adhering the surface of the CS-W™ filter. Alloy Type: 6063

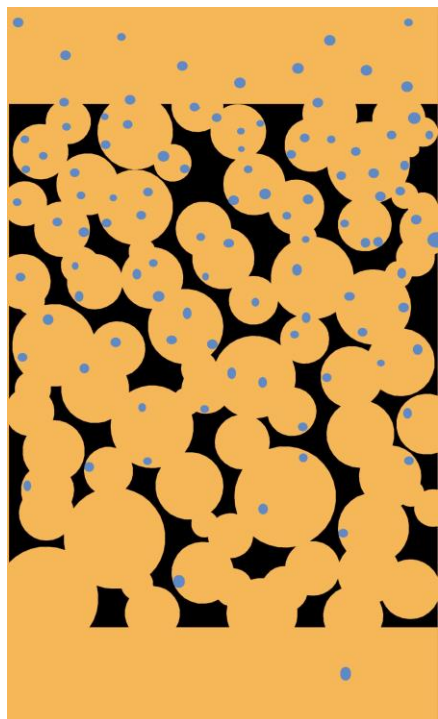
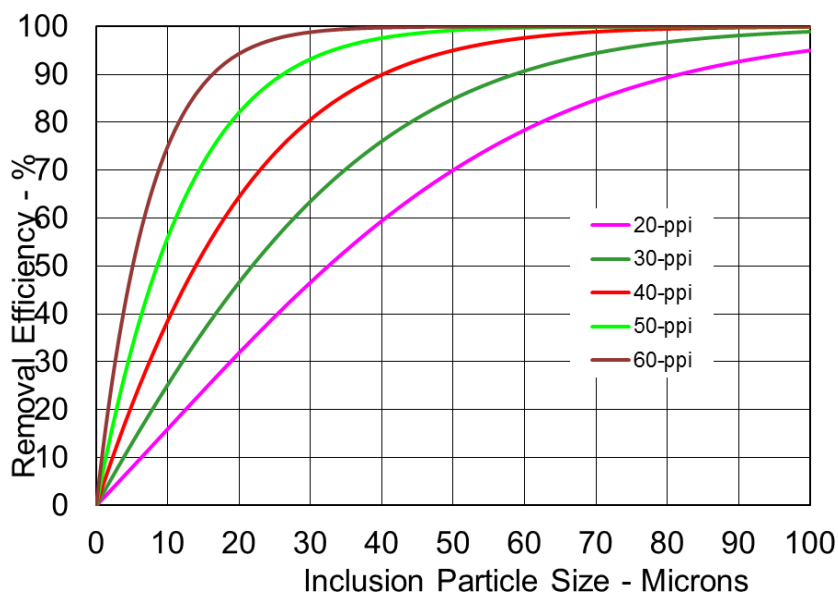


Illustration of depth filtration in a SELEE® CS-W™ filter.



Calculated oxide particle removal efficiency of SELEE® CS-W™ ceramic foam filters as a function of inclusion particle size and filter pore size (grade).

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