

Cost Efficient Filtration and De-Risening Solutions



AMETEK[®]

FOUNDRY PRODUCTS

FLEXSIL[®] / CERRA-FLEX[®] REFRACTORY CLOTH FILTERS

Successful foundries and metalcasting operations know that the key to competing and winning in today's hyper-competitive global marketplace lies in their ability to produce high quality end-castings through the use of the most advanced & cost-efficient production methods available. While this may sound easy on paper, any metallurgist will tell you that it's a never ending challenge...AMETEK is the solutions partner of choice for many of the world's best-practice foundries and is committed to helping them meet this challenge through cutting edge technology and top tier metallurgical & technical support.

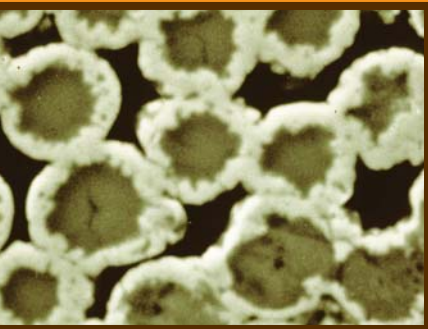
INCREASED CASTING QUALITY + DECREASED OPERATIONAL COSTS

Flexsil® and Cerra-Flex® refractory cloth filters serve a dual role in their ability to filter molten metal and to provide a proficient and cost effective method for both de-risening and runner segmentation.

The increase in casting quality comes from filtering out the slag and dross that forms in molten metal during the casting process, increasing end-casting machinability while simultaneously reducing the

casting line scrap rate. Flexsil silica cloth traps impurities using a method uniquely different than that of competing ceramic filters. When molten ferrous metals contact the cloth surface, special surface coatings decompose to instantly form a continu-

ous film of fayalite (Fe_2SiO_4). This fayalite coating becomes soft and viscous at high temperatures to entrap even micron-sized inclusions as they pass through the filter. For Magnesium treated ductile iron, the fayalite coating absorbs Magnesium reaction products (inclusions) contained in the molten metal, and forms lower melting solid solutions on the surface of the silica fibers. This helps



to trap inclusions on the filter surface, especially the Magnesium dross, sulfides and silicates that are formed by the MgFeSi nodularizing treatment. Conventional ceramic filters are unable to capture molten metal impurities in this manner.

Decreased casting operational costs can be achieved through a drastic reduction of time and effort usually required for riser removal and runner segmentation. By placing small pieces of Cerra-Flex at both the riser casting contact and in various locations along lengthy runner systems, the traditional need for production line personnel to manually cut away the risers and runners after the casting has cooled can be eliminated. These residual components are instead easily knocked off or come apart during the shakeout process. This additional benefit can quickly translate into significant operational cost savings, with the typical casting line reducing its labor-related expenditure by as much as 50%.

TAILORED FORMULATIONS FOR UNIQUE APPLICATIONS

Because the range of metalcasting applications that can benefit from using these technologies is quite wide, we've developed a variety of filter cloth formulations designed to meet the unique environmental and performance requirements that each demands. Additionally, these different cloth types can be cut and formed to virtually any size or shape required.

FLEXSIL®

The standard Flexsil fabric is woven from silica fibers into a mock leno mesh configuration, then coated with a phenolic resin and dried to two different stages of dryness ("B" & "C"). The "B" stage cloth is semi-soft, slightly tacky, and is the base material for thermally cured end products such as investment casting filter cups and pre-stiffened cut pieces. The "C" stage cloth is cured to a full dry stiff condition ideal for cut piece applications used industry-wide for riser knock-off and runner segmentation.

CERRA-FLEX®

A new refractory coated version of Flexsil, called Cerra-Flex, has been developed with greatly increased thermal properties and rigidity. This new version can be used in metalcasting applications where metal pour temperatures approach the maximum allowable for silica mesh fabric, such as you'd find with steel casting operations or when pouring large amounts of ferrous metals. The excellent rigidity of Cerra-Flex, even at higher temperatures, helps limit any deflection of the fabric from the pressure of the metal flow and thus can be placed closer to the casting at the riser contact. Thus after knock-off, there is a very small contact nub to grind. Additionally, larger quantities of metal can be poured due to the increased strength of the cloth.

INVESTMENT CASTING

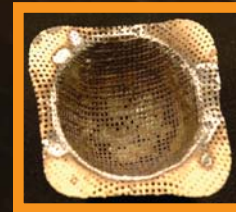
Small filter cups that accurately fit the wide variety of ceramic pouring cones used in investment casting operations are available in the standard Flexsil silica mesh fabric or with the high-purity Cerra-Flex coating. These cups are rigid and have support flanges that stabilize them during metal pouring. In addition to being cost competitive, the

Flexsil investment casting filter cups offer several strong advantages over the traditional ceramic foam filters.

In order for an investment casting line to utilize ceramic foam filters, it must use a specially designed pouring cone that has a small pocket in the bottom to secure the foam filter.

In addition, the ceramic foam filter must be secure and in place during the wax burn-out so that it reaches the same temperature

as the investment shell prior to the metal pour. Were that same investment casting line to use a Flexsil filter cup, there would be no need for a custom pouring cone (lower cost) nor a need to "pre-heat" that filter prior to the metal pour as a Flexsil filter cup is typically placed into the hot investment just before the metal is poured. Another factor to consider is the ease of removal of the spent filter. While a ceramic foam filter is basically immovable from the pouring cone after the metal is poured,



a Flexsil filter cup typically floats to the top of the cone after the pour and can be easily removed before metal solidification. The removal of the filter media enables a cleaner re-melt metal and provides for an addition of hot-topping if required. Additionally, the metal feed to the casting after the hot-top is added is not slowed by a ceramic filter still in place at the bottom of the pouring cone.

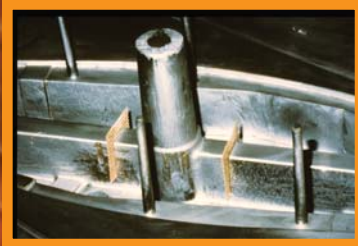
For those special investment casting applications using more exotic alloys as used in metallic medical implants or for single crystal turbine blade



castings, AMETEK offers Cerra-Flex, a high purity refractory-coated filter material. This coating provides a much more rigid cup and significantly increases the thermal operating range. Another area where investment casting operations can greatly benefit from this new technology is by placing small cut pieces of Cerra-Flex directly into the wax ingates of the castings, which in turn provides for additional filtration as well as easy knock-off or removal of each casting from the central sprue.

DE-RISERING & RUNNER SEGMENTATION

The strategic placement of either Flexsil or Cerra-Flex cut pieces at the riser contacts makes it possible for a casting line to realize significant time and labor cost savings in making riser removal easier. A cut piece of either type of filter cloth is placed into the base of a breaker core, which after cooling, allows the solid riser to come off the casting either in shakeout or



through a light blow with a hammer. Where the fabric has provided a cleavage site, the fracture surface is highly uniform and does not create a jagged surface that might break into the

casting. This uniform fracture surface also makes it much easier to grind off the remaining contact stub.



Often, long or complex runner systems can cause problems when used in a furnace recharge. This problem can be solved through the placement of a small section of either Flexsil or Cerra-Flex across the runner at several locations. This allows the runner to be segmented or come apart in shakeout, which in turn produces smaller pieces for easier furnace charging.



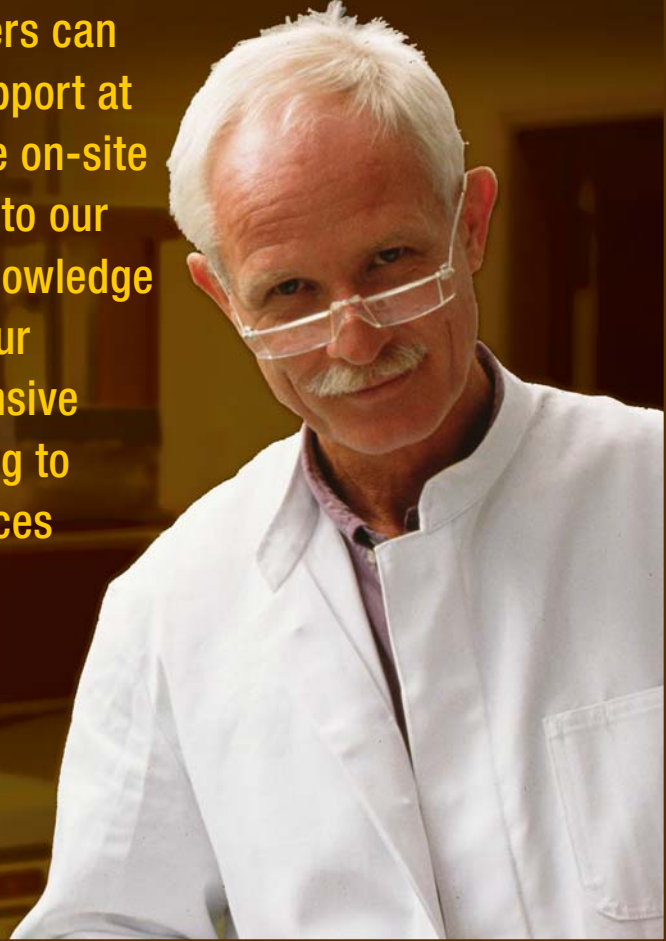
CHOICE BY APPLICATION NEED

APPLICATION PERFORMANCE CONSIDERATIONS	B - STAGE FLEXSIL	C - STAGE FLEXSIL	CERRA-FLEX
Metal Pouring Temperature	PT < 3000°F / 1649°C	PT < 3000°F / 1649°C	PT < 3500°F / 1927°C
Fayalite Coating	Yes	Yes	No*
Fabric Rigidity	Flexible	High Rigidity <i>(may experience slight deflection near temperature maximum when coupled with a slow pour)</i>	Completely Rigid <i>(no deflection)</i>

* Although Cerra-Flex does not have the advantage of the fayalite coated surface, it remains a highly effective filter and traps impurities by the same method as the ceramic or reticulated foam filters but at a comparable or even lower price.

WORLD CLASS CUSTOMER SUPPORT

Flexsil & Cerra-Flex customers can receive top tier technical support at no additional cost, to include on-site product training and access to our world-class metallurgical knowledge base. Additionally, each of our distributors undergoes extensive product & application training to become value-added resources for our customers.



Sales Office

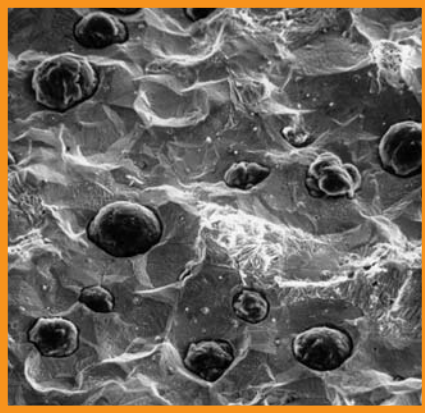
455 Corporate Blvd. Newark, DE 19702

Tel: 302-456-4431 or 1-800-441-7777

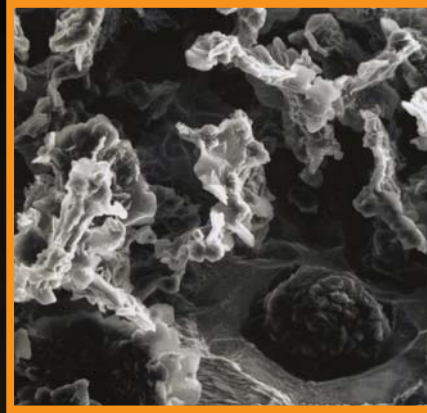
Fax: 302-456-4444

info.haveg@ametek.com

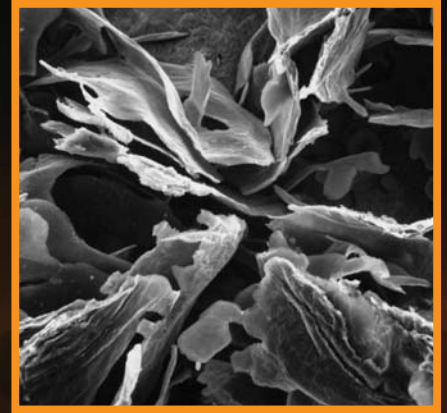
www.ametekfpp.com



DUCTILE IRON



COMPACTED GRAPHITE IRON



GRAY IRON

SCANNING ELECTRON MICROSCOPY: Deep-etched micrographs showing three-dimensional views of the microstructure for each of the three major types of cast iron

AMETEK is a leading global manufacturer of electrical and electromechanical products and specialty materials engineered for niche markets. AMETEK has been listed on the NYSE (AME) since 1930, with operations world-wide. The foundry and specialty metals market is served by the Chemical Products Division, which maintains a strategic relationship with Comanche Technologies for research and development.

AMETEK®

CHEMICAL PRODUCTS

455 CORPORATE BOULEVARD • NEWARK, DELAWARE 19702 U.S.A.
TEL: (302) 456-4431 • (800) 441-7777 • FAX: (302) 456-4444

www.ametekfpp.com
E-mail: info.haveg@ametek.com