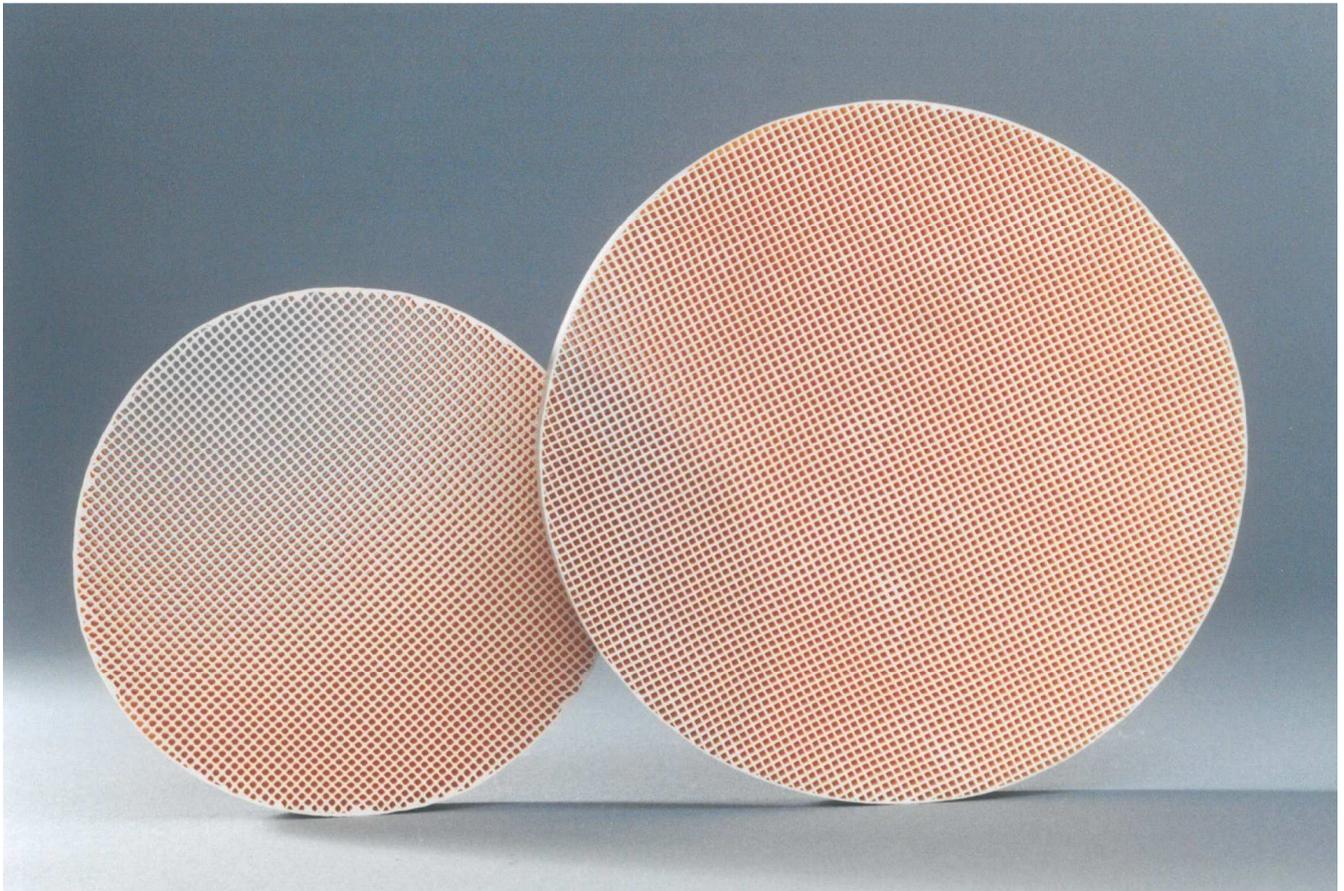




CTI

SUPERFILTRAMICS®



Céramiques Techniques Industrielles sas

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Dear Madam, Dear Sir,

The Céramiques Techniques et Industrielles S.A. company (C.T.I.) has set up in Salindres, in the Gard near Alès, a large production facility and an industrial research unit more than 64,000 sq. ft.

*C.T.I. is specialized in perfecting the design of technical ceramics often porous, whose applications are mainly in **environment, filtration, catalysis fields and SOFC.***

These include:

- **Filtration of liquids:** membrane's carriers in micro, ultra filtration.
- **Diesel Particulate filter** (SiC patented)
- **Gas and particle's filtration :** tubular, flat, honeycomb filtration's carrier
- **Catalyst's carriers :** granulated with high specific area, honeycomb, smooth and grooved porous rings
- **Filtration of liquid metals :** honeycomb refractories
- **Special refractories :** withstanding temperatures higher than 1 600°C
- **Special ceramics**

C.T.I. has a 6,000 sq. ft industrial line as well as a 3,000 sq. ft of laboratories and research line dedicated to the design and pre-production of technical ceramics. The research line, including mixers, presses, extruders, cell and H.F. driers, 1 700°C kilns, temperature and humidity controlled room, etc..., is designed for perfecting specific new products. This line is an efficient backsupport for many research centers.

Deriving its strength from long experience and a stable industrial team, C.T.I. remains a link between university research and mass productions.

Our engineers and technicians are at your disposal.

Yours sincerely,

The Chairman
François Garcia



THE CURE

FILTRATION

Dross is an inevitable phenomenon when mixing and pouring foundry alloys. Unless it can be kept out, this dross gets carried into the mould, to cause inclusion faults which affect the component's quality. These are various types of inclusion: sand grains from moulds or cores, bits of slag, particles of refractory material from furnace or ladle, dirt from the crucible...

According to the type of metal, these are also :

- **Non ferrous alloys:** oxide particles or flakes (from aluminium or magnesium skin), traces of flux, chlorides, nitrides, boron...
- **Lamellar or spheroidal graphite iron:** pieces of inoculant or iron

alloy not completely absorbed by the metal, magnesium slag particles...

- **Steels :** ceroydes and traces of de-oxidising material, de-sulphurising and de-phosphorising slag.

All these inclusions affect castings in a number of ways:

- Reduced mechanical properties,
- Worse machinability,
- Loss of proofness in parts subject to pressure testing,
- Surface defects which inhibit surface treatment,
- Poor surface appearance,
- Reduced corrosion resistance.

In the car industry for example, where "zero defect" standards are now the rule, these faults usually result in the reject components or, at best, re-working them at the foundry's expense.



A FOUNDRY PROBLEM

HOW TO ELIMINATE DROSS

Metal filtration is the surest way of retaining dross ; before it reaches the mould and causes defects.

Filtering :

- Reduces reject rates considerably,
- Saves re-work costs
- Improves the structures of castings,
- Enhances their mechanical properties, improves machineability
- Improve surface condition,
- Reduce yield loss,
- Improves corrosion resistance,
- Eliminates risks of leakage in parts which are pressure tested,
- Limits machining allowances, particularly with steel components.



SUPERFILTRAMICS

CTI'S FILTERS

CTI offers a large range of filters which are specially suited to casting alloys :

SUPERFILTRAMICS, a multicellular filter produced by extrusion by CTI team. Using high performance ceramic materials, some operating at 1 650 deg-C,

SUPERFILTRAMICS filters meet the needs of filtering all aluminium and copper' alloys, cast irons, super alloys, and even some special steels. Their effect is not mechanical, because they also filter by

means of a physico-chemical reaction with the wall surface.

In this way, they retain dross particles which are much smaller than the size of each cell.

Futhermore, the filter effect takes place with only a slight reduction in the pouring system's flow rate.

Finally SUPERFILTRAMICS's cellular structure, being produced by extrusion, ensures perfect reproducibility.



INSERTION

SIMPLE AND QUICK

Whether placed horizontally, vertically or at a slight angle in the pouring system, SUPERFILTRAMICS's effectiveness remains constant. However, experience shows that, according to the alloy, certain positions are recommended to ensure good feed to the components :

- The methods "Tilted, bottom-to-top" (fig 1*) and "Tilted ; top-to-bottom"

(fig 2*) are suitable for all ferrous and non-ferrous alloys.

- The vertical position (fig 3*) is better for special steels and SG irons,
- The horizontal position (fig 4*) is used only for irons which are inoculated in the mould.

*See following pages.



INSERTION

SIMPLE AND QUICK

Figure 1 – Titled position (bottom-to-top)
C.T.I.F. method

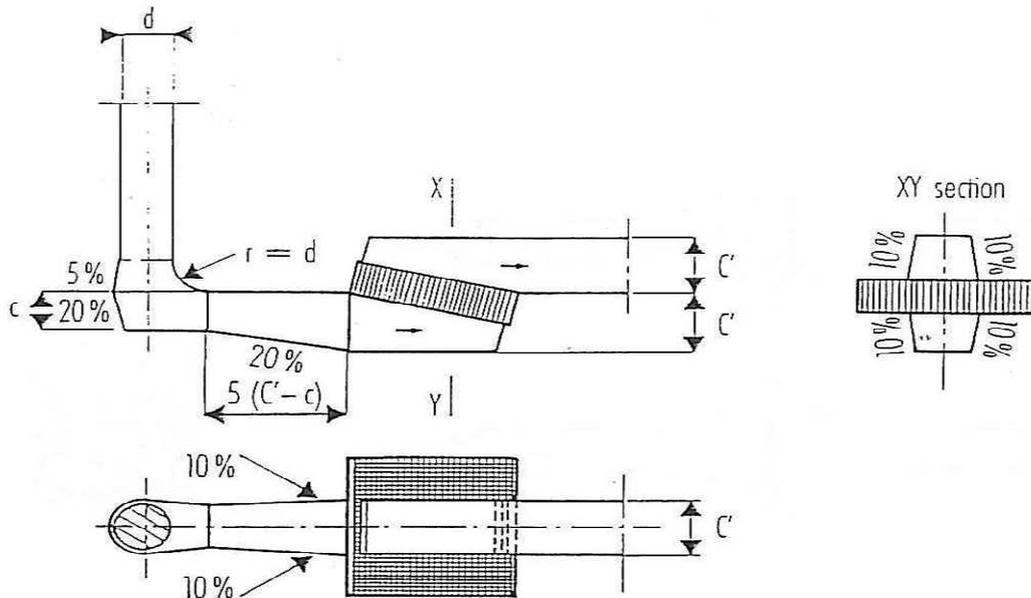
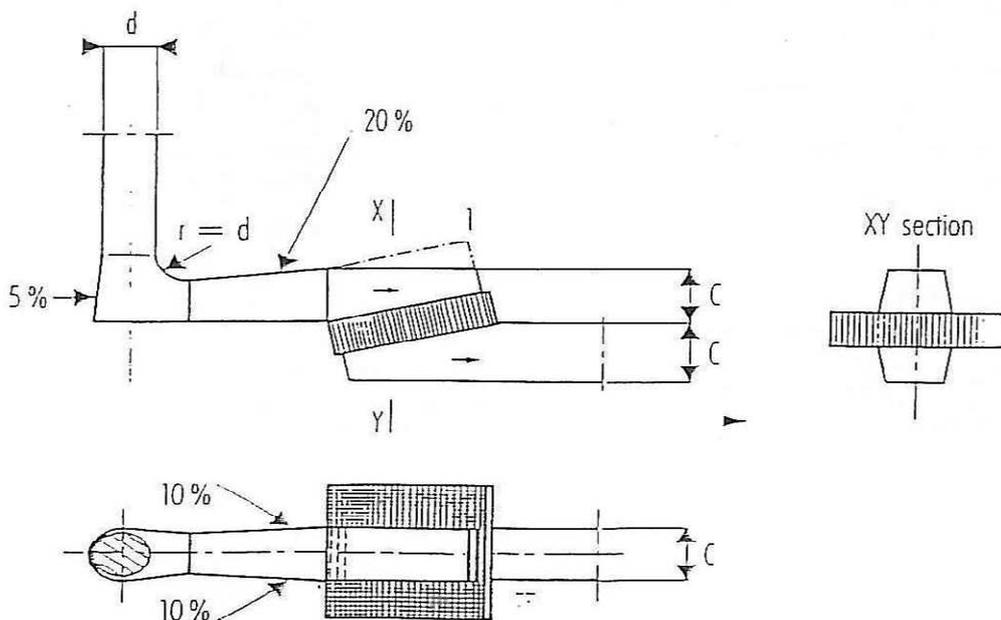


Figure 2 - Tilted position (top to bottom)





INSERTION

SIMPLE AND QUICK

Figure 3 - Vertical position

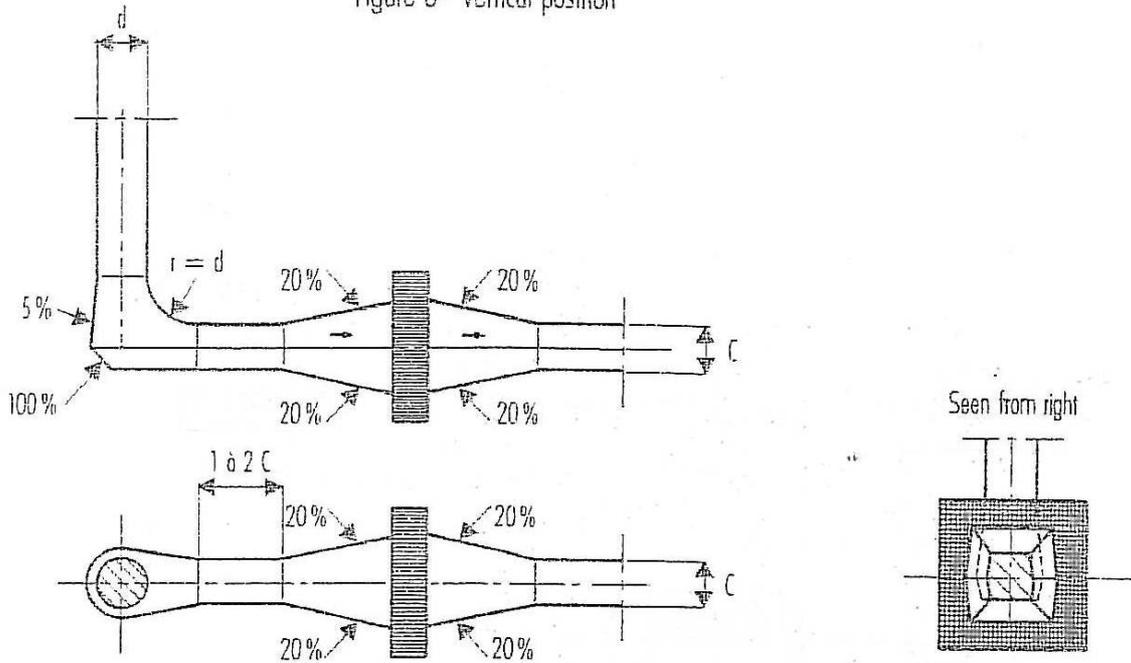
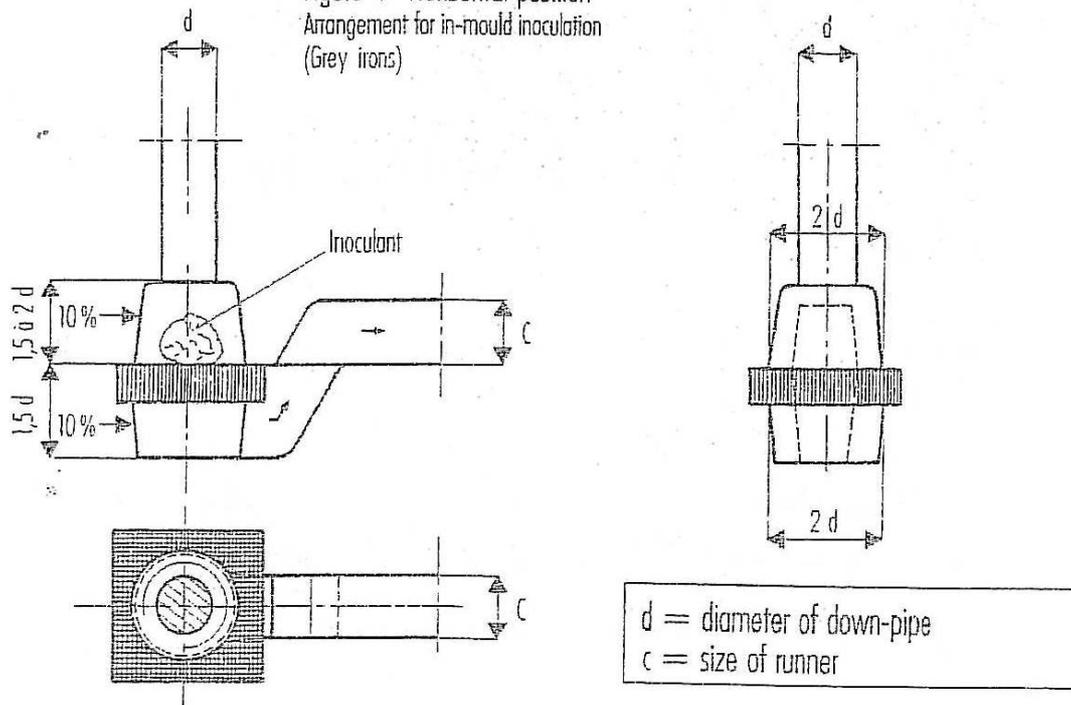


Figure 4 - Horizontal position
Arrangement for in-mould inoculation
(Grey irons)





SUPERFILTRAMICS®

ZIRCONIA - MULLITE

REF	DIMENSIONS				MESH
	CROSS-SECTION		THICKNESS		
	Inches	mm	Inches \pm 0.02	mm \pm 0.5	cps
81034 ZM	1.92 X 1.92 \pm 0.04	48.8 X 48.8 \pm 1	0.50	12.70	400
	1.92 X 1.92 \pm 0.04	48.8 X 48.8 \pm 1	0.50	12.70	280
82001 ZM	\emptyset 4.11 \pm 0.06	\emptyset 81.0 \pm 1	0.50	12.70	400
82008 ZM	\emptyset 4.11 \pm 0.06	\emptyset 104.4 \pm 1.5	0.75	19.05	400
82006 ZM	\emptyset 4.11 \pm 0.06	\emptyset 104.4 \pm 1.5	1.00	25.40	400



SUPERFILTRAMICS®
ZIRCONIA-MULLITE

DESCRIPTION Honeycomb filters available size 400 - 280 CPSI
cut after sintering

DIMENSIONS Round and square filters in many dimensions and thickness
(Consult our reference list)

TYPICAL PROPERTIES *

CHEMICAL	Content	<i>Unit</i>	Value
	Pure Mullite	<i>weight %</i>	71.4
	ZrO ₂	<i>weight %</i>	28.0
	Na ₂ O + K ₂ O	<i>weight %</i>	< 0.3
	Other impurities	<i>weight %</i>	< 0.3
	Crystalline structure		ZrO ₂ monoclinic + mullite
PHYSICAL	Frontal porosity	<i>%</i>	> 63
	Bulk density	<i>g/cm³</i>	2.70 ± 0.2
	Theoretical density	<i>g/cm³</i>	3.60
THERMAL	Coefficient of thermal expansion	<i>20 - 500 °C</i>	<i>10⁻⁶/ °C</i>
		<i>20-1000 °C</i>	<i>10⁻⁶/ °C</i>
		<i>20-1400 °C</i>	<i>10⁻⁶/ °C</i>
MECHANICAL	Mechanical strength	<i>20 °C</i>	<i>daN</i>
			>50
	Maximum working temperature	<i>in air</i>	<i>°C</i>
			1650
		<i>in inert atm</i>	<i>°C</i>
			1650
VISUAL CONTROL	Acute visual control under magnifying glass		



SUPERFILTRAMICS®

ZIRCONIA - MULLITE

DESCRIPTION

Name	4.11" round ceramic honeycomb filter 400 M SUPERFILTRAMIC
Code	82001 ZM / 82006 ZM / 82008 ZM
Composition	zirconia – mullite

Firing's temperature **1600° C in the center of burden**
1650°C temperature control ring (Philips)

DIMENSIONAL REQUIREMENTS

Cell opening	0.039" X 0.039" \pm 0.003"
Cell Wall	0.012" \pm 0.003"
Skin thickness	0.021" \pm 0.003"
Size	4.11" \pm 0.06"
Thickness	0.5" – 0.75" – 1" (as required) \pm 0.02"
Camber	0.012" maximum

VISUAL REQUIREMENTS

Missing cell walls	\leq 1 per filter
Cracked cell walls	\leq 3 per filter
Surface debris	none
Distorted or blocked cells	\leq 3 per filter
Cracks in skin-filter	1
Circumference (max)	

PACKAGING REQUIREMENTS

This material is packaged in a manner to prevent breakage, or contamination during shipping handling and storage.



SUPERFILTRAMICS®

ZIRCONIA - MULLITE

DESCRIPTION

Name	1.92" X 1.92" , square ceramic honeycomb filter 400 M SUPERFILTRAMIC
Code	81034 ZM
Composition	zirconia – mullite

Firing's temperature **1600° C in the center of burden**
1650°C temperature control ring (Philips)

DIMENSIONAL REQUIREMENTS

Cell opening	0.039" X 0.039" \pm 0.003"
Cell Wall	0.012" \pm 0.003"
Skin thickness	0.021" \pm 0.003"
Size	1.92" X 1.92" \pm 0.04"
Thickness	Nominal \pm 0.02"
Camber	0.012" maximum

VISUAL REQUIREMENTS

Missing cell walls	\leq 1 per filter
Cracked cell walls	\leq 3 per filter
Surface debris	none
Distorted or blocked cells	\leq 3 per filter
Cracks in skin-filter	1
Circumference (max)	

PACKAGING REQUIREMENTS

This material is packaged in a manner to prevent breakage, or contamination during shipping, handling and storage.