



TENBLOC[®]
INOCULANT

TENBLOC® INOCULANT

Tenbloc® is a unique in the mould inoculant block which provides consistent, reliable and cost-effective inoculation for ductile and grey irons. This assists foundries to produce castings with improved metallurgical structures and mechanical properties.

Your main benefits

- ▶ Inoculating at the latest possible stage in the casting process eliminates inoculant fade.
- ▶ Accurate weight control gives a consistent level of inoculation into every mould.
- ▶ Close dimensional tolerances ensure a good fit into the mould print.
- ▶ Tenbloc® is 100% inoculant and does not contain a binder or any other additive.
- ▶ Tenbloc® is available in several different analytical grades, specifically formulated for both ductile and grey iron.

Introduction

Tenbloc® is manufactured by a unique powder metallurgical method, giving very accurate dimensions and weights. Blocks are produced in either cylindrical or taper shape, in the weight range from 5 g to 1000 g.

Production by this method results in Tenbloc® having low thermal conductivity. This means Tenbloc® starts to dissolve immediately and continuously throughout the pour time ensuring all metal, particularly the first metal poured, is inoculated.

The use of Tenbloc® in the mould is the latest possible stage at which inoculant can be added. This means the amount of inoculant to be used can be reduced to a minimum as there is no inoculant fade and as such, it is a cost effective and efficient use of inoculant. Typical addition rates are 0.1% but these can be adjusted to suit specific customer requirements.

Close control of all stages of production gives Tenbloc® several advantages:

- ▶ It is free from impurities, eliminating the introduction of undesirable elements in the iron.
- ▶ There are no slag inclusions, gas holes or porosity.
- ▶ The unique metallurgical bond formed during production is important for immediate and controlled dissolution.

Weight and shape availability

Tenbloc® are available in a range of weight, shapes and sizes as detailed below.

Cylindrical shape

Diameter	Weight availability (g)
20.5mm	5, 10, 15, 20
25.4 mm (1")	15, 20, 25, 30, 40
38.1mm (1.5")	50, 60, 80, 100
50.8mm (2")	80, 100, 120, 150, 200, 220
76.2 mm (3")	300, 350, 400, 500
90mm	600, 800, 1000

Taper shape	Description	Weight availability (g)	Dimensions, typical (mm)		
			A	B	C
	19.5	15, 20, 25	21	20	11
	22.5	25, 30, 40, 50, 60	26	23	20
	28.4	50, 60, 70, 80, 90	31	29	40
	35.6	100, 110, 120, 150, 180	40	36	40
	38	200, 240	44	39	50
	52	200, 250, 300, 350, 400	56	53	30

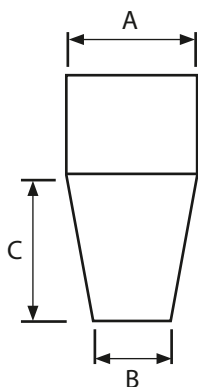


Figure 1: The overall height of the block is dependent upon weight and grade

Chemical information

Tenbloc® Std – Formulated to give good nodule count and shape and freedom from carbide for ductile iron.

Tenbloc® Std+Zr – Adding Zr to the std grade effectively controls carbide formation in thin sections where increased undercooling can cause problems.

Tenbloc® Low Al – Restricting Al to <1% makes the low Al grade well suited for grey iron inoculation minimising the risk of hydrogen pin-holing.

Tenbloc® Low Al+Zr – Adding Zr to the low Al grade effectively controls carbide formation particularly in thin sections where increased undercooling can cause problems.

Tenbloc® MZ – This grade is suitable for both ductile and grey iron. The controlled amounts of Al, Ca and Zr give a strong inoculating effect and Mn increases the solubility of the block even when the pouring temperatures are lower.

Tenbloc® alternate grade availability – Many different grades can be produced and developed to suit specific foundry requirements. Elements such as Ba, Bi, Ce, La and Sr can be added, following discussions with our technical personnel. Smaller trial quantities can be produced for initial trials to determine the best analysis to give the required metallurgical properties in the finished casting.

Recommendations for Tenbloc® use

Addition rate – The recommended addition rate is between 0.08% and 0.12% of the poured mould weight. Generally, most applications utilise a 0.1% addition. However, several factors can affect this, and these include:

- ▶ Pour time
- ▶ Metal temperature
- ▶ Hold time in ladle
- ▶ Degree of inoculation required

Placement print – Tenbloc® should ideally be printed wherever possible in order that the block remains in position during the pouring period.

An incorrectly printed or unprinted block could be washed through in the mould cavity resulting in the possibility of undissolved material in the casting.

Type of print – Due to high dimensional accuracy of the pressed block, standard core prints can be utilised. The recommended print depth is between 25 – 30% of the block height.

Under certain pouring conditions, i.e. pressure pouring or small pouring cup design, a print depth of between 30% and 35% is more suitable to prevent the block from being dislodged because of the velocity of the metal stream.

Position of print – Tenbloc® is normally printed at the base of the downsprue. However, some foundries have placed it in a print in the runner system to avoid the initial impingement of metal.

Care should always be taken when placing the block into the runner system to avoid choking the metal stream.

Standard gating system ratios are recommended for the use of Tenbloc®, with the most widely recognised as being the ratio of 8:4:8:3 for the cross sections of A4 downsprue, A3 runner, A2 runner and •A gate areas respectively.

Care should always be taken to ensure that the distance between the block print and the ingate is sufficient to provide adequate dissolution time.

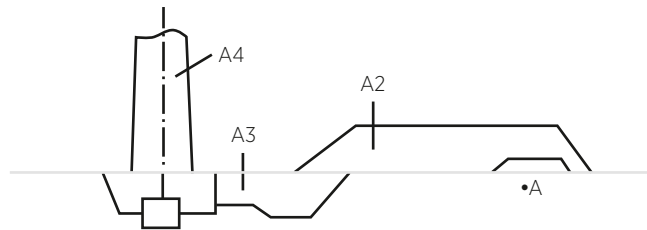


Figure 2: The diagram shows the typical location of Tenbloc® in a horizontally parted mould

Placement of filter – There are occasions when due to the mould design it is more convenient to place Tenbloc® on top of the filter in the downsprue which can be glued in place, if necessary.

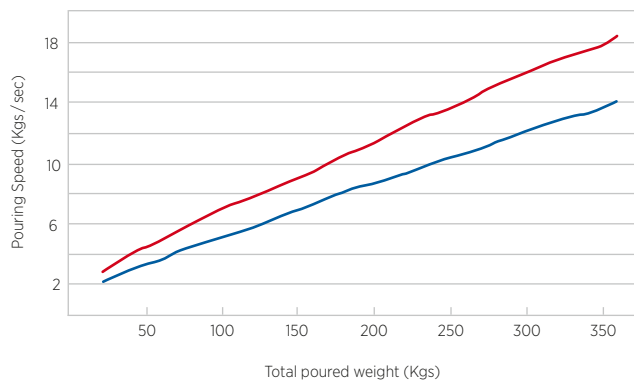
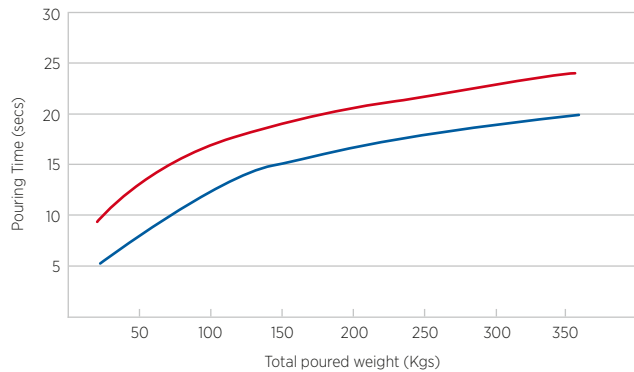
Metal temperature – This is normally in the range 1350 – 1500 °C depending on the type and section thickness of the casting being produced.

Flow rate – From experience we would recommend the following flow rates:

Weight of metal	Poured flow rate
20 kgs	2 – 3 kgs/second
40 kgs	3 – 4 kgs/second
60 kgs	4 – 6 kgs/second
80 kgs	5 – 6 kgs/second
100 kgs	5 – 7 kgs/second
150 kgs	8 – 10 kgs/second
300 kgs	12 – 18 kgs/second

Recommendations for Tenbloc® use (continued)

The following charts show typical pouring speeds and times where Tenbloc® has provided effective inoculation.



General – Whilst these guidelines will give the foundryman a basis for use, account must be taken of the differences which exist in operations from foundry to foundry.

It has been our experience that trials should always take place utilising these guidelines with modification, if necessary by the individual foundry to obtain optimum results.

Elkem supports you

Elkem's high quality products help our customers to achieve consistency in their castings. Our skilled Technical Service teams, together with our local sales force, are willing to share their experience to assist in improving your processes.

Get in touch with your regional Elkem representative on elkem.com/foundry

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