

A Steel Maker's Dream

Pre-Melted Calcium Aluminate Synthetic Slag and Al-Metal bearing $C_{12}A_7$ Slag Conditioners.

We feel proud to join our hands with you to add value to your steel. We promise to make your steel cleaner and cheaper.

Let us tune your steel with our synthetic slags and slag conditioners to reach newer heights in metallurgy by availing the following benefits.

- Produces clean steel with **Ultra Low Oxide & Sulphide inclusion level** through quick desulphurisation and faster **non-metallic inclusion floatation** to give better value addition and **lower level of inclusion rating and rejection**.
- **Reduction of refining time** by upto **20%**.
- Avoids addition of harmful CaF_2 to **increase ladle life by 10-20 %**.
- AL-Bearing Synthetic Slags (Z SLAG CAL-50 & CA-AL 20/40) **does instant killing of bath and slag to give Low FeO content in slag from the very beginning to accelerate refining process and to reduce re-oxidation of steel**.
- **>80 micron Alumina** content of Z SLAG CAL/CA-AL helps **inclusion removal very fast** by quick coagulation of finer inclusions into the bigger ones to make the refining process faster.
- **Reduces power consumption** due to lower slag volume and faster LRF process.
- Quick melting Slag cover (within one minute of addition) reduces re-oxidation drastically.
- It gives better **recovery of rolled product and better surface finish**.
- It helps you catch your sequences for better productivity and costing.
- Use of Calcium-Aluminate synthetic slag in tundish **reduces reoxidation of soluble aluminium in th tundish. Use – Basic Tundish cover**.
- Reduces or avoids **Calcium treatment** due to reduced alumina inclusion level with pre-melted slag.
- Z SLAG CA-AL 20/40 reduces Aluminium consumption to save cost.

Properties	Z Slag CA ~ N	Z Slag CAL - 50	Z Slag CA – LT	Z Slag CA~Al 20
Al- Metal	NIL	6~8 %	Nil	10-12%
Total Al_2O_3	38%	55 %	38%	65%
CaO Min.	48%	30 %	42%	12%
$C_{12}A_7$ (Calc-Aluminate)	100%	50 %	100%	20%
SiO_2 max. **	8%	5.5 %	8 %	6 %
$Fe_2O_3 + FeO$	1.8%	3.0 %	1.5 %	3.5 %
MgO ** Min.	2%	3%	2%	2.5%
TiO_2	1.5%Ma	Traces	Traces	Traces
Size	10-40mm	2 - 40mm	2-40mm	2-20 mm 10-40 mm
Melting Temperature	1300°C	1370°C	1380°C	1380°C
Water absorption	NIL	NIL	--	--
Uses	LC / Alloy/ SS	Al-Killed / Alloy/ SS/C /52 100	Low titanium Alloy/ Ball bearing.	Al-Killed / Alloy/ SS/ 52 100/MS
Packing	1 MT bulk bag/ 25Kg HDPE bags in pallet.	1 MT bulk bag/ 15kg HDPE bags in pallet	1 MT bulk bag/ 15kg HDPE bags in pallet	1 MT bulk bag/ 15kg HDPE bags in pallet

** Indicative values.

Application Procedures

- **Z Slag CA-N & Z Slag CAL-50** → This is to be added at the bottom of the ladle before or during tapping followed by Aluminium and Lime (As per the Practice). The consumption norm can vary from 3 kg to 10 kg per MT of liquid steel depending upon the Lime addition. In many plants across the globe, where 'S' opening is low and refining is the major cause, lime is totally replaced by Z SLAG CA-N. In such cases, the addition norm can vary between 5 to 15 kg per MT of steel depending upon the ladle/heat size. The addition can be made from bunkers through chutes or manually (25 kg bags) from the tapping platform.
- **Z-Slag CAL-50, Z CON – 12AX & CA –Al 20/40** → Our extensive experiences at many plant of Furnace / Vessel capacity varying from 25 mt to 200 mt, we recommend two stage addition of these varieties, as follows for maximum benefit. The addition can be made from bunkers through chutes or manually (15 kg bags) from the tapping / LRF platform.

1st Stage Tapping Addition

1-1.5 kg (depending upon the steel grade and the visibility factor of metal level in ladle) of Z SLAG CAL-50 / CA-AL 20/40 per MT of steel is to be added in the ladle as soon as the tapping starts from LD/Furnace followed by Calcined lime, ferro alloys and Al- Bar/Ferro aluminium.

This addition does the deoxidation of steel and at the same time makes an instantaneous killed & fluid slag cover on the top to prevent heat loss and reoxidation of steel. Besides, the large size alumina content of it helps faster coagulation of the fine alumina inclusions for faster removal of the inclusions from steel. The Calcium Aluminate content of Z SLAG CAL-50/CA-AL 20/40 works as a catalyst to convert the floated up alumina instantaneously into $C_{12}A_7$ & CA phase with the added lime to prevent inclusion reversal. This also keeps the sulphide capacity of slag high through out the process. The quick de-oxidation of the bath also results into faster removal of Sulphur. Thus the whole refining process becomes faster to save refining time.

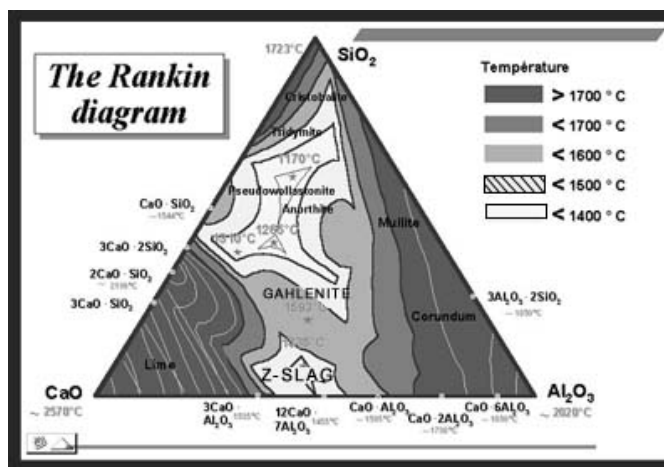
2nd Stage LRF Addition

1-1.5 kg (depending upon the quantity of slag carryover and steel grade) of Z SLAG CAL-50/ CA-AL 20/40 is to be added at the beginning of LRF operation, followed by the lime cover. In case of higher FeO level due to higher slag carry over, further quantity can be added at a later stage after seeing initial desulphurisation rate, FeO level of the slag and visual inspection of the slag. However in case of VD heats, the LRF addition may be avoided / reduced to make viscous slag to avoid rising.

This addition kills and at the same time increases alumina in the slag to form an instantaneous Calcium Aluminate Slag with lime, added separately. Thus an adequately killed and fluid slag enhances the rate of desulphurisation and at the same time makes a refractory friendly slag to enhance the refractory life.

As seen in Rankin diagram, all three varieties of synthetic slag targets to make the slag in the $C_{12}A_7$ phase region.

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Optimisation of quantity for most cost effective addition.

Optimisation of the quantity of addition of the Synthetic Slag and the Lime is very important for maximum saving of cost and yet to achieve desired steel chemistry within the specified period of time. As the grade of steel, raw material mix and processes are different from plant to plant, the norm of addition of Synthetic Slag, Lime, Ferro Alloys and Aluminum also varies drastically. While the following factors govern the addition norms, we find from our data from our customers that if we achieve close to following slag chemistry, we automatically optimize on costing as well as FeO + MnO level, Desulphurisation rate, rate of Inclusion removal and desired slag fluidity.

TARGET SLAG CHEMISTRY

Al₂O₃ 30-33%, CaO→48-54%, MgO→ 6-8%

Governing factors for Quantity of addition of Z SLAG CA AL20/40

- Opening O₂ ppm of steel after tap.
- Amount of Slag carry over and FeO % age of furnace / vessel slag.
- Amount of Ferro alloys addition.
- Amount of Al-bar/wire addition – actually these quantities would be as per the quantity of Z SLAG CA-AL 20-40.
- Opening and finish 'S' ppm.
- Carbon ppm of the steel.
- Quantity of Lime addition.
- Available refining time (Considering sequence pressure).
- Specification of C, Si & Al of the finish steel.
- Grade of steel.

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