

Heraeus



Argon Sampling Systems

For AOD, Ladle stations,
Degasser and Tundish

T.O.S. Total Oxygen Sampling

The Total Oxygen Sampling system offers superb pin sample quality and quick preparation for combustion analysis. T.O.S. pins are free of contamination from slag and cover powders, thus being a print for the steel cleanliness. Best results are obtained with the special lance system in as well RH, ladle, tundish and moulds.

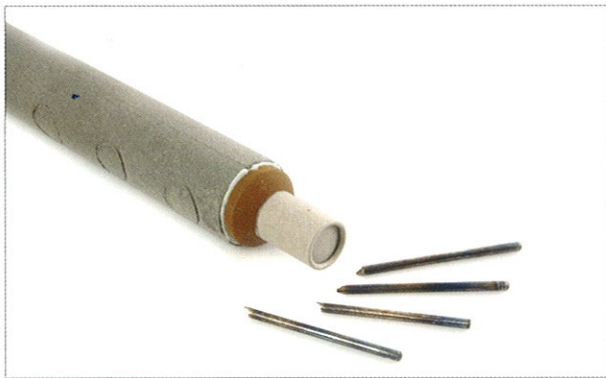
Samples taken by T.O.S. offer following advantages:

Representative for the melt:

- Free of powder and slag contamination
- No contamination by cardboard or metal caps

Reliable and high success rates:

- No hollow or oxidized samples
- Operator independent
- Operator and environment friendly non-splash



T.O.S. Pneumatic Unit

The T.O.S. uses argon flushing before sampling. When using the special pneumatic switch box, the sampling procedure is completely automated. As soon as the correct immersion depth is reached, argon flushing is stopped and a controlled vacuum applied.

The T.O.S. sampling system consists out of:

- The T.O.S. probe with a very specific design to:
 - > Ensure controlled filling to avoid cavities in the pin
 - > Side filling to avoid emptying of the pin
 - > Usage of an O-ring to ensure that a vacuum is applied
 - > Non-splash to avoid splashing
- The T.O.S. pneumatic lance
- T.O.S. pneumatic cable
- T.O.S. pneumatic system with signalisation



The T.O.S. sampling system has been designed to ensure leak tight conditions and an easy handling procedure.

It is however also possible to use a manual lance.

Applications:

- As quality tool to control the steel making process:
 - > Taking samples in as well ladle and tundish will give a good indication on the efficiency of the steel making process in improving the cleanliness of the steel.
 - > Regular monitoring of the different heats will also provide information on the applied processes.
- As R&D Tool:
 - > When used for total oxygen analysis:
New steel processing methods can be checked on their results by using the T.O.S. samplers.
 - > For use in the SEM:
Indeed, due to their small size, T.O.S. samplers will freeze in immediately all the existing inclusions. This allows steel researchers to understand the behaviour of the different inclusions during steel making.

Clean Argon Sampling

Getting Perfect Samples

Slag entrapment, oxidation by the air present in the moulds and insufficient filling leaves us with samples that are just not good enough when you are aiming for perfection.

In the past, the Total Oxygen Sampler has been developed to provide the steel makers with a pin sampler for reliable Total Oxygen Analyses. Meanwhile, other analyzing techniques based on spectrographic methods are being implemented that allow the steel makers to analyze the steel not only on steel composition, but also on inclusions.

Heraeus Electro-Nite improved the sampling technique (in cooperation with the Swedish Engineering Company Provac) and provides yet samples that are a perfect footprint of the steel and suitable for this new analyzing techniques.



Clean Argon Sampling technique

The Clean Argon Sampling technique of Heraeus Electro-Nite uses a pneumatic argon sampling unit, pneumatic cable, lance and dedicated samplers.

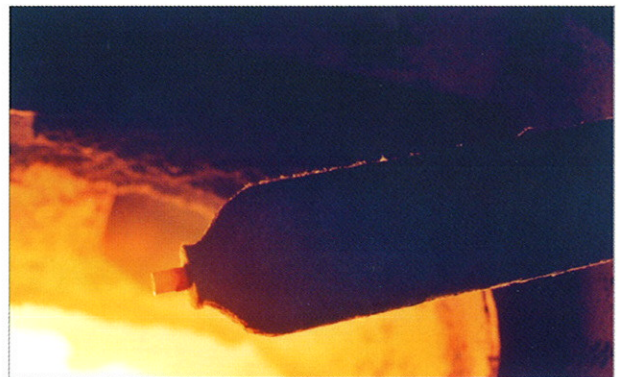
The immersion technique is very simple:

- The sampler is pushed on a conical lance.
- The immersion sequence is started and argon is blown throughout the quartz to blow away the slag when passing it during immersing.
- The argon blowing is maintained until the correct immersion depth is found.

- Once the immersion depth has been found, a vacuum valve is switched and the steel sucked in the sample mould halves.
- The sampling depth is monitored by the use of an inductive coil in the probe holder. The sample is being filled only after detection of the correct steel level.

Applications

- Ladle station, AOD, RH as tundish
- Especially useful for ULC and stainless steel grades



Clean Argon Sampling results

- The sample halves are filled with argon. An inert atmosphere has been created, avoiding occurrence of oxidation of the sample.
- Secondly, no capping is being applied. The steel that flows in the moulds is exactly the same as in the ladle, avoiding any dilution effects. Argon sampling techniques with slag caps can not always avoid capping influences.
- The use of the vacuum will also ensure that samples can be obtained even with temperatures close to liquidus.
- Density measurement shows that Clean Argon Samplers have filling characteristics of 99%. Classic immersion samplers are found to have densities between 94 to 98%.
- In average, a carbon content of 2 to 3 ppm lower is found then in the classic ULC samplers.
- The surface of the sampler is also superior to classic immersion samplers.

Clean Argon Samples vs T.O.S.

When developing the Clean Argon Samplers, the goal was set to have samples that were as clean as the T.O.S. samples. Experiments show a close correlation between T.O.S. samples and the lugs obtained out of the double thickness sampler. Similar correlation is found with the larger cylindrical samplers with values around 20 ppm total oxygen or lower.

What makes the Heraeus Electro-Nite Clean Argon Sampler special?

- The sample is taken only once the correct immersion depth has been found. This ensures a correct and representative sampling procedure.
- A dedicated filter in the sampler avoids tar build up in the lance and contamination of the sample.
- The samplers have been optimized to ensure not only a correct filling, but also to provide the correct analyses.



Ordering info T.O.S.

Item	Description	Reference number	
Pneumatic	220 V	IR 28100600	
T.O.S. Unit	110 V	IR 28100601	
Hardware			
Pneumatic	5 m	LC 29050605	
T.O.S. Cable	10 m	LC 29050610	
Lance	length	Probeholder 600 mm	Probeholder 1200 mm
Pneumatic	3 m	LC29101130	LC29100130
T.O.S. Lance	4 m	LC29101140	LC29100140
	4m Bent 45°	LC29101140B45	LC29100140B45
T.O.S. Samplers			
T.O.S. Sampler	600 mm	SAPTOSB4N0650	-
	1200 mm	-	SAP000NS01

Ordering Info Clean Argon Sampling

Item	Description	Reference number	
Pneumatic	220 V	IR 28100700	
Argon Unit	110 V	IR 28100710	
Hardware			
Pneumatic	5 m	LC33050705	
Cable	10 m	LC33050710	
Lance	length	Probeholder 600 mm	Probeholder 900 mm
Pneumatic	3 m	LC29201230B45	LC29202230B45
Lance	4 m	LC29201240B45	LC29202240B45
Bent 45°	5 m	LC29201250B45	LC29202250B45
Samplers			
Sampler	Type	Tube 600 mm	Tube 900 mm
350 mm	Double Thickness	SACGNN606D03WF	SACGNN609D03WF
Non-splash	Round 12 mm	SACRNN606D03WF	SACRNN609D03WF
	Oval 12 mm	SACBNN606D03WF	SACBNN609D03WF

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