

Use of Basic Pig Iron in the Electric Arc Furnace (EAF) for Steelmaking

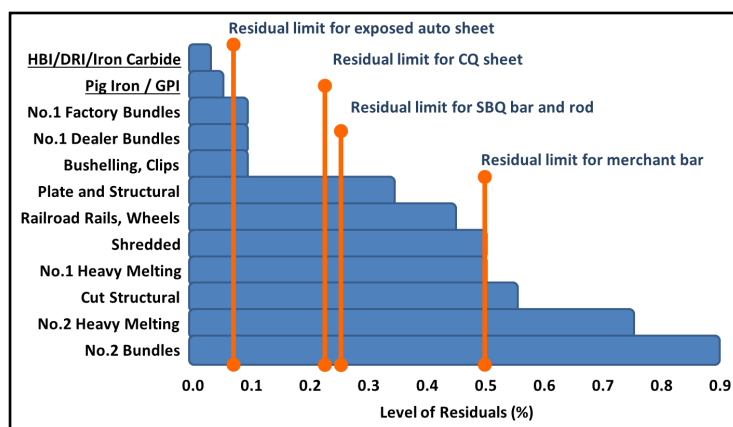
- Steel production in the EAF continues to grow both in North America and worldwide. The past 5 years have seen increases in the supply and use of Pig Iron, Direct Reduced Iron (DRI), and Hot Briquetted Iron (HBI) in the EAF.
- Pig Iron is a high Fe, low residual metallic material for producing high quality iron and steel products in a wide variety of furnaces. It should not be considered as a scrap substitute but rather as a source of clean iron units that can be used to supplement and enhance the scrap charge. Many EAF operators prefer to use Pig Iron to blend with scrap and other feedstock materials due to its high Fe content, low gangue, and chemical purity.
- On average, Pig Iron makes up between 5-10 percent of the global EAF metallics charge. In some parts of the world where scrap is scarce, Pig Iron can be used at up to 60 percent of the charge.
- The value-in-use of Pig Iron is different for each melt shop and will depend on local scrap supply, production facilities, metallurgical practice and steel product mix.

The Benefits of Using Basic Pig Iron in the EAF

- **High purity, low gangue** allows for the production of steel products requiring low residual content or for the use of higher percentages of lower cost scrap in the charge mix
- **Known and consistent chemistry** certified by analysis
- **Chemical energy** delivered efficiently by contained carbon, which promotes faster melting and increased productivity
- **High density** can reduce the number of bucket charges, allows for increased use of lower cost, less dense materials, and reduces storage space requirements
- **Consistent shape and form** provide efficient material handling characteristics
- **Easy to store** with no special requirements (silos, covered space, etc.) and a very low rate of degradation (oxidation) even when stored outdoors and uncovered



Pig Iron



General Specifications for Basic Pig Iron Used for Steelmaking

Typical Characteristics of Basic Pig Iron (Ranges % by Weight)	
Fe	94.0 - 95.0%
C	3.5 - 4.5%
S	≤ 0.05%
P	0.08 - 0.15%
Si	≤ 1.25%
Mn	≤ 1.0%
Cu, Ni, Cr, Mo, Sn, Pb, Zn, V	Traces - dependent upon the iron ore and coal/coke chemistry
Ingot weight	Can range from 3.5 kg up to 45 kg
Apparent density	6.5 – 7.0 t/m ³
Bulk Density	3.3 – 3.7 t/m ³
Content of chips and fines	< 2% as shipped

EU steel scrap specifications				
Category	Grade	Cu %	Sn %	Cr, Ni, Mo %
Old scrap	E3	≤ 0.250	≤ 0.010	Σ ≤ 0.250
	E1	≤ 0.400	≤ 0.020	Σ ≤ 0.300
New scrap, low residuals, uncoated	E2	Σ ≤ 0.300		
	E8	Σ ≤ 0.300		
	E6	Σ ≤ 0.300		
Shredded	E40	Σ ≤ 0.250	Σ ≤ 0.020	
Steel turnings	E5M	≤ 0.400	Σ ≤ 0.030	Σ ≤ 1.0
High residual scrap	EHRB	≤ 0.450	Σ ≤ 0.030	Σ ≤ 0.350
	EHRM	≤ 0.400	Σ ≤ 0.030	Σ ≤ 1.0
Fragmented scrap from incineration	E46	≤ 0.500	≤ 0.070	
Ore-based metallics *	pig iron, DRI, HBI	0.002	trace	Σ ≤ 0.15
* Dependent on source iron ore				