

SG Iron Defect Analysis Questionnaire

1. General & Defect Baseline Information

Data Field	Description / Options	Details (To be filled by Engineering)
Component Name / Part ID	Name and drawing/part number	
Material Grade	SG Iron Grade (e.g., GGG40, EN-GJS-400-15, 65-45-12, ADI)	
Defect Name / Type	Specific identification (e.g., Shrinkage, Pinholes, Dross/Slag inclusion, Chunky Graphite, Cold Shut)	
Defect Location	Where does it occur? (e.g., Heavy section, Hotspot, Ingate, Drag/Cope side, Machined surface)	
Defect Frequency / Rejection Rate	% of total production or batch count affected	
Observation Point	Stage where defect is discovered (e.g., As-cast, Post-shot blast, After rough machining, Final NDT/UT)	

2. Geometry, Gating & Methoding Variables

Data Field	Description / Options	Details (To be filled by Engineering)
Section Thickness Range	Minimum vs. Maximum ruling section thickness (<i>mm</i>)	
Pouring / Casting Weight	Net weight of casting vs. Gross weight (liquid metal poured)	
Yield Percentage	Yield % ($\frac{\text{Net Weight}}{\text{Gross Weight}} \times 100$)	

Data Field	Description / Options	Details (To be filled by Engineering)
Gating System Design	Pressurized, Unpressurized, Direct pouring, or Gated via Feeder?	
Feeder / Riser Setup	Feeder size, shape, sleeve type (Exothermic / Insulating / Sand), neck dimensions	
Fillet & Radius Details	Are adequate radii provided at section transitions near the defect zone?	

3. Liquid Metal Chemistry & Treatment Data

Data Field	Description / Options	Details (To be filled by Engineering)
Base Chemistry (%)	C, Si, Mn, P, S (before nodulization)	
Final Chemistry (%)	C, Si, Mn, P, S, Mg (residual), Cu, Ni, Cr, Mo, Sn	
Carbon Equivalent (CE)	$\%CE = \%C + \frac{\%Si}{3} + \frac{\%P}{3}$	
Residual Magnesium (Mg_{res})	Exact residual Mg % in final sample	
Nodulizing Alloy (FeSiMg)	Addition rate (%), alloy grade, Mg %, Ce/RE content	
Inoculation Strategy	Stream, In-mold, or Ladle inoculation? Addition rate (%) and inoculant grain size	

4. Melting & Pouring Parameters

Data Field	Description / Options	Details (To be filled by Engineering)
Furnace Type	Medium Frequency Induction, Arc Furnace, etc.	
Tapping Temperature	Metal temperature at tap ($^{\circ}\text{C}$)	
Treatment Temperature	Temperature during FeSiMg nodulization ($^{\circ}\text{C}$)	
Pouring Temperature Range	Initial pouring temp vs. Final pouring temp ($^{\circ}\text{C}$)	
Pouring Time & Rate	Total pour time per mold (seconds)	
Fading Time	Elapsed time between nodulizing treatment and completion of pouring (minutes)	

5. Mold & Core Characteristics

Data Field	Description / Options	Details (To be filled by Engineering)
Molding Process	Green Sand, No-Bake / Resin Sand, Shell Molding, etc.	
Mold Rigidity / Compaction	Mold hardness / compactability (%) / mold strength (Green Sand)	
Sand Moisture & Volatiles	Moisture content (%), Loss on Ignition (LOI) %	
Core Binder & Gas Content	Resin type (Cold Box / Shell / Furan), binder %, gas evolution rate	
Venting Details	Are core vents and mold top vents adequate and clear?	

6. Metallographic & NDT Findings (If Available)

Data Field	Description / Options	Details (To be filled by Engineering)
Nodularity (%)	Microstructural nodularity percentage (e.g., >85%, Type I & II graphite)	
Nodule Count	Nodule count per mm^2	
Matrix Structure	Pearlite %, Ferrite %, Carbide/Carbo-nitride presence	
Defect Morphology	SEM / Optical microscope observations (e.g., smooth gas cavity walls vs. dendrites)	
Non-Destructive Testing (NDT)	Radiography (RT), Ultrasonic (UT), Magnetic Particle (MPI), Dye Penetrant (DPT) results	

7. Visual Attachment Checklist

Note: To facilitate rapid diagnosis, please attach the following media when submitting this query:

- **Photos of the defect:** Microscopic (20x–100x), close-up macro, and full part context.
- **Methoding Layout:** Gating and risering scheme (3D CAD or 2D drawing showing ingates, runners, and feeders).
- **Thermal/Filling Simulation:** Mold filling or solidification simulation results (if available).