The following typical defects of ductile iron castings are based on the experiences of process engineers from Dandong Foundry in China. We hope these information could be helpful for other iron foundries and casting buyers.

1. abnormal and degraded nodularizing

If the ductile iron castings have defects of abnormal and degraded nodularizing, the fracture surfaces will show the grey color with the small black particles. There will be large amount of flaky graphite in the microstructure.

It is mainly because the too much sulphur in melted iron, or other anti-nodularizing elements. So, we suggest to use the low sulphur coal, or use the desulphite treatment. If necessary, please try to add more nodularizing agents.

2. shrinkage holes and porosity

Shrinkage holes show the concaved surfaces, and the inside surfaces of shrinkage holes are very rough. Shrinkage porosity shows many dendritic small holes.

These defects are because of low content of carbon and silicon, too much sulphur.

Using hard molding, such as resin sand casting process. Increasing the content of Si and C.

3. graphite floatation

This defect is usually happen at the end of castings, especially at the gating head. You could see many graphite balls gathering together.

This defect is because of high content of carbon and silicon, and too much residues of nodularizing agents.
The solving method is reducing the content of C and Si, and control the nodularizing agents.

4. inverse chill

This defect will show the clear white blocks on the surfaces of fractures. Some are just like the white shiny needles. The reason is the too quick cooling for some positions, or insufficient nodularizing. So, the foundries need to control the usage of nodularizing agents, not too much. At the same time, enhance the temperature of pouring.

5. slag inclusion

Slag inclusion will show the inclusion with dark color and different shapes on the surfaces of fractures. From macrostructures, you could see the obvious inclusion. One reason is because of too much sulphur in the melted iron. Another reason is too much magnesium residues. So, iron foundry needs to reduce the content of sulphur in the pig iron, and try to reduce the residues of magnesium, and set the more gating heads at the positions of easy slag inclusion.

6. deformation and cracks

When the shrinkage stress becomes higher than resistance to deformation, then there will be deformation or even cracks to ductile iron castings. The hot cracks are brown, and cold cracks are light yellow. The main reasons are low content of carbon, insufficient nodularizing and too quick cooling. So, you need to increase the content of carbon and silicon, reduce the content of sulphur and improve the nodularizing.

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