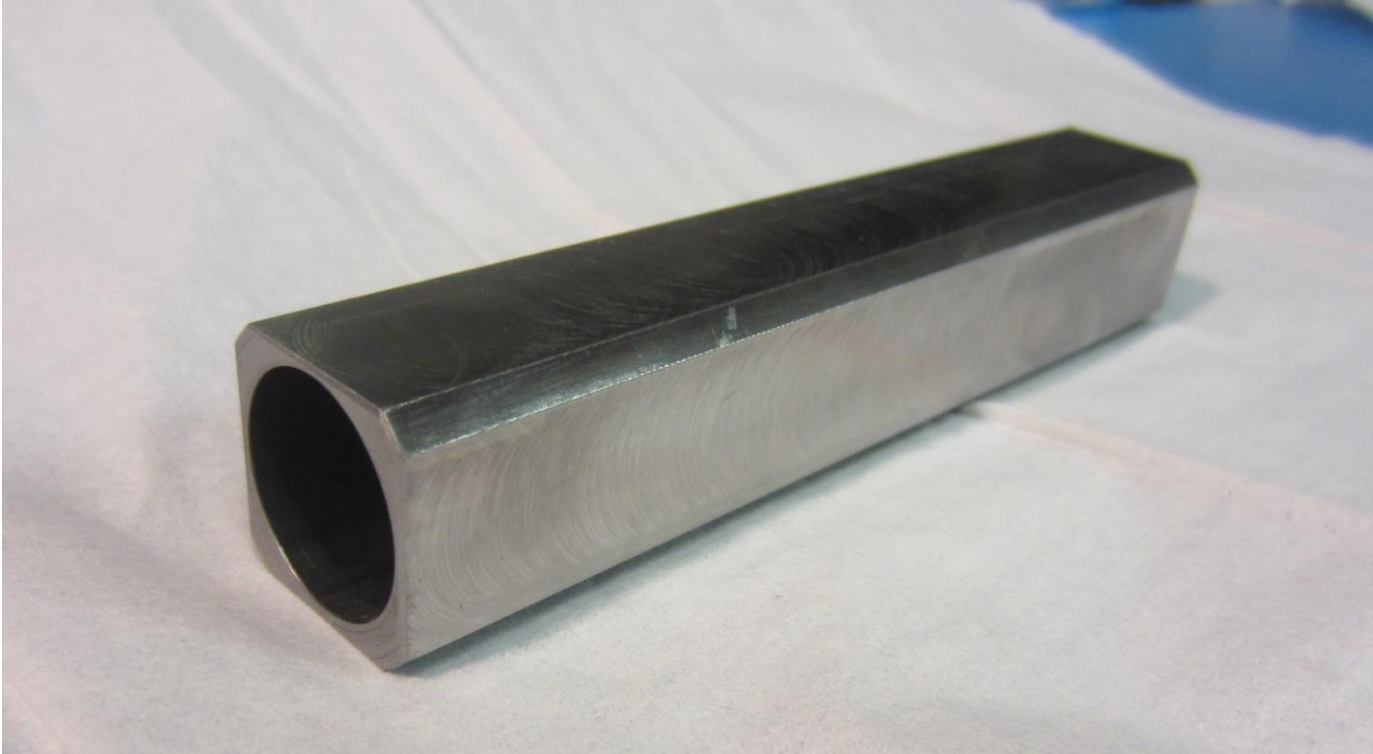


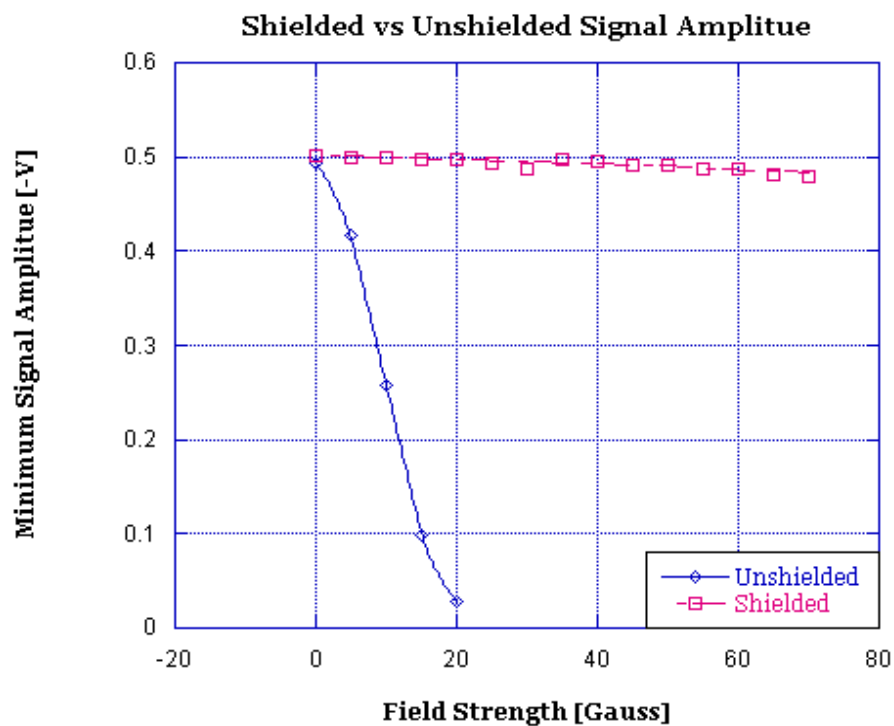
# New Graphs Based on The Rectangular Shield



Last summer I was tasked to find out what shielding would be necessary to protect or HA4125 PMT if it was exposed to a 60-65 Gauss magnetic field.

We were successfully able to shield up to 75 Gauss with minimal loss of signal amplitude.

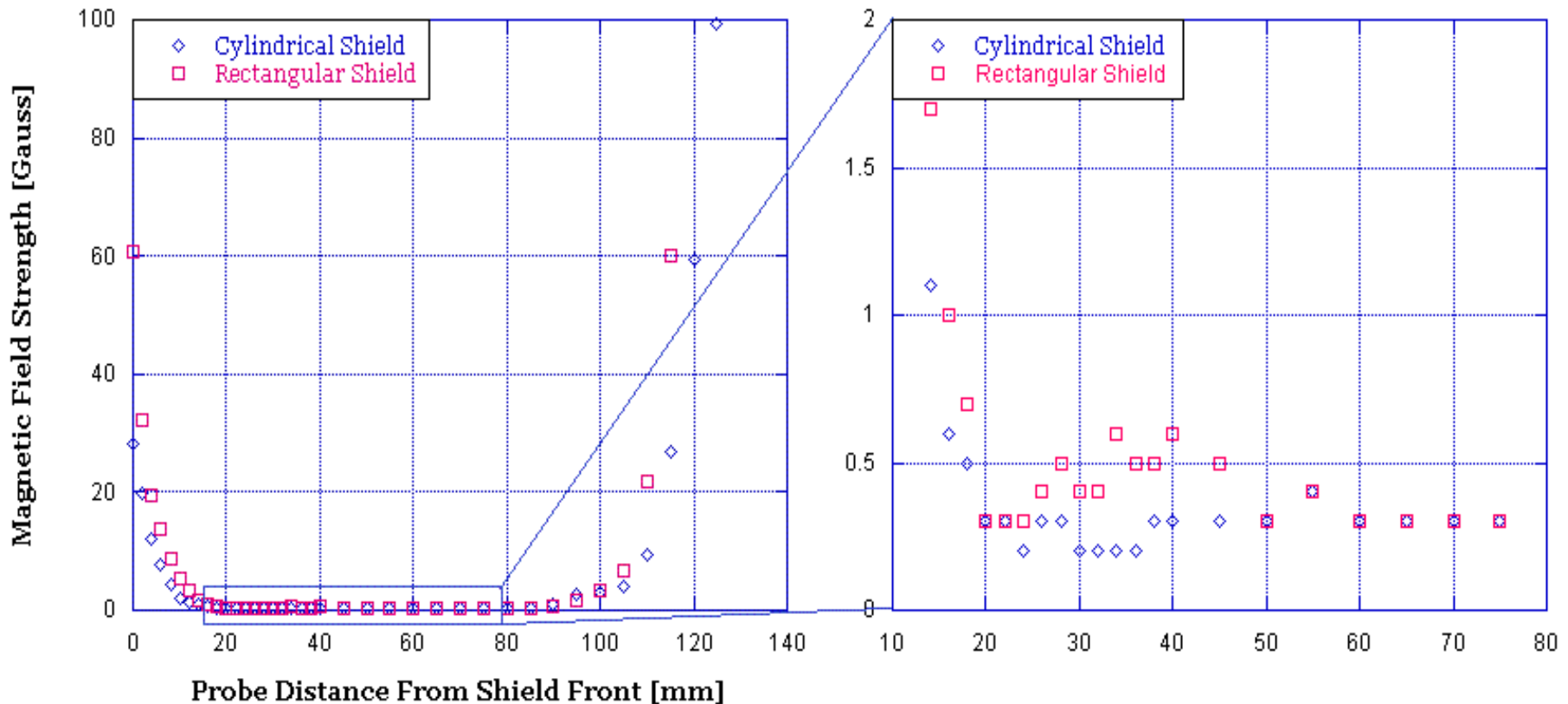
# Initial Testing



Initial testing showed that the PMT was severely effected by the magnetic field and it was effectively disabled at 20 Gauss. Cylindrical shielding was initially used, and after a rectangular shield was machined.

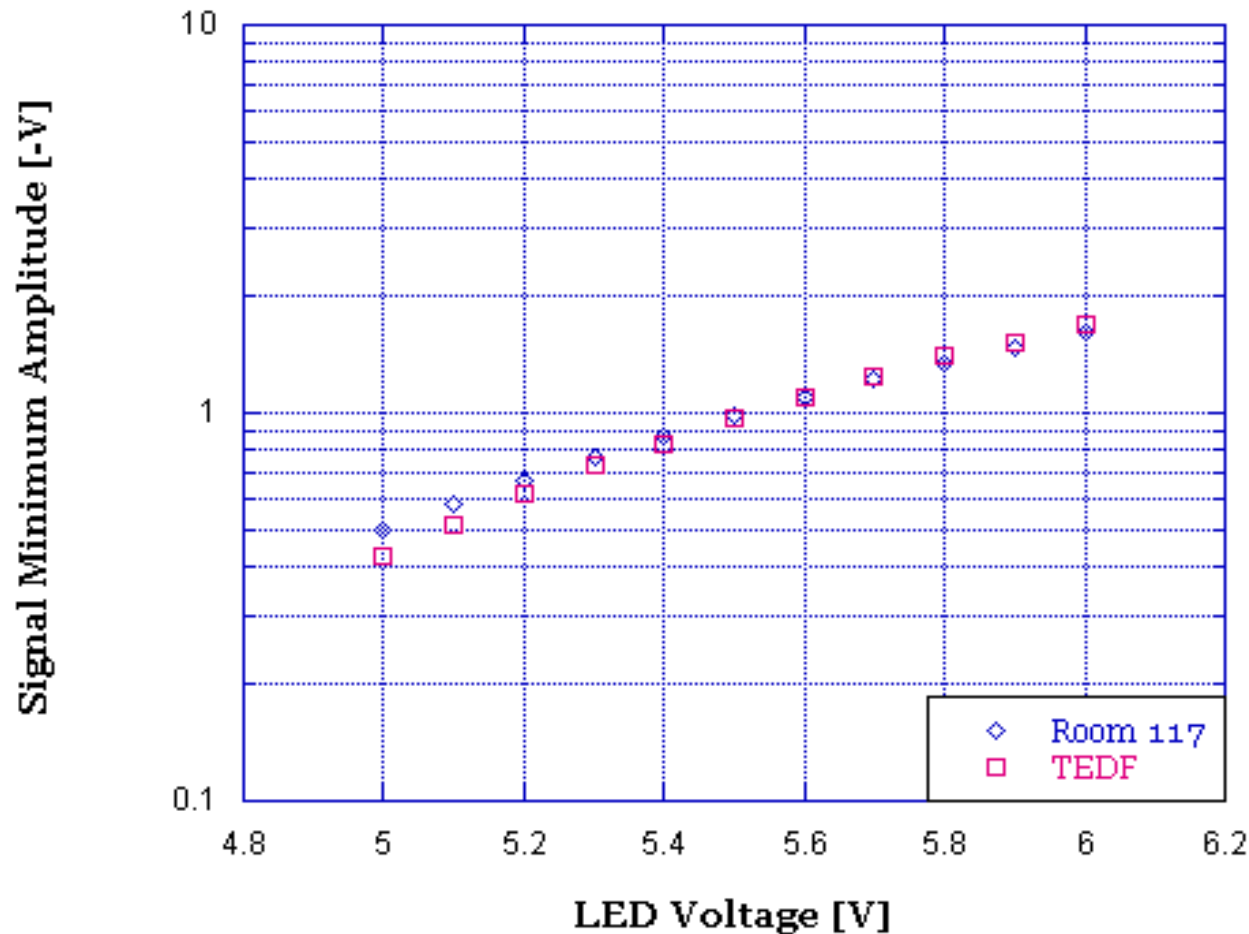
The graph compares the effects of the rectangular shield as compared to the old cylindrical shield. The zoom is on the region of significance. We achieved our desired shielding of stable  $<1$  Gauss field strength in the interior.

### Cylindrical vs Rectangular Shield Comparison



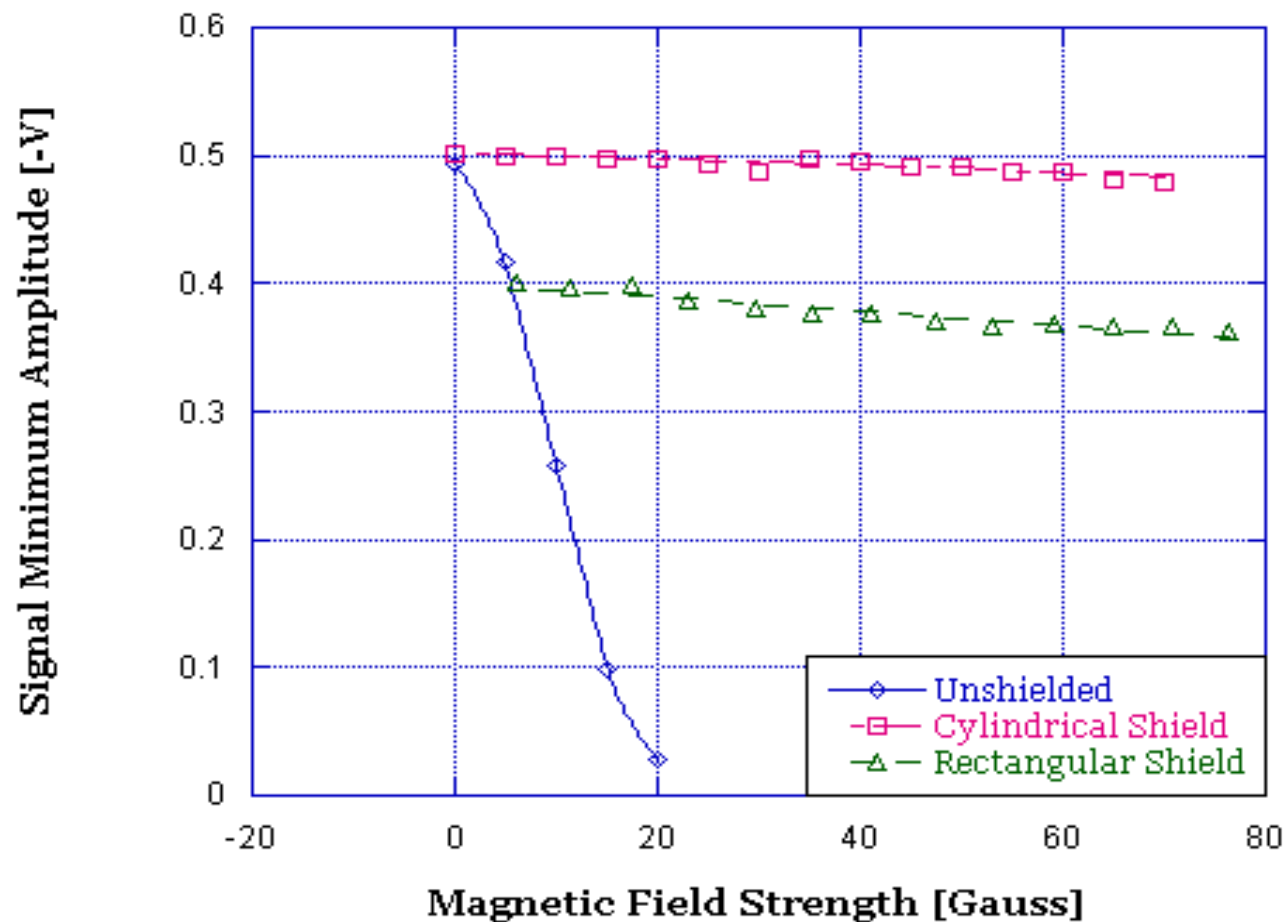
The graph shows the difference between our initial tests in room 117 to the baseline test preformed in TEDF both were conducted with no magnetic field.

**TEDF vs 117 baseline 0Gauss**



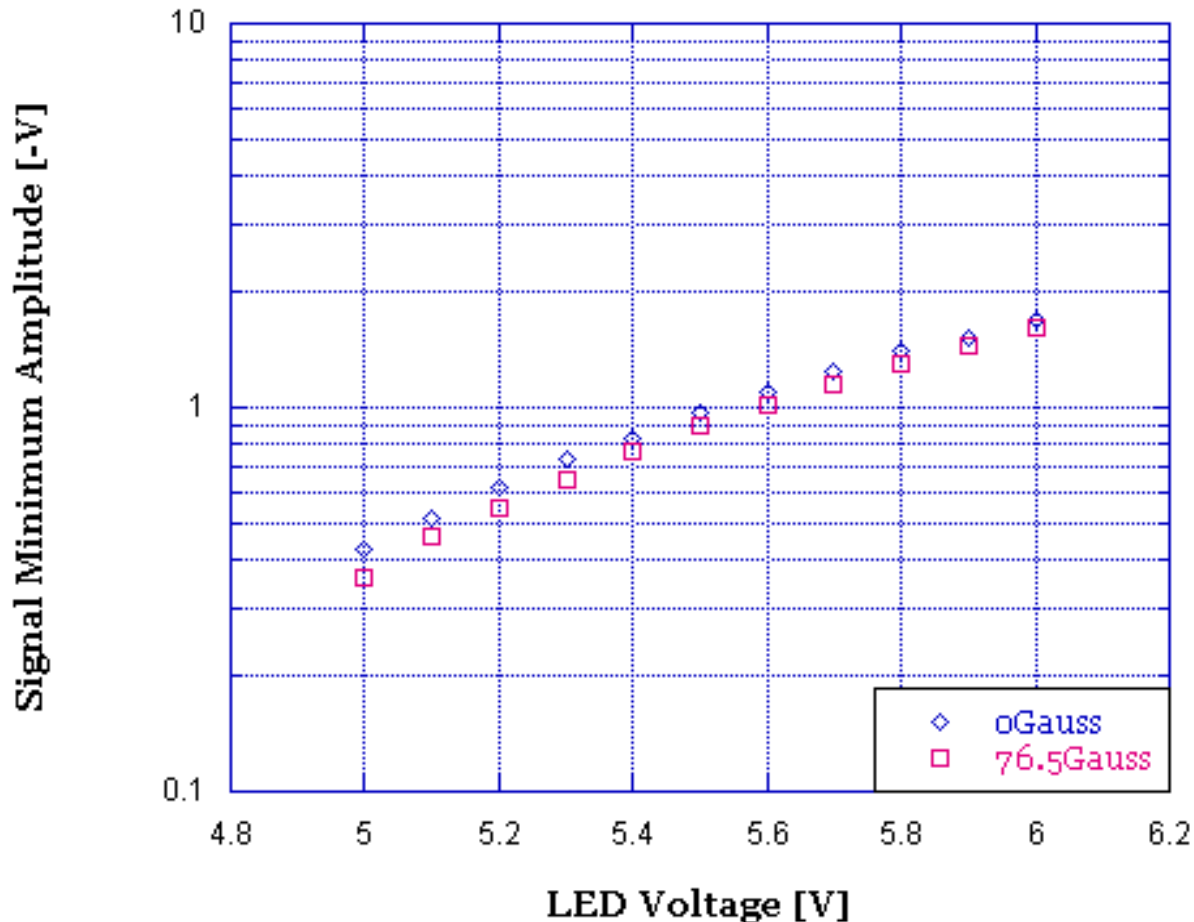
The graph shows the comparison between the cylinder and rectangular shield in with respect to their effectiveness at shielding the PMT taken at 5 volts on both runs.

**Shielding Effectiveness  
With Increasing Magnetic Field**

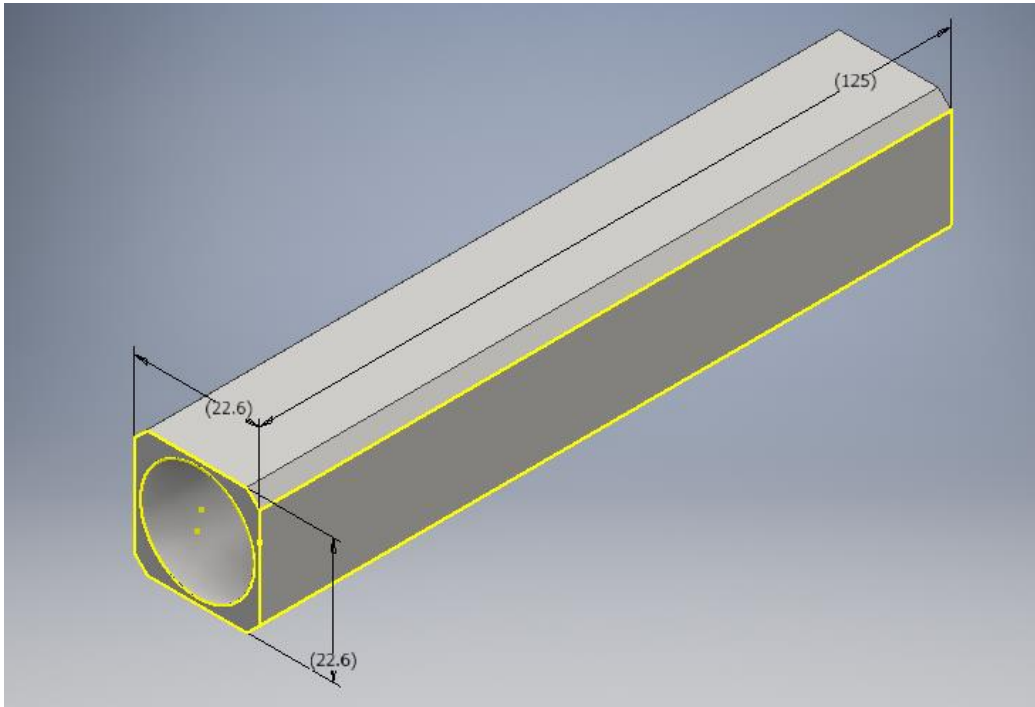


The graph shows the comparison of the PMT signal amplitude at both 0 Gauss and 76.5 Gauss the percent difference in this graph is an average of  $9.0 \pm_{4.3}^{7.2}$  % and a minimum of 4.7%.

### Rectangular Shield 0Gauss vs 76.5Gauss



# Specifications



- Machined from a cylindrical soft iron stock to dimensions of 125x22.6x22.6mm with wall thickness 1mm at the minimum the inner hole being 20.5mm
- Two layers of individually wrapped  $\mu$ Metal of .1mm thickness were inserted around the PMT also.
- Possible Annealing should be considered to improve the magnetic susceptibility of soft iron.