

**DETERMINATION OF THE DISTRIBUTION OF [001] CRYSTAL DIRECTION  
IN GRAIN-ORIENTED SILICON STEEL BY ASYMMETRICAL X-RAY  
DIFFRACTION METHOD**

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In this paper, a theory for determining the distribution of [001] crystal direction in 3% silicon steel has been explained by using asymmetrical X-ray diffraction technique. It is based on Omega (which is the angle between the incidence X-ray beam and the surface of the sample tested) scanning while the 2theta angle keeps constant at the diffraction angle of (002) crystal plane of silicon steels. A special method for silicon steel sheets to evaluate the angles of  $\alpha$ ,  $\beta$  of grain-oriented silicon steel by piling up many small plates of silicon steel is developed (the angle of  $\alpha$  refers to the deviation angle of [001] from rolling direction in the rolling plane; the angle of  $\beta$  refers to the tilt angle of [001] out of the sheet plane.). The method developed in this paper is used to determine the angles of  $\alpha$ ,  $\beta$  of two gauges of silicon steels. The results show that there are many different  $\alpha$ ,  $\beta$  angles for each silicon steel, instead of one value of  $\alpha$  or  $\beta$ , because there are many different oriented grain in every plate of silicon steel. The approach quantitatively to characterize the angles of  $\alpha$ ,  $\beta$  in silicon steels is investigated.