Card Testing INTERNATIONAL
AN ISO/IEC 17025 LABORATORY

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High Coercivity vs. Low Coercivity

Accidental magnetic card erasure, a problem today?

We have come to expect reliability in our electronic system. Yes, repairs are required, but when you add up all the electronic gadgets in our homes and businesses it's a miracle that service isn't needed more often. Banking, vending, identification and security are some of the most important systems in our lives, and it is critical that they work smoothly.

Some of the cards we use in these systems are subject to reliability problems depending on the material used in their tape. The standard magnetic tape that is used on many bank cards are made with iron oxide, effectively rust. The magnetism needed to erase this medium is called coercive force. Units of coercivity are named Oersted. The coercivity of the iron oxide tape used in banking and many other application is 300 Oersted. Ordinary magnets with which we come into contact can easily erase this tape. The magnets that are sometimes used to hold messages onto our refrigerators fall into this category. Some handbags/wallets have magnetic latches that can be a problem.

Magnetic force falls off rapidly as the card distance from the offending magnet is increased. It's unlikely that an ordinary magnet kept at least 10 to 15mm from the stripe will damage the tape. It seems that a magnetic stripe card in one's wallet would be rather secure from erasure. This is generally true, but some access control cards use very strong barium ferrite pellets that can and do corrupt normal magnetic stripe data. These particular access control cards must be kept separate from ordinary magnetic stripe cards.

To avoid accidental erasure or data corruption, a tape with higher coercivity must be used. The International Standards Organisation (ISO) has now set parameters for many of the Magnetic characteristics of HiCo tape. These parameters, or characteristics, are specified in the
International Standard ISO 7811-6. Coercivity influences many of the quantities specified in this standard, but itself is not specified, although a coercivity of 2500 to 4200 Oersted is recommended. The major focus of the standard is to specify HiCo tape that has dramatically improved resistance to accidental erasure, while retaining read compatibility with current reading systems and devices. Any HiCo tape used, should idealistically meet all the specifications detailed in this Standard. Iron oxide is generally replaced by materials such as barium ferrite. Ordinary magnets will have little effect to this high coercivity tape. Special rare earth magnets such as samarium-cobalt or neodymium-iron-boron will corrupt the data, but these magnets are not ordinarily found in the home or workplace.

In practice, a very high percentage of 300 Oersted cards (banking, point of sale, access control etc.) will not be accidentally erased during their lifetime. If any card is in doubt, an evaluation and/or test may be performed to confirm this suspicion.
It is not the scope of this paper to go into great technical detail. And I am confident many will not need to know the fine detail of the ISO Standards Committee work over the past 20+ years.

The diagram overleaf utilises an analogy of bottles of water and sponges to explain the differences between LoCo and HiCo coercivity tape.

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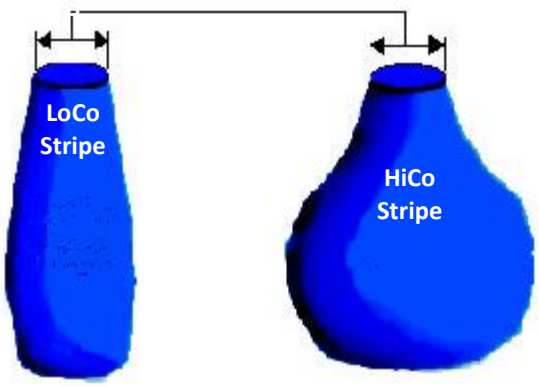
Coercivity Explained

Imagine two bottles of water

Same Diameter



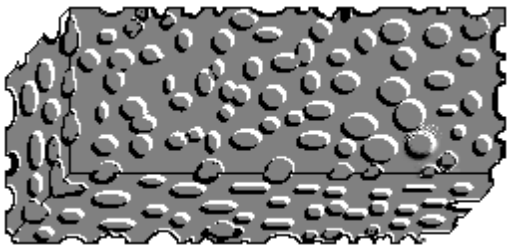
Where Magnetic Read back
Force = Flow

The "flow" from each bottle is the **same**. ISO established that LoCo and HiCo tape must have the **same** read back level.

However, the amount of stored magnetic energy or as in this example, water, that each bottle holds is completely **different**.

If the small bottle is spilled, it will take a small sponge (i.e. magnetic field) to clean (erase) the spill.

If it is the large bottle that is spilled, it will take a very large sponge (magnetic field) to clean (erase) the spill.



And there you are - a simple concept of the coercivity.

The range of HiCo Stripe materials are varied and many. Be sure to have any new stripe materials tested by an independent testing facility for their compliance to ISO before making changes to your current tested stock --- This includes HiCo (2500-4200 Oersted) or LoCo (300 Oersted).