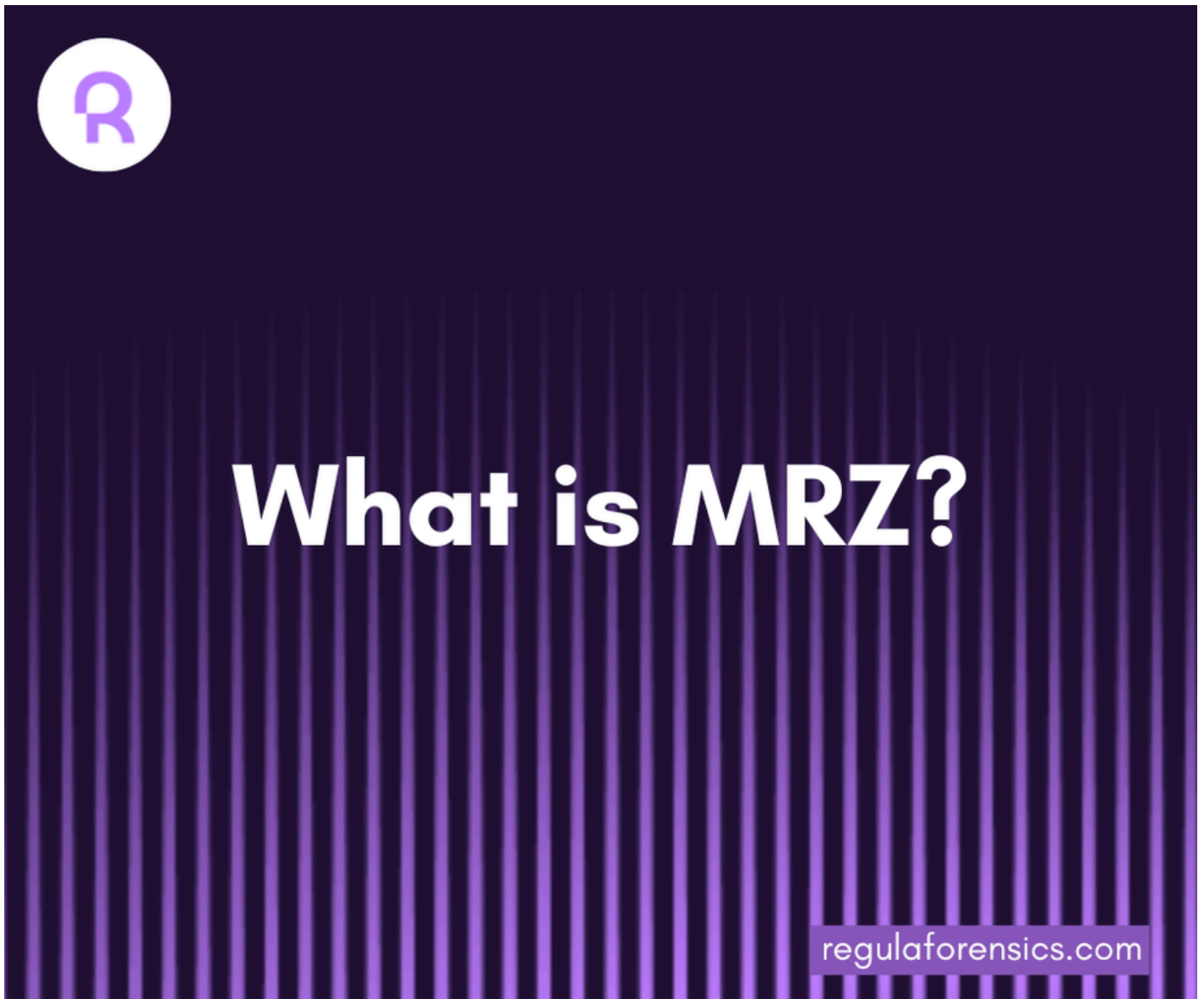




What is MRZ?



A machine-readable zone ([MRZ](#)) is a crucial security feature in identity documents like passports, ID cards, and visas. It encodes personal information about the document holder, allowing machines—whether hardware or software—to quickly read and verify identity documents. Initially, MRZs were introduced to streamline checks at borders and airports, but now they are also essential in identity verification for many businesses. This guide provides a detailed overview of MRZs and highlights the intricacies involved in recognizing and reading them.

What is an MRZ Code?

The MRZ, found on passports, was first introduced by the International Civil Aviation Organization (ICAO) in the 1980s. Since November 24, 2015, non-machine-readable passports are considered invalid in the 193 ICAO Member States, making [MRZ reading](#) a standard requirement. An MRZ generally consists of one to three lines of characters located on the document's data page. The layout varies by document type and issuing authority, but it can be on the front or back side.

To ensure a unified standard, the ICAO developed Doc 9303 Machine Readable Travel Documents (MRTDs), outlining MRZ parameters such as character type, size, and spacing for consistent readability across different countries. Typical data in MRZs includes:

- Document number
- Expiration date
- Holder name
- Gender
- Date of birth
- Nationality

Example: The MRZ in a Finnish Passport

In a Finnish passport MRZ, the code 'P' at the start denotes a passport, with variations like 'V' for visas or 'D' for driver's licenses. The first line includes the issuing authority's code, followed by the holder's name with fillers (<) used to occupy any extra space. The second line contains the document number, nationality, birth date, gender, expiration date, and a personal identifier. Check digits follow each data set to enhance fraud detection. Additionally, biometric passports use MRZ data to unlock the RFID chip, enabling further verification through NFC.

The Purpose of a Machine-Readable Zone

MRZs make identity verification fast and reliable, deterring unauthorized access. Since they use a universal format, MRZs are compatible with IDV hardware and software worldwide, converting diverse alphabets into standardized Latin characters. MRZs are found not only on travel and identity documents but also on other forms like vehicle registrations, work permits, and voter cards. Some countries incorporate additional security features, such as MRZs printed in inks visible only under UV light.

Common Use Cases for MRZ Reading

- **Check-In Automation**
- **Data Entry Automation**
- **Age Verification**
- **Customer Onboarding**
- **KYC Automation**
- **Fraud Prevention**

Types of Machine-Readable Zones

MRZ formats vary based on document type:

- **ID1 (TD1):** Used in driver's licenses and some ID cards, containing 30-character lines.
- **ID2 (TD2):** Typically found on visas with two lines of 36 characters.
- **ID3 (TD3):** Common for passports, featuring two lines of 44 characters each.

Though IDV solutions support these standard MRZ types, unique formats, like the two 30-character lines on a Swiss driver's license, may require specialized software for accurate reading.

How Do Machines Read MRZ Codes?

The MRZ reading process includes:

1. **Capture and Scanning:** OCR or cameras capture the MRZ, even at an angle or in low resolution, for enhanced examination under various lights.
2. **Data Extraction:** OCR algorithms structure and analyze MRZ data, identifying the type and format to extract essential details like document number and expiration date. Parsers adapt to non-standard formats or additional data fields unique to certain countries.
3. **Data Verification and Cross-Validation:** Decoded data is verified against MRZ specifications, confirming legitimacy by analyzing each character's meaning and position. Cross-checks with visible information (e.g., birth date, document number) ensure consistency, while calculations of check digits help detect forgery. This process even compares MRZ and RFID chip data for further fraud detection.

Conclusion

Machine-readable zones form a reliable foundation for secure identification, benefiting various industries with fast and accurate verification. Understanding MRZ types and reading mechanisms is vital for effective identity verification solutions, ensuring security and efficiency across sectors.