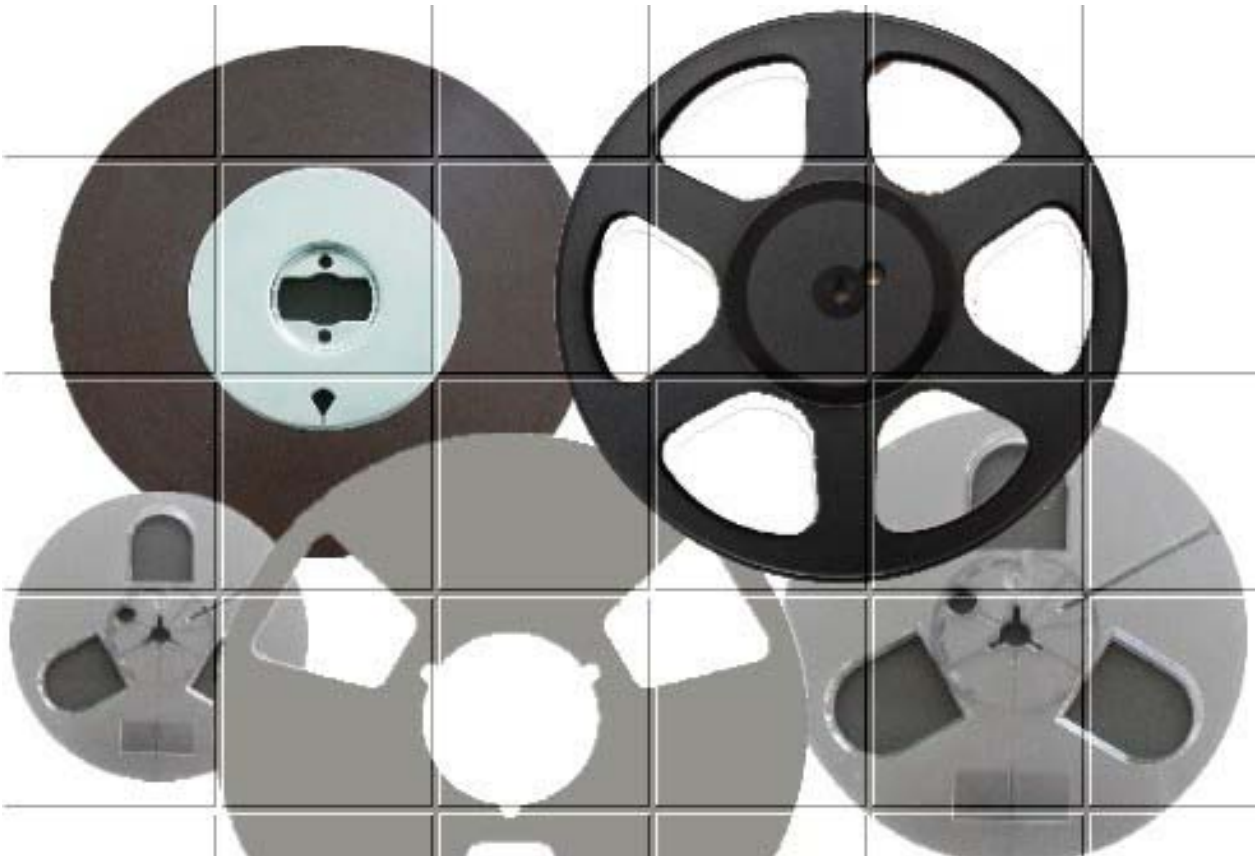
# Audio Broadcast PER 528

PER 528 meets the quality standards as required by major **European radio broadcasters**.
Offering
- outstanding electroacoustic and
- mechanical characteristics;
- very good print-through,
- excellent winding properties for flangeless hub operation.
- archiveability, long term stability, worldwide proven.



Audio Studio

# Technical Data Audio Broadcast PER 528

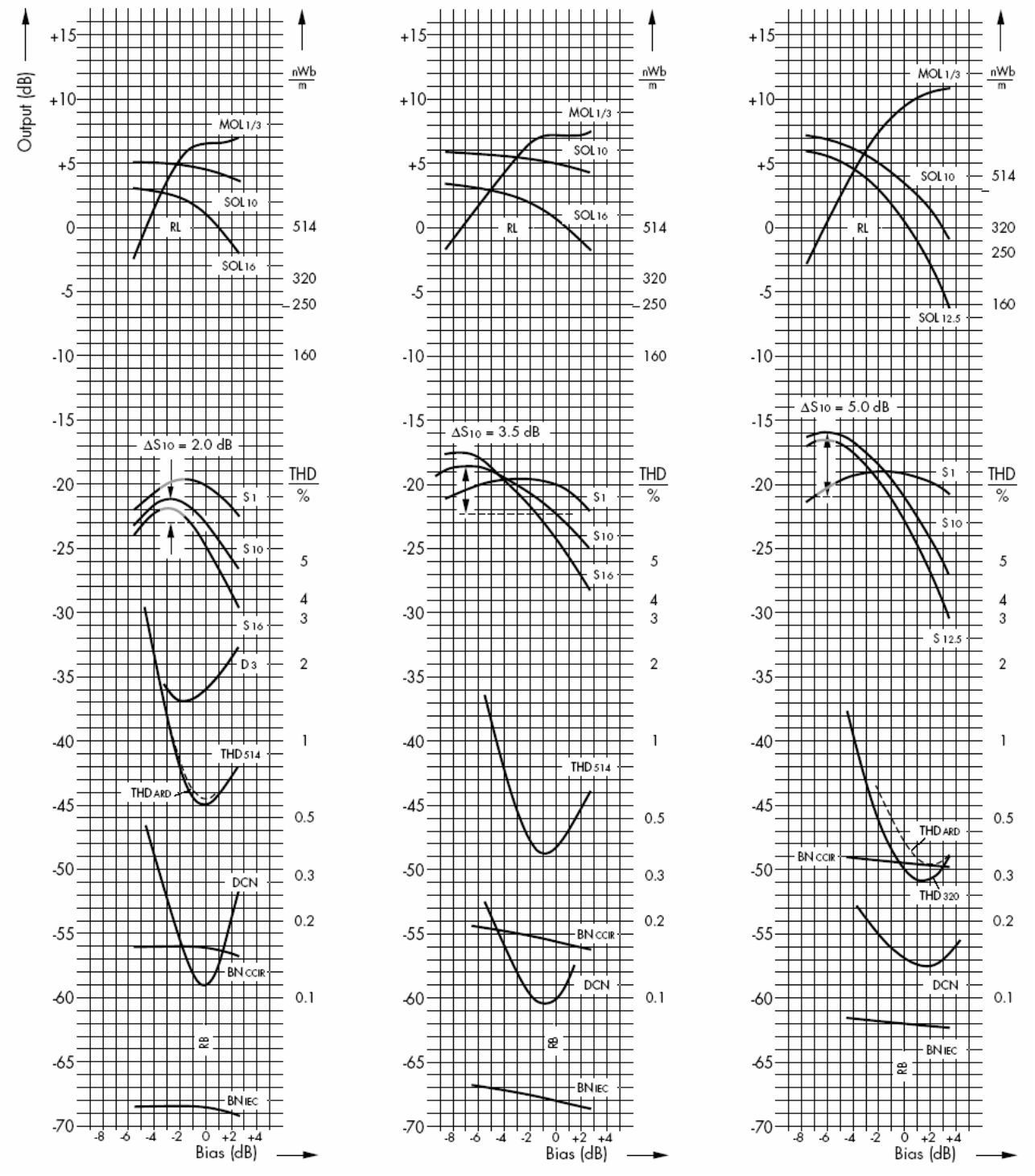
(03) 12/06

**1. Recording Performance Specifications** (depending on bias settings)

| | |
|---|---|
| Tape speed | 38.1 cm/s |
| Recording head gap length | 18.0 µm |
| Playback head gap length | 3.0 µm |
| Equalisation | 35 µs |
| Reference level | 514 nWb/m |

| | |
|---|---|
| Tape speed | 38,1 cm/s |
| Recording head gap length | 7.0 µm |
| Playback head gap length | 3.0 µm |
| Equalisation | 35 µs |
| Reference level | 514 nWb/m |

| | |
|---|---|
| Tape speed | 19,05 cm/s |
| Recording head gap length | 7.0 µm |
| Playback head gap length | 3.0 µm |
| Equalisation | 70 µs |
| Reference level | 320 nWb/m |



## 2. Measurement conditions

| | | | | | Ref. |
|---|---|---|---|---|---|
| Tape speed | | **38.1 cm/s 15 in/s** | **38.1 cm/s 15 in/s** | **19.05 cm/s 7,5 in/s** | |
| Recording head | | | | | |
| | Gap length | 18.0 µm | 7.0 µm | 7.0 µm | 1.1 |
| | Track width | 6.3 mm | 6.3 mm | 6.3 mm | |
| Playback head | | | | | |
| | Gap length | 3.0 µm | 3.0 µm | 3.0 µm | 1.1 |
| | Track width | 2.575 mm | 2.575 mm | 2.575 mm | |
| Playback equalisation | | 35 µs | 35 µs | 70 µs | 1.2 |
| RL | Reference level (1 kHz) | 514 nWb/m | 514 nWb/m | 320 nWb/m | 1.3 |
| | Reference tape: batch | 43 211 | 43 211 | 43 211 | |
| | Reference tape bias definition | ARD: Min. THD514 | ARD: Min. THD514 | | 1.4 |
| RB | Recommended bias | 0.0 dB | 0.0 dB | 0.0 dB | 1.5 |
| $\Delta S_{10}$ | **Sensitivity drop for recommended bias setting** | **2.0 dB** | **3.5 dB** | **5.0 dB** | 1.6 |

## 3. Recording performance specifications

The table below presents the main parameters at the recommended bias setting. All figures given represent nominal values.

| | | | | | |
|---|---|---|---|---|---|
| $MOL_{1/3}$ | Maximum output level at 1 kHz | +6.5 dB | +7.0 dB | +9.5 dB | 2.1 |
| $SOL_{10}$ | Saturation output level at 10 kHz | +4.5 dB | +5.0 dB | +3.5 dB | 2.2 |
| $SOL_{12.5}$ | Saturation output level at 12,5 kHz | | | +0.5 dB | 2.2 |
| $SOL_{16}$ | Saturation output level at 16 kHz | +1.0 dB | +1.0 dB | | 2.2 |
| $S_1$ | Relative tape sensitivity at 1 kHz | 0.0 dB | 0.0 dB | 0.0 dB | 2.3 |
| $S_{10}$ | Relative tape sensitivity at 10 kHz | +1.0 dB | +0.5 dB | +2.0 dB | 2.3 |
| $S_{12.5}$ | Relative tape sensitivity at 12,5 kHz | | | +2.0 dB | 2.3 |
| $S_{16}$ | Relative tape sensitivity at 16 kHz | +1.5 dB | +1.0 dB | | 2.3 |
| $THD_{320}$ | Third harmonic distortion level at 320 nWb/m | | | -50.0 dB | 2.4 |
| $THD_{320}$ | Third harmonic distortion factor at 320 nWb/m | | | 0.31 % | 2.4 |
| $THD_{514}$ | Third harmonic distortion level at 514 nWb/m | -45.0 dB | -48.0 dB | | 2.4 |
| $THD_{514}$ | Third harmonic distortion factor at 514 nWb/m | 0.58 % | 0.38 % | | 2.4 |
| $THD_{ARD}$ | Third harmonic distortion level of reference tape | | | | 2.4 |
| DCN | DC noise level, weighted, rel. RL | -59.5 dB | -58.5 dB | -55.5 dB | 2.5 |
| $BN_{IEC}$ | Bias noise level (IEC 94; A curve) | -68.5 dB | -67.5 dB | -60.0 dB | 2.6 |
| $BN_{CCIR}$ | Bias noise level (CCIR 468-3) | -56.0 dB | -55.5 dB | -47.5 dB | 2.6 |
| $MOL/BN_{IEC}$ | Dynamic range | 75.0 dB | 75.0 dB | 68.5 dB | 2.7 |
| $MOL/BN_{CCIR}$ | Dynamic range | 62.5 dB | 62.5 dB | 56.0 dB | 2.7 |
| D3 | Difference frequency level | -35.0 dB | | | 2.8 |
| P | Print-through | 56.0 dB | 56.0 dB | 56.0 dB | 2.9 |
| E | Signal to erase ratio | ≥78.0 dB | ≥78.0 dB | ≥78.0 dB | 2.10 |
| Variations in sensitivity at 1 kHz | | | | | |
| | within a tape | ± 0.25 dB | | | 2.11 |
| | from tape to tape | ± 0.5 dB | | | 2.11 |

## 4. Magnetic properties

| | | | | Ref. |
|---|---|---|---|---|
| $H_C$ | Coercivity | 30.0 kA/m | 377 Oe | 3.1 |
| $B_{RS}$ | Retentivity | 137 mT | 1370 G | 3.2 |
| $Ø_{RS}$ | Saturation flux | 1920 nWb/m | 192 mM/mm | 3.3 |

## 5. Physical properties

| | | | |
|---|---|---|---|
| Base material | Polyester | | |
| Tape width | 6.3 mm | 1/4 inch | |
| Tolerances of tape width | +0/-0.06 mm | +0/-2.4 mil | |
| Base thickness | 30.0 µm | 1.18 mil | 4.1 |
| Coating thickness | 13.0 mm | 0.51 mil | 4.1 |
| Backcoating | black | | |
| Total thickness | 47.0 µm | 1,85 mil | 4.1 |
| Load for elongation of 3% (F3) | ≥ 24 N | ≥ 78 MPa | 4.2 |
| Load for elongation of 5% (F 5) | ≥ 27 N | ≥ 89 MPa | 4.2 |
| Breaking tensile strength (6.3 mm tape width) | ≥ 63 N | ≥ 208 MPa | 4.3 |

## 6. References

The data in this publication are based on test methods of IEC Publication 94, Part 5 and Technical Recommendations Issue 3/4 (Magnetic Tape for Broadcast Use) by ARD (German Broadcast). In as far as any test method is not part of this publication, reference has been made.

**1.1** Measurement method according to IEC 94, using the IEC standard reference heads for professional application. For this purpose recording heads with a gap length of 7 µm are recommended. Recording heads with a gap length of 18 µm are recommended by the Technical Recommendations of ARD.

**1.2** Playback equalization on the tape testing equipment is adjusted to provide a flat frequency response of the output voltage when compared with the frequency response section of the appropriate IEC calibration tape (time constants t 1 = 35 µs at tape speed 38.1 cm/s, t1 = 70 µs at tape speed 19.05 cm/s).

**1.3** $R_L$ (Reference Level): The reference level 514 nWb/m corresponds to the reference level section of the relevant ARD calibration tape (Rundfunk-Betriebsbezugsband 38.1 m/s). This level is 4.05 dB above that of the reference level (320 nWb/m) of relevant IEC calibration tape.

**1.4** Reference tape bias definition: Using the relevant ARD reference tape and the standard reference heads, the bias current providing the minimum third harmonic distortion level at the reference level (signal frequency 1 kHz) is the ARD reference bias setting at tape speed 38.1 cm/s. At tape speed 19.05 cm/s = 71/2 ips the $\Delta S_{10}$-method is recommended (cf. 1.6).

**1.5** $R_B$ (Recommended Bias): This data represents the bias ratio of the relevant ARD reference tape and the tape under test at 38.1 cm/s.

1.6 $\Delta S_{10}$ (Sensitivity drop for recommended bias setting): Operationally, the recommended bias is set with an input signal of 10 kHz at -20 dB. Based on the sensitivity curve's $S_{10}$ peak, the bias is increased until the playback level is reduced by the given value $\Delta S_{10}$ resp. (see graph).

**2.1** $MOL_{1/3}$ (Maximum Output Level): Output level 1 kHz relative to reference level RL, with a third harmonic distortion factor of 3 % or THD = -30.5 dB.

**2.2** $SOL_{10}$, $SOL_{12.5}$, $SOL_{16}$ (Saturation Output Level): Output level at 10 kHz, 12.5 kHz or 16 kHz respectively, at which saturation occurs, relative to reference level RL.

**2.3** $S_1$, $S_{10}$, $S_{12.5}$, $S_{16}$ (Sensitivity): The sensitivity curves were recorded using a constant current with no equalisation. The magnetic tape's 1 kHz input signal is approximately 20 dB below the reference level RL. In accordance with IEC publication 94 the values for relative tape sensitivity refer to those of the relevant reference tape (batch 43 211) at its own reference bias. – The distance between the sensitivity curves $S_1$ and $S_{10}$, $S_{12.5}$ and $S_{16}$ resp. reflects the recording equalisation necessary to achieve a flat frequency response.

**2.4** $THD_{320}$, $THD_{514}$ (Third Harmonic Distortion level): The diagram shows the third harmonic distortion level and the third harmonic distortion factor (of a 1 kHz signal) at a constant magnetisation of 320 nWb/m or 514 nWb/m resp..

**2.5** DCN (DC Noise level): According to ARD recommendations and IEC 94 a direct current is recorded which is equal to the RMS value of the signal current that is required to produce reference level RL at 1kHz. Measurement of DC noise level is made using an RMS meter anda weighting filter network according to ARD recommendations and IEC 94, part 5, appendix 4 respectively.

**2.6** $BN_{IEC}$, $BN_{CCIR}$ (Bias Noise level): The bias noise level is measured after operational erasure and HF biasing have been applied and compared to the reference level RL. $BN_{IEC}$ is measured after weighting with an A filter in accordance with IEC 651. $BN_{CCIR}$ is given as a quasi peak reading following filter weighting in accordance with CCIR 468-3 (as in IEC 94, part 5, clause 3.4).

**2.7** $MOL/BN_{IEC}$, $MOL/BN_{CCIR}$ (Dynamic range): The signal to bias noise ratio $MOL/BN_{IEC}$ results from the addition of the maximum output level at 1 kHz $MOL_{1/3}$ and the bias noise level $BN_{IEC}$. In the same manner, MOL/BNCCIR is the result of adding $MOL_{1/3}$ at 1 kHz and $BN_{CCIR}$.

**2.8** $D_3$ (Difference frequency level) - Two signals – frequencies of 7 kHz and 11 kHz resp. – are recorded simultaneously at half the reference level flux. The recording causes difference frequency signals at 3 kHz and 15 kHz. The difference frequency level is the ratio of the playback level of the difference frequency 3 kHz to the playback level of one of the two recorded signals, the figure given in dB.

**2.9** P (Print-through): Print-through is the ratio of a reference level recording to the highest signal level transferred to the next tape layer after storage at 20°C for 24 hours.
**2.10** Signal-to-erase ratio - The ratio between the maximum output level $MOL_{1/3}$ and the residual output level after this recording has been erased.
**2.11** Sensitivity variations at 1 kHz - These variations refer to variations in output level reproduced from a tape being recorded at constant current level. With modern production techniques sensitivity variations are kept as low as possible.
**3.0** The magnetic measurements are made by means of a magnetic field having a strength of 100 kA/m (1,250 Oe) in order to obtain a practically saturated magnatisation in the magnetic material of the sample.
**3.1** HC (Coercivity): The coercitive field strength is the magnetic field strength that saturated magnetic material exerts in a magnetically neutral situation.

**3.2** $B_{RS}$ (Retentivity): The remanent saturation flux is the remaining tape flux after the magnetic material has been subjected to saturation magnetisation.
**3.3** $Ø_{RS}$ (Residual Saturation Flux): The remanent saturation flux per meter track width is the remanent saturation multiplied by the coating cross-section of a one meter wide track.
**4.1** Thicknesses: Values given are mean averages.
**4.2** Load for elongation (F3 or F5 value): According to IEC 94-4, the force necessary to produce 3% or 5 % elongation resp. is evaluated using a sample test length of 200 mm and an elongation rate of 100 mm/min.
**4.3** Breaking tensile strength is the force to get the breaking point of a tape sample, according to IEC 94-4.

All data given in the specification are subject to change without prior notice due to technical progress

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## 7. Ordering Information

| RMGI Product Code | Tape Width | | Tape Length | | Reel Diameter | | Reel Type or Pancake | Hub Type | Box Type | Tapes/ Carton |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inch | mm | ft | m | Inch | mm | | | | pcs |
| **PER 528** | | | | | | | | | | |
| **35610** | 0,25 | 6,3 | 600 | 183 | 5 | 130 | Plastic Reel | Trident | Hinged | 20 |
| **35611** | 0,25 | 6,3 | 1.200 | 366 | 7 | 180 | Plastic Reel | Trident | Hinged | 20 |
| **35620** | 0,25 | 6,3 | 2.500 | 762 | 10,5 | 265 | Metal Reel | NAB | Hinged | 10 |
| **35630** | 0,25 | 6,3 | 2.500 | 762 | | | Pancake | NAB | Hinged | 10 |
| **35640** | 0,25 | 6,3 | 2.395 | 730 | | | Pancake | AEG | ECO Pack | 20 |
| **35641** | 0,25 | 6,3 | 3.280 | 1.000 | | | Pancake | AEG | ECO Pack | 20 |
| **35649** | 0,25 | 6,3 | 3.280 | 1.000 | | | Pancake Mag Coat outside | AEG | ECO Pack | 10 |

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