

## Grading HD/HDR and UHD/HDR Productions

The following instructions and specifications are mandatory when creating HD/HDR or UHD/HDR productions for ZDF.

The basis for grading is the Rec. ITU-R BT.2100 in its most recent version.

- Deliveries to ZDF must have a grading for Hybrid Log-Gamma (HLG) HDR with the following parameters:
  - HLG system gamma: 1.2, 1000 Cd/m<sup>2</sup>, color space: ITU-R BT.2020, DCI-P3 Subset (D65 Reference white): It is imperative that no colors be generated outside the DCI-P3 range, as this can lead to faulty representations on end devices (clipping, hue shifts)
  - Grading must be done on a 1000 Cd/m<sup>2</sup> monitor (Color space ITU-R BT.2020, EOTF: HLG system gamma 1.2, ambient light level 5Cd/m<sup>2</sup>)
- Prior to grading, a 3-second sequence of the HLG TIFF file (input color space BT.2020 HLG full range) provided by ZDF – referred to below as the ZDF HLG intro – followed by 1 second of black must be inserted into the production; this allows the start timecode of the first frame of the production to remain at 10:00:00:00
- The ZDF HLG intro may not be changed during grading
- If, for technical reasons, a PQ workflow with subsequent conversion to HLG HDR is preferred, the following parameters must be observed:
  - The grading adheres to BT.2100, PQ, 1000 Cd/m<sup>2</sup>, color space: ITU-R BT.2020, DCI-P3 Subset (D65 Reference white): It is imperative that no colors be generated outside the DCI-P3 range, as this can lead to faulty representations on end devices (clipping, hue shifts)
  - Grading must be done on a 1000 Cd/m<sup>2</sup> monitor (Color space ITU-R BT.2020, EOTF: ST-084PQ, ambient light level 5Cd/m<sup>2</sup>)
  - Prior to grading, a 3-second sequence of the PQ TIFF file (input color space BT.2020 PQ full range) provided by ZDF – referred to below as the ZDF PQ intro – followed by 1 second of black must be inserted into the production; this allows the start timecode of the first frame of the production to remain at 10:00:00:00
  - The ZDF PQ intro may not be changed during grading
  - After the production has been converted to HLG HDR, the converted ZDF PQ intro should be compared to the HLG TIFF file provided by ZDF (please use the same code value range); it should be identical
- For the HDR grade, you should access the original material, not the rendered SDR version, to avoid losing resolution in the dark or bright parts of the picture
- The level of fonts (subtitles, credits, etc.) must be at least 75% IRE (equivalent to approx. 200cd / m<sup>2</sup> on a 1000cd / m<sup>2</sup> monitor); depending on the background image, the brightness of the fonts should be adjusted so that they are displayed in pure white without overpainting; this also applies to the white in the content branding logo

- The content branding logo HDR Stylesheet of the ZDF is valid for the adaptation of the content branding logo
- To avoid juddering, the credits must be rendered in 50p
- It is imperative that the metadata in the MXF header and essence stream be correctly placed (this can be tested with the MXF-Read tool provided by ZDF)
- The recommendations in the ITU Report ITU-R BT.2408 should be followed