Psycho-Visual Encoder Cheat Sheet

One-page reference for x264, x265, SVT-AV1, libvpx — features, defaults, safe ranges. May 2026 · v1.0

Feature support across encoders

Feature	x264 (H.264)	x265 (HEVC)	SVT-AV1	libvpx (VP9)
Chroma 4:2:0 default	yes	yes	yes	yes
Quantisation matrices	yes (CQM)	yes (scaling list)	yes (qm)	yes
Adaptive quantisation	--aq-mode 1/2/3	--aq-mode 1/2/3/4	--aq-mode 0/1/2	--aq-mode 0/1/2/3
Psy-RD / Psy-RDOQ	--psy-rd 1.0:0.0	--psy-rd 2.0 --psy-rdoq 1.0	--enable-tpl-la 1	(implicit in tune)
Variance boost	implicit	--hevc-aq	--enable-variance-boost	no
Scene-cut QP	auto	auto	auto	auto
Dark-region tune	via psy + AQ	--tune grain / animation	--tune 0/1/2	tune=film

Safe parameter ranges by content type

Content type	Chroma	AQ strength	Psy-RD (x264)	Note
VOD movie / TV	4:2:0	0.7 – 1.0	0.7 – 1.0	Default. Best subjective vs PSNR balance.
Live sport	4:2:0	0.5 – 0.8	0.5 – 0.8	Lower to avoid pumping under tight rate control.
Animation	4:2:0	0.4 – 0.6	0.4 – 0.6	Flat shading exposes psy noise. Use --tune animation.
Screen capture / UI	4:4:4 / 4:2:2	0.4 – 0.6	0.4 – 0.7	Chroma fidelity matters; AQ stays moderate.
Surveillance	4:2:0	0.0 – 0.4	0.0 – 0.4	Preserve high-frequency forensic detail; minimise psy.
Telemedicine (skin)	4:2:2 / 4:4:4	0.4 – 0.6	0.4 – 0.6	Diagnostic colour requires extra chroma fidelity.
Music video / concert	4:2:0	0.8 – 1.2	0.8 – 1.2	Stage lights, smooth gradients — protect chroma transitions.

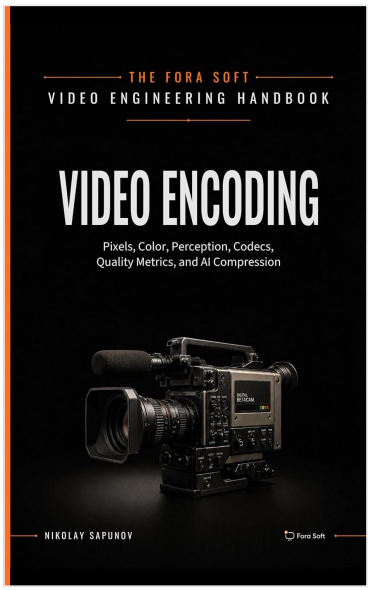
Pre-flight checklist before shipping an encode profile

1. Chroma format matches use case (4:2:0 unless screen-share, medical, or post).
2. Quantisation matrices ON (default in all modern encoders — verify not disabled by legacy preset).
3. AQ mode enabled; strength tuned to content type per table above.
4. Psy-RD set, not zero. PSNR will drop slightly; VMAF and human raters will rise.
5. Scene-cut detection ON. Cuts get higher QP at the boundary, finer QP shortly after.
6. Compare with a control encode at SAME psycho-visual settings (feature parity). Never mix.
7. Validate on at least two viewing distances (close-up, 1.5x picture height).

When to dial psycho-visual features DOWN

- Forensic surveillance — high-frequency detail (plate, face) must survive at any cost.
- Mezzanine / contribution feeds — leave perceptual tuning for the delivery encoder downstream.
- Benchmark runs against a baseline — keep feature parity, or numbers are not comparable.
- Encodes that will be re-encoded later — psy-rd compounds on cascaded re-encode.

Companion to: 'Psycho-Visual Redundancy: Things The Viewer Won't Notice'
www.forasoft.com/learn/video-encoding/articles/psycho-visual-redundancy



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This sheet lists psycho-visual features and safe ranges across x264, x265, SVT-AV1 and libvpx for each content type. Volume 1 explains why they work: how the eye perceives detail and colour, chroma subsampling, adaptive quantization and psy-RD, and why PSNR, SSIM and VMAF disagree about the result.

WHAT YOU WILL FIND INSIDE

- Human vision: what viewers notice and what they miss
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- Chroma subsampling and colour fidelity
- Why PSNR, SSIM and VMAF disagree

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