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Why GEM Maintains an Approved Camera List

To empower filmmakers and deliver exceptional visual experiences for audiences, GEM requires that at least 90% of a program's total final runtime be captured on [approved cameras], following specific [capture requirements]. For nonfiction projects, this standard may be more flexible depending on production needs.

GEM works closely with creative professionals, manufacturers, and global experts to evaluate and approve cameras that support robust, adaptable production workflows. All approved cameras have been assessed by GEM's technical team for criteria including dynamic range, color accuracy, image detail, signal-to-noise ratio, resolution, and overall workflow compatibility. This ensures partners are equipped with high-performing, reliable capture solutions throughout production.

- For more insights into GEM's camera approval process, see [Approved Cameras – Behind the Scenes].
- For additional advice, check out [best practices] that help prevent common image capture errors.

Limited use of non-approved cameras may sometimes be necessary. GEM is available to support productions with special capture scenarios; reach out to your GEM representative for guidance. For advice on using non-approved cameras, see [Recommended Settings & Best Practices for Non-Approved Cameras].

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CAPTURE REQUIREMENTS

To meet GEM's standards, productions should adhere to the following technical guidelines:

- **Minimum resolution:** 3840 photo sites wide (spherical capture)
- **Codec:** Lightly compressed or uncompressed RAW, or an intra-frame codec with at least 4:2:2 chroma subsampling
- **Bit depth:** 10-bit or higher
- **Data rate:** Minimum 240Mbps at 24fps
- **Color space:** Scene-referred color space (e.g., S.Gamut3, ALEXA Wide Gamut, REDWideGamut)
- **Transfer function:** Scene-referred log encoding (e.g., S-Log3, Log C, V-Log)
- **Timecode:** Must allow external jamming and preserve timecode metadata

Note: Meeting these baselines is necessary but not sufficient for approval—additional factors like dynamic range, form factor, reliability, and workflow needs are considered.

APPROVED CAMERAS

GEM continually updates its list of approved cameras as new systems are developed and evaluated.

Approved cameras include models from ARRI, Canon, Panasonic, RED, Sony, Panavision, Blackmagic, and DJI, among others. Each approved model is assessed for specific production applications, including spherical and anamorphic shooting.

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IMAGE CAPTURE BEST PRACTICES

The following best practices are recommended to minimize workflow obstacles and protect creative quality:

- **Black Balancing:** Regularly perform sensor calibration according to the manufacturer to optimize black levels and minimize pixel issues, ideally after reaching operating temperature.
- **Framing Charts:** Capture and distribute framing charts before photography to guide on-set framing, dailies, editorial, and VFX teams.
- **Aspect Ratio Decisions:** Aspect ratio selection affects both storytelling and technical setup; use available tools to confirm compatibility with GEM's standards.
- **Anamorphic Lenses:** Ensure camera selection allows for extra resolution if using anamorphic lenses.
- **Color Management:** Validate that color transformations are compatible with your project's pipeline, using ACES or other standards where practical.
- **Spanned Clips:** Avoid spanning clips over multiple cards unless essential; this decreases risks of downstream breakage.
- **Film Capture:** For photochemical film workflows, consult GEM early.
- **External Recorders:** If external recorders are needed, ensure the recording format matches GEM's requirements, and coordinate with production contacts.

GEM is committed to helping productions achieve their creative vision through reliable technology and best-in-class workflow support. For further questions or specific project needs, contact your GEM project lead.

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APPROVED CAMERAS
Cameras that have been approved for GEM productions are listed below. We will continue to maintain and update this list as new camera systems become available and are evaluated by our technologists.

ARRI

Camera		Effective Pixels	Preferred Recording Format
ARRI Alexa LF		4.5K: 4448x3096	- ARRIRAW - ProRes 4444 XQ - ProRes 4444 - Approved for anamorphic capture
ARRI Alexa Mini LF		4.5K: 4448x3096	- ARRIRAW - ProRes 4444 XQ - ProRes 4444 - Approved for anamorphic capture
ARRI Alexa 65		6K:6560x3100	- ARRIRAW - Approved for anamorphic capture

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ARRI Alexa 35		4.6K: 4608x3164	- ARRIRAW - ProRes 4444 XQ - ProRes 4444 - Approved for anamorphic capture
ARRI ALEXA 265		6K:6560x3100	- ARRIRAW - Approved for anamorphic capture

Canon

Camera		Effective Pixels	Preferred Recording Format
Canon C300 Mk II		4K: 4096x2160	- Canon RAW - XF-AVC (4K)

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Canon C300 Mk III		4K: 4096x2160	- Cinema RAW Light - XF-AVC (4K)
Canon C500 Mk II		5.9K: 5952x3140	- Cinema RAW Light - XF-AVC (4K) - Approved for anamorphic capture
Canon C500		4K: 4096x2160	- Canon RAW
Canon C700		4K: 4096x2160 4.5K: 4512x2376	- Canon RAW - XF-AVC (4K) - ProRes HQ (4K)

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Canon C700 FF		RAW FF: 5952 x 3140 RAW 2.35: 5952x2532 4K: 4096 x 2160 UHD: 3840 x 2160	- Canon RAW - XF-AVC (4K) - ProRes HQ (4K) - Approved for anamorphic capture
Canon EOS C70		4K: 4096x2160	- Cinema RAW Light - XF-AVC (4K)
Canon EOS R5 C		4K: 4096x2160	- XF-AVC (4K)
Canon EOS C400		6K: 6000x3164	- Cinema RAW Light - XF-AVC (4K)

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Canon EOS C80		6K: 6000x3164	- Cinema RAW Light - XF-AVC (4K)

Panasonic

Camera		Effective Pixels	Preferred Recording Format
Panasonic VariCam 35		4K: 4096x2160	- V-RAW - AVC-Intra4K
Panasonic VariCam LT		4K: 4096x2160	- V-RAW - AVC-Intra4K
Panasonic VariCam Pure		4K: 4096x2160	- V-RAW

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Panasonic AU-EVA1		4K: 4096x2160	- 422 All-I 400Mb/s* *Firmware 2.02 or higher required
Panasonic S1H		4K: 4096x2160	- 422 All-I 400Mb/s
Panasonic BGH1		4K: 4096x2160	- 422 All-I 400Mb/s
Panasonic BS1H		4K: 4096x2160	- 422 All-I 400Mb/s
Panasonic AK-UC4000		UHD: 3840x2160	- Baseband Video

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RED

Camera		Effective Pixels	Preferred Recording Format
RED DSMC2 / WEAPON MONSTRO 8K VV		8K: 8192x4320	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture
RED WEAPON DRAGON 8K VV		8K: 8192x4320	- REDCODE RAW (up to 6:1) - Approved for anamorphic capture
RED DSMC2 / WEAPON HELIUM 8K S35		8K: 8192x4320	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture
RED EPIC-W HELIUM 8K S35		8K: 8192x4320	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture

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RED WEAPON DRAGON 6K S35		6K: 6144x3160	- REDCODE RAW (up to 6:1) - Approved for anamorphic capture
RED EPIC DRAGON 6K S35		6K: 6144x3160	- REDCODE RAW (up to 6:1) - Approved for anamorphic capture
RED DSMC2 / EPIC-W GEMINI 5K S35		5K: 5120x3000	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture
RED SCARLET-W DRAGON 5K S35		5K: 5120x2700	- REDCODE RAW (up to 6:1)
RED RAVEN 4.5K		4.5K: 4608x2160	- REDCODE RAW (up to 6:1)

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RED RANGER MONSTRO 8K VV		8K: 8192x4320	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture
RED RANGER HELIUM 8K S35		8K: 8192x4320	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture
RED RANGER GEMINI 5K S35		5K: 5120x3000	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture
RED DSMC2 DRAGON-X 6K S35		6K: 6144x3160	- REDCODE RAW (up to 6:1) - Approved for anamorphic capture
RED KOMODO 6K		6K: 6144x3240	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture

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RED V-RAPTOR 8K VV		8K: 8192x4320	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture
RED V-RAPTOR XL 8K VV		8K: 8192x4320	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture
RED V-RAPTOR 8K S35		8K: 8192x4320	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture
RED V-RAPTOR XL 8K S35		8K: 8192x4320	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture

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RED KOMODO-X 6K S35		6K: 6144x3240	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture
RED V-RAPTOR [X] 8K VV		8K: 8192x4320	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture
RED V-RAPTOR XL [X] 8K VV		8K: 8192x4320	- RECODE RAW (HQ or MQ) - Approved for anamorphic capture

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Panavision

Camera		Effective Pixels	Preferred Recording Format
Panavision DXL2		8K: 8192x4320	- REDCODE RAW (up to 8:1) - Approved for anamorphic capture

Sony

Camera		Effective Pixels	Preferred Recording Format
Sony Venice		6K: 6048x4032	- RAW (up to 4096x2160) - X-OCN - XAVC-I (4K) - Approved for anamorphic capture
Sony Venice 2 6K		6K: 6048x4032	- X-OCN RAW - ProRes 422HQ (4K) - Approved for anamorphic capture

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Sony Venice 2 8K		8.6K: 8640x5760	- X-OCN RAW - ProRes 422HQ (4K) - Approved for anamorphic capture
Sony Burano		8.6K: 8632x4856	- X-OCN RAW - Approved for anamorphic capture
Sony FX9		4K: 4096x2160	- XAVC-I (4K)
Sony F55		4K: 4096x2160	- F55RAW - X-OCN - XAVC-I (4K)
Sony F65		4K: 4096x2160	- F65RAW - F65RAW-LITE - XAVC-I (4K)

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Sony FS7 / FS7 II		4K: 4096x2160	- XAVC-I (4K)
Sony F5		4K: 4096x2160	- XAVC-I (4K)* *4K upgrade license required
Sony FX6		4K: 4096x2160	- XAVC-I (4K)
Sony FR7		4K: 4096x2160	- XAVC-I (4K)
Sony PXW-Z450		UHD: 3840x2160	- XAVC-I QFHD 300 mode
Sony PXW-Z750		UHD: 3840x2160	- XAVC-I QFHD 300 mode

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Sony FX3		UHD: 3840x2160	- XAVC S-I (4K)
Sony HDC-F5500		UHD: 3840x2160	- Baseband Video

Blackmagic

Camera		Effective Pixels	Preferred Recording Format
Blackmagic Design URSA Mini 4.6K		4.6K: 4608x2592	- CinemaDNG RAW (up to 4:1)
Blackmagic Design URSA Mini Pro 4.6K		4.6K: 4608x2592	- Blackmagic RAW (up to 5:1)

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Blackmagic Design URSA Mini PRO 4.6K G2		4.6K: 4608x2592	- Blackmagic RAW (up to 5:1)
Blackmagic Design URSA Mini PRO 12K OLPF		12K: 12288x6480	- Blackmagic RAW (up to 8:1)
Blackmagic Design URSA Cine 12K LF		12K: 12288x8040	- Blackmagic RAW (up to 8:1)
Blackmagic Design URSA Cine 17K 65		17K: 17520x8040	- Blackmagic RAW (up to 12:1)

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DJI

Camera		Effective Pixels	Preferred Recording Format
DJI Inspire 3 Zenmuse X9-8K Air		8K: 8192x4320	- ProRes RAW - ProRes 422 HQ