Peptide COA Checklist

What to look for — and what to walk away from — before accepting a vial for laboratory use.

> *A COA without a batch number is not a certificate of analysis — it is a portrait of a stranger who happens to share the molecule's name.*

A — IDENTITY

Confirms the molecule is the one on the label. Purity does not establish identity.

- [ ] **Method named**

  Mass spectrometry (MS/ESI-MS/MALDI-MS) is the standard. Method should be explicit, not implied.

- [ ] **Theoretical molecular weight shown**

  Calculated from the target amino-acid sequence; allows you to check the arithmetic independently.

- [ ] **Observed mass shown and compared**

  The instrument result next to

the theoretical value, within stated tolerance. "Confirmed" with no numbers is insufficient.

- [ ] **Orthogonal data (if available)**

  Amino-acid analysis, HPLC retention time vs reference standard, or sequence confirmation strengthens identity significantly.

B — PURITY (HPLC)

Quantifies the main-peak fraction. Does not identify what the remaining percentage contains.

- [ ] **Method is HPLC, peak-area %**

  Reverse-phase HPLC (RP-HPLC) is standard. "Purity" without naming the technique is unverifiable.

- [ ] **Result ≥99%**

  The field benchmark for research-grade synthetic peptides.

Below this, the impurity breakdown becomes decisive.

☐ **Chromatogram or representative trace included**

The visual record of peaks. A single figure with no trace cannot be cross-checked. Dominant main peak + clean baseline is the target.

☐ **Column and wavelength stated**

Conditions define what the method detects. Different wavelengths (UV 210 nm vs 220 nm) can shift apparent purity for some sequences.

☐ **Run date on the chromatogram matches COA date**

Chromatograms from

an earlier or generic batch can be borrowed. Date consistency is a basic authenticity check.

C — IMPURITY PROFILE

The most informative — and most often skipped — section of a peptide COA.

- [ ] **Individual impurities listed at ≥0.1%**

  The EMA 2026 synthetic-peptide guideline and ICH Q3A operate around a reporting threshold near 0.1%. Impurities above this level should appear individually, not vanish into "other".[12]

- [ ] **Nature of major impurities described where possible**

  Deletion sequences, truncated chains, oxidised or deamidated variants, residual protecting groups

—
these
are
the
predictable
cousins
in
synthetic
peptide
chemistry.

☐ **No single impurity dominates unexpectedly**

A
"99%
pure"
vial
with
a
single
0.9%
impurity
differs
in
risk
profile
from
one
with
nine
0.1%
impurities.

☐ **Residual solvents reported (if relevant)**

Particularly
for
peptides
where
the
synthesis
or
lyophilisation
process
uses
solvents
that
could
carry
over
(e.g.
acetonitrile,
TFA).

D — BATCH / LOT TRACEABILITY

The most diagnostic section for real-versus-recycled certificates.

☐ **Lot / batch number present on COA**

A
COA

without a lot number describes no specific batch. It is a generic document, not a release certificate.

- [ ] **COA lot number matches the vial label**

Cross-check physically. A mismatch means the certificate was issued for different material.

- [ ] **Analysis date is plausible**

A COA dated years before your order or after your delivery date is a red flag. Dates should precede or closely accompany dispatch.

- [ ] **Net weight or quantity stated**

Relates the certificate

to the actual amount in the vial; makes concentration calculations traceable.

E — WATER CONTENT & APPEARANCE

☐ **Water content measured and stated**

Method: Karl Fischer titration or loss on drying. Lyophilised peptides are hygroscopic; 5–10% water in the vial means 5–10% less peptide per net-weight label. This directly affects reconstitution concentration calculations.

☐ **Appearance described and consistent**

Standard: white to off-white lyophilised powder. Discolouration or

clumping is a free integrity indicator worth checking against the COA description.

F — ENDOTOXIN (CRITICAL FOR CELL-BASED & IN VITRO WORK)

Invisible to HPLC. The most common silent confound in immunology and cell-culture models.

- [ ] **Endotoxin test performed and named**

  Bacterial endotoxin test (BET/LAL — gel-clot, turbidimetric, or chromogenic) or recombinant Factor C (rFC). The method name must appear; "tested" alone is not sufficient.

- [ ] **Result expressed in endotoxin units (EU/mg or EU/mL)**

  A specific measured value, referenced to USP <85> or Ph. Eur. 2.6.14. Acceptable limits depend on

the intended research application.

☐ **If not present: supplier can provide on request**

For applications where LPS contamination could confound results (cytokine assays, NF-κB reporters, macrophage models), treat an absent endotoxin section as incomplete QC data.

G — ISSUING LABORATORY

☐ **Laboratory name and location stated**

Anonymous "third-party testing" without identifying the lab is unverifiable. Condor Research uses an independent analytical laboratory in the Czech Republic (EU).

☐ **Independent of the manufacturer**

Self-certified COAs (manufacturer tests own product without external verification) carry an inherent conflict of interest.

☐ **Accreditation referenced (ISO 17025 or equivalent)**

Not universally present on peptide COAs but the strongest quality signal available. Even a named, non-accredited laboratory is better than no laboratory.

☐ **Authorised signatory or stamp**

A real laboratory report carries a traceable signature or stamp. A document that could have been edited

in
a
word
processor
offers
weaker
assurance.

RED FLAGS — WALK AWAY

WHAT YOU SEE	WHAT IT MEANS	VERDICT
No batch / lot number	Certificate describes no specific production run	Reject
Lot number does not match vial label	Certificate was issued for a different (or fictional) batch	Reject
Purity stated; no method named	Unverifiable claim — what instrument, what conditions?	Insufficient
"Confirmed" identity with no mass data	Identity not actually demonstrated; just asserted	Insufficient
No chromatogram or trace	Peak profile cannot be cross-checked; figure could be fabricated	Insufficient
Impurity percentage unaccounted for	What is the other 1–5%? If unlisted, it is uncharacterised	Insufficient
No laboratory named	No independent verification; self-certification at best	Insufficient
COA dated after your delivery	Temporal impossibility — document was backdated or generic	Reject
No water content or appearance data	Incomplete specification per ICH Q6A; affects concentration accuracy	Incomplete

QUICK REFERENCE — WHAT GOOD LOOKS LIKE

COA SECTION	METHOD	MINIMUM ACCEPTABLE
Identity	Mass spectrometry (ESI-MS / MALDI)	Observed mass vs theoretical, both values shown, within stated tolerance
Purity	RP-HPLC, peak-area %	≥99%, chromatogram included, run date consistent
Impurities	HPLC profile vs ICH / EMA thresholds	Individual impurities listed at ≥0.1%; not hidden in "other"[1][2]
Water content	Karl Fischer / loss on drying	Stated value; relevant for concentration calculations
Appearance	Visual / physical description	Matches vial contents; white lyophilised powder is standard
Batch / Lot	Traceability	Number present on COA, matches vial; date plausible
Endotoxin	BET/LAL or rFC (USP <85> / Ph. Eur. 2.6.14)	Named method, EU/mg value stated; critical for cell-based assays[3][4]
Laboratory	Independent, named, EU preferred	Lab identified; ideally ISO 17025; not the manufacturer itself

FREQUENTLY ASKED QUESTIONS

What purity should a research peptide COA show?

> The field benchmark is ≥99% by HPLC peak-area percentage. Below that, the fraction and identity of what accounts for the remainder becomes the deciding question — a 97% purity with a fully characterised 3% impurity profile may be more informative than a 99% figure with no breakdown.

Can a COA be faked?

> Yes. Red flags include no batch/lot number, no named analytical method, no observed mass next to theoretical, and a purity figure with no chromatogram or impurity breakdown. Independent re-testing by an accredited laboratory is the only absolute defence. Ask your supplier if they support third-party re-analysis.

Why is the batch number so important?

> A COA describes one specific manufacturing lot. Two batches of the same peptide can differ in purity and impurity profile even from the same manufacturer. Without a batch number that matches the one on your vial, the certificate describes a different — or entirely hypothetical — batch.[5]

Does HPLC purity cover endotoxin contamination?

> No. HPLC is essentially blind to lipopolysaccharide (LPS) endotoxins. A separate bacterial endotoxin test (BET/LAL or rFC) is required. High HPLC purity with no endotoxin data leaves a major confound completely uncharacterised for any cell-based or immunological assay.

What does "independent laboratory" mean?

> The testing laboratory is separate from the peptide manufacturer — ideally accredited to ISO 17025 — so the result is not self-certified. Condor Research uses an independent EU analytical laboratory based in the Czech Republic. COAs are issued per batch, not per product line.

How do I read the mass spec result if I am not a chemist?

> Look for two numbers: theoretical MW (calculated from the sequence) and observed MW (what the instrument measured). If they match within ±1–2 Da (or the stated tolerance), the backbone is the right sequence. If only one number appears, or the result is written as "confirmed" without showing the observed value, the identity check cannot be independently verified.

FURTHER READING — CONDOR RESEARCH

- How to Read a Certificate of Analysis (COA) for a Research Peptide — full editorial guide
- What "99% Pure" on a Peptide COA Really Means: HPLC, Mass Spec and the Limits of a Purity Number
- Endotoxins and Sterility: The COA Section Almost Nobody Reads
- How to Choose a Research Peptide Supplier in Europe (2026)
- Why Peptide Experiments Fail: Reproducibility and the Reagent Problem

How to use this checklist. Work through sections A–G against the COA supplied with each batch. Keep a signed copy with your laboratory notebook entry for the lot. If an item cannot be confirmed, contact the supplier before use — a credible supplier will be able to provide documentation or direct you to the issuing laboratory.

REFERENCES

1. European Medicines Agency. *Guideline on the development and manufacture of synthetic peptides*. EMA/CHMP/BWP/651353/2022 (effective 2026). ema.europa.eu
2. ICH Harmonised Guideline. *Impurities in New Drug Substances Q3A(R2)*. International Council for Harmonisation, 2006. ich.org
3. United States Pharmacopeia. *USP <85> Bacterial Endotoxins Test*. USP-NF. usp.org
4. European Pharmacopoeia. *2.6.14 Bacterial Endotoxins*. Council of Europe. edqm.eu
5. ICH Harmonised Guideline. *Specifications: Test Procedures and Acceptance Criteria for New Drug Substances and New Drug Products Q6A*. 1999. ich.org

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