

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QD OXFORD UK LIMITED, and
QUANTUM DESIGN INTERNATIONAL INC.,
Petitioners,

v.

MAYBELL QUANTUM INDUSTRIES, INC.,
Patent Owner.

IPR2026-00291
U.S. Patent No. 12,313,320

**PETITIONERS' REPLY TO PATENT OWNER'S
PRELIMINARY RESPONSE**

Patent Owner attempts to distinguish the asserted prior art through two narrowing claim interpretations. It construes “access” to require human access to the coldest stage and to exclude access via probes or sample carriers, and construes “experimental volume” to require a sample stage or plate coupled to a mixing chamber. POPR 26-30, 33-35, 39-44. The intrinsic record contradicts both constructions. As to “access,” during prosecution, Applicant acknowledged that Mikheev’s experimental volume is accessible through a “probe access path,” and instead distinguished Mikheev based on the location of the opening, not the use of a probe. EX1004, 71-72. As to “experimental volume,” the ’320 Patent presents coupling to a mixing chamber only as an optional embodiment, not a definition. EX1001, 12:66-13:2. Patent Owner cannot distinguish the prior art or avoid institution through incorrect narrowing constructions presented as merits arguments.

I. PATENT OWNER’S INTERPRETATION OF “ACCESS” CONTRADICTS THE INTRINSIC RECORD

Patent Owner interprets “access” to mean “access *by the user* of the dilution refrigerator *to the coldest stage*” and asserts that “probe insertion does not allow a user to access the experimental volume and thus is not the claimed access.” POPR 26-29. Claim 1 requires only “an opening . . . configured to provide access to an experimental volume.” EX1001, claim 1. It does not specify who must obtain

access, require access to the coldest stage, or exclude accessing with a probe or sample carrier.

The '320 Patent likewise describes human access as optional: “*In some embodiments*, the experimental volume 124 *may* be accessed by the user . . . through an opening in the vacuum chamber 106 and door 125.” EX1001, 13:6-13 (emphasis added). It further states: “For example, the opening may provide access to a sample stage or experimental volume . . . or any other interior portion.” *Id.*, 19:7-13. These examples do not limit “access” to human access.

The prosecution history is even more clear. Applicant stated that Mikheev’s experimental volume “is accessible only through bore 11,” which “defines a probe access path.” EX1004, 71. Applicant then distinguished Mikheev because “tube 60 is not an opening in outer wall 2 or an opening in the cited plate adjacent port 8A.” *Id.* The distinction was the opening’s location failing to provide access through the outer wall into the “interior of the outer vacuum chamber,” not the use of a probe.

The Petition maps Batey’s “access opening,” Chow’s ports providing “access to sample mounting surface 340 from an exterior,” and Garside’s aperture permitting insertion into its working region. Pet. 20-21, 49-50, 70-72; EX1009, 7:3-11; EX1011, ¶39; EX1007, ¶8. These disclosures satisfy the claim; Patent Owner’s contrary arguments depend on its unsupported human access construction.

II. PATENT OWNER’S INTERPRETATION OF “EXPERIMENTAL VOLUME” CANNOT DISTINGUISH WIKUS

Patent Owner interprets “experimental volume” to require a sample stage or plate coupled to the mixing chamber and argues that Wikus’s 4 K and 1 K regions do not qualify. POPR 42-44. But the ’320 Patent states: “*In some embodiments*, an experimental volume 124 (*e.g.*, a sample stage or plate) *may be* thermally coupled to the mixing chamber 122.” EX1001, 12:66-13:2 (emphasis added). “In some embodiments,” “*e.g.*,” and “*may be*” identify an example, not a definition. Applicant called extension tail 27 “the experimental volume of Mikheev” without requiring a stage, plate, or coupled mixing-chamber. EX1004, 71.

The Petition identifies Wikus’s 4 K and 1 K regions as experimental regions and cites evidence describing “experimental stations” at those temperatures. Pet. 85-86; EX1002, ¶284; EX1013. Patent Owner attempts to distinguish Wikus only by applying its unsupported construction of “experimental volume” to require a sample stage or plate coupled to the mixing chamber. The Petition also addressed that alternative: “if the term ‘experimental volume’ were to require a mixing chamber within the vacuum chamber,” Wikus illustrates a traditional configuration with the still and mixing chamber in the same vacuum chamber. Pet. 86-87.

Because Patent Owner’s arguments depend on narrowing constructions unsupported by the intrinsic record, they do not distinguish the asserted prior art or justify denying institution.

Date: August 4, 2026

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), lead counsel for Petitioners hereby certifies that on August 4, 2026, a copy of this Petitioners' Reply to Patent Owner's Preliminary Response was served on Patent Owner's counsel of record at the email correspondence addresses of record:

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