Product Profile

VeraSeq™ 2.0 High Fidelity DNA Polymerase

Key Benefits

- 50x higher fidelity than Taq DNA Polymerase
- Highest sensitivity of all available proofreading polymerase, showing successful amplifications down to 300 pg template DNA
- Increased speed, amplifying at rates of 15 s/kb, enabling shorter PCR reaction time
- Simplified optimization - Tolerates a broad Mg^{2+} and DMSO concentration range, simplifying PCR optimization
- Simplified licensing structure including clinical applications
- Unmatched polymerase purity with zero animal derived protein additives

High Fidelity Amplification

PCR is routinely used for DNA amplification and serves several downstream applications, including cloning or DNA sequencing. Ensuring stringent conditions in PCR has become increasingly important, with fidelity playing a crucial role in ensuring accurate replication of DNA sequences and minimizing errors that could compromise the reliability of downstream applications, such as sequencing and synthetic biology. VeraSeq 2.0 DNA Polymerase contains a dsDNA-binding domain fused to a Pyrococcus-like proofreading polymerase.
The dsDNAbinding domain enhances the affinity of the resulting fusion protein for dsDNA, thereby increasing its processivity. This protein generates PCR products with superior accuracy and speed, surpassing the capabilities of traditional polymerase blend formulations.

The future of high-fidelity PCR

Previous generations of high-fidelity PCR formulations had significant compromises in terms of market applicability or technical performance. These compromises typically include increased amplicon length at the expense of fidelity, or the highest fidelity at the expense of sensitivity. VeraSeq 2.0 DNA Polymerase addresses these trade-offs by offering high-fidelity polymerase without compromising other features of interest:

- Sensitivity down to 300 pg human genomic DNA input template
- 15 s/kb incorporation rate
- Simplified reaction optimization
- Unrestricted field of use (contact QIAGEN for rights to use in diagnostic applications)

Established quality, consistency and scalability

In addition to the above key performance features, VeraSeq 2.0 DNA polymerase benefits from a world-renowned record of producing benchmark-quality enzyme products under ISO 13485:2003 Quality System. QIAGEN employs the same strict quality control processes and proprietary methods for maintaining purity (Figure 1) that it incorporates into all its enzyme and protein products. This ensures that our products meet the rigorous demands of global supply and are of unmatched purity in the industry. No animalderived protein additives, such as BSA, are included in VeraSeq 2.0 DNA Polymerase.se (contact QIAGEN for rights to use in diagnostic applications)

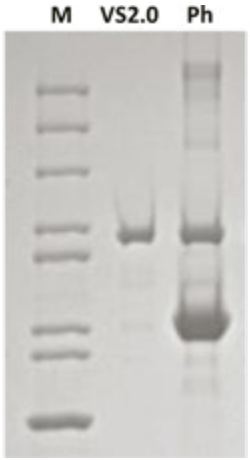

Figure 1
Change caption: Protein gel showing the purity of VeraSeq 2.0 DNA Polymerase (VS2.0) compared to the competition (Ph)

Sensitivity

One key challenge with high-fidelity polymerase formulations is the trade-off with sensitivity. Competitor products often rely on protein additives to boost performance. In contrast, expression and purification methods from QIAGEN delivers high-purity proteins. As a result, VeraSeq 2.0 ensures high sensitivity by sucessfully amplifying input human genomic DNA down to 300 pg (Figure 2).

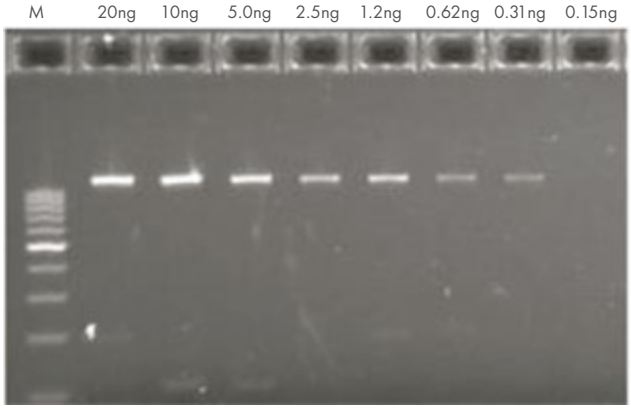

Figure 2
Successful amplification down to 300 pg of human genomic DNA.

Robust amplification across increasing G:C rich templates:

The VeraSeq 2.0 DNA Polymerase used with VeraSeq Buffer II has been shown to yield successful amplifications across a broad range of G:C containing templates (Figure 3). However, for templates with the highest G:C content, we recommend using the included G:C buffer, specifically designed for the most demanding applications.

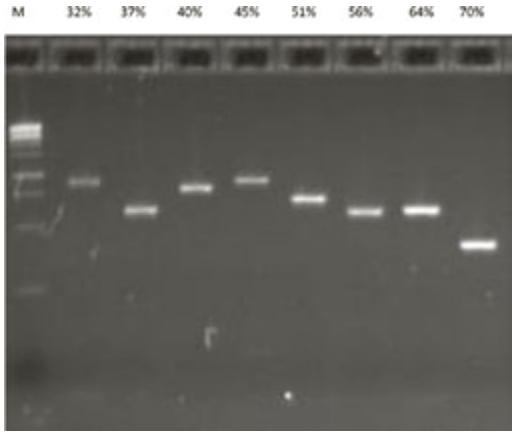

Figure 3
Successful amplification of up to 70% G:C rich templates using VeraSeq Buffer II.

Fidelity

Two buffers are supplied: VeraSeq buffer II for regular amplifications and VeraSeq GC buffer for G:C rich templates. VeraSeq 2.0 DNA polymerase is a fusion of a single-stranded binding (SSB) protein to a *Pyrococcus*-like polymerase domain, resulting in a polymerase with a fidelity greater than 50 times that of Taq DNA polymerase. Fidelity measurements, performed using the industry-standard lacI assay. The fidelity versus Taq DNA polymerase for each buffer is shown below.

Polymerase	Buffer	Error Rate	Fidelity times higher than Taq-B
Vera Seq 2 .0	VeraSeq Buffer II	4.0×10^{-7}	61
Vera Seq 2.0	VeraSeq GC Buffer	4.6×10^{-7}	54
Taq-B	PCR Buffer I	2.5×10^{-5}	1

VeraSeq 2.0 DNA polymerase shows >50x improvement in fidelity compared to Taq-B DNA polymerase. Use of the G:C buffer decreased fidelity slightly, however, it still yields industry-leading fidelity for G:C rich templates.

Rapid extension rate minimizing reaction times:

The increased affinity of the SSB binding protein for DNA templates enhances processivity. VeraSeq 2.0 DNA Polymerase exhibits an extension rate of 1 kb in15 seconds (Figure 4), supporting amplifications up to 8 kb with minimized turnaround time. Combined with a high-amplification success rate, VeraSeq 2.0 DNA polymerase reduces rework time, making it the most effective high-fidelity polymerase on the market today.

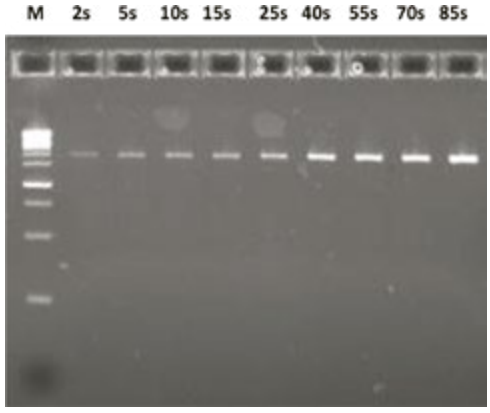

Figure 4
20 cycles of amplification at 72°C extension temperature. Clear product bands can be observed at an extension time of 2 s, with robust amplification clearly observed at a rate of 15 s/kb.

Simplified optimization:

VeraSeq 2.0 DNA polymerase has been developed to simplify optimization of individual PCR amplifications. The polymerase works effectively across a broad range of Mg2+ concentrations (1.5-3.0 mM) and is tolerant to routinely used additives known to positively impact PCR success rate. For example, adding up to 9% DMSO will improve success rate on the most challenging PCR templates (Figures 5 and 6).

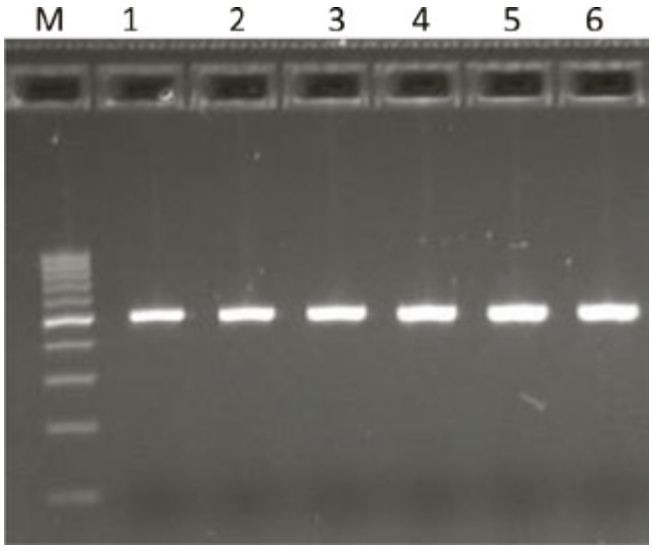

Figure 5
Titration of VeraSeq 2.0 DNA polymerase units and Mg2+ shows successful amplification. Lanes 1-3 show amplification with 1U polymerase, lanes 4-6 show amplification using 2U. Lanes 1-3 also show increasing concentration of Mg2+, starting at 1.5 mM, then increasing to 1.8 and 3.0 mM, respectively. Lanes 4-6 follow the same trend in Mg2+ concentration.

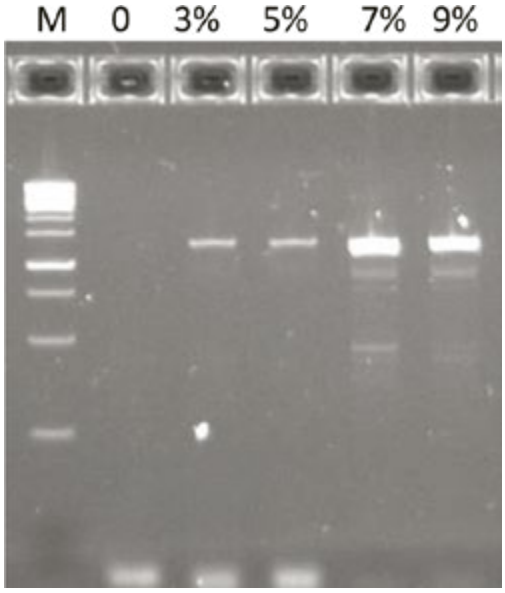

Figure 6
Addition of increasing volume of DMSO on human genomic DNA. No amplification is observed for this difficult target until larger volumes of DMSO are added. Up to 9% v/v can be added with a positive impact on amplification success rate.

Amplification size range

VeraSeq 2.0 DNA polymerase has been shown to reliably amplify up to 8 kb. For amplicons above 3 kb, we recommend the use of an additive such as DMSO to maximize your experimental success. For next-generation sequencing applications requiring amplicon pooling, VeraSeq 2.0 Polymerase offers a high level of amplification success rate with the highest possible fidelity, as shown in Figure 7 below.

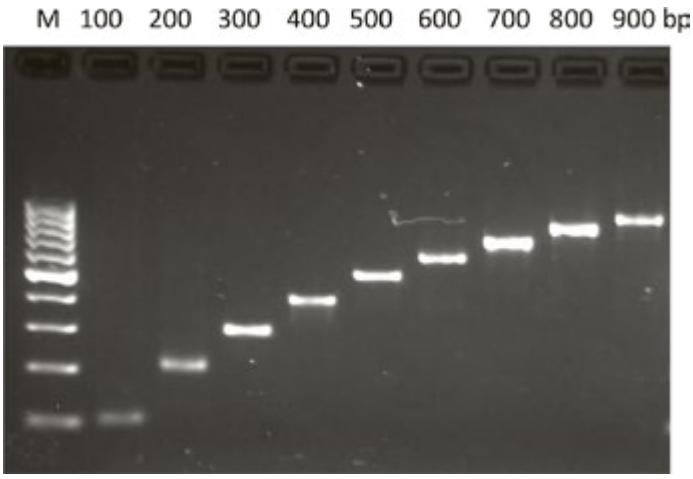

Figure 7
Routine amplification up to 1 kb, which is ideal for NGS enrichment sample preparation.

Quality and service you can count on

QIAGEN manufactures pure, superior quality enzymes and reagents for molecular biology and other applications. QIAGEN strives to resolve customers' challenges by providing the highest quality materials, a consistent supply chain and excellent service. QIAGEN manufactures analytical grade quality products to meet the most rigorous specifications.

VeraSeq 2.0 DNA Polymerase reflects our commitment to identifying, developing and delivering outstanding enzyme technologies. If your company requires protein products and a service partner that stands above the crowd, then we'd love to hear from you.

Ordering Information

Product	Contents	Cat. no.
VeraSeq 2.0 High-Fidelity DNA Polymerase	500 U at 2,000 U/mL	P7511L

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