PRODUCT NOTE

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VeraSeq™ 2.0 High Fidelity DNA Polymerase

KEY BENEFITS

- Highest fidelity of the polymerases available on the market today, measured at 50x higher than Taq
- 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
- 24h room temperature stability simplifying reaction set up
- 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

The PCR is routinely used for DNA amplification and serves a number of downstream applications, such as cloning or DNA sequencing. The requirements for the PCR continue to increase in stringency with fidelity becoming increasingly important due to the emergence of high resolution techniques in the fields of next generation sequencing and synthetic biology. VeraSeq 2.0 DNA polymerase possesses a dsDNA-binding domain fused to a *Pyrococcus*-like proofreading polymerase. The presence of the dsDNA binding domain is known to increase the affinity of the resulting fusion protein for double-stranded DNA, increasing processivity. The resulting protein generates PCR products with the highest accuracy and speed beyond what traditional polymerase blend formulations are capable of achieving.

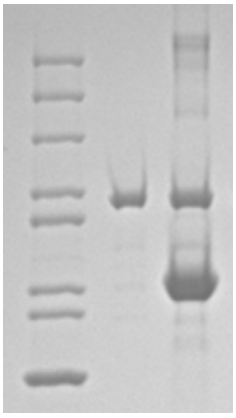

Figure 1.
Protein gel showing the purity of VeraSeq 2.0 DNA polymerase compared to the competition.

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The Best of All Worlds

Previous generations of high fidelity PCR formulations have carried significant compromises, in terms of available markets or technically, whether it be increased amplicons length at the expense of fidelity, or the highest fidelity at the expense of sensitivity. VeraSeq 2.0 DNA polymerase overcomes current compromises by offering highest fidelity with no compromise in other features of interest:

- Sensitivity to 300 pg human genomic DNA input template
- 15 s/kb incorporation rate
- Simplified reaction optimization
- Unrestricted field of use – Contact Enzymatics for rights to use in diagnostic applications

Demonstrated Quality, Consistency, Scalability

In addition to the above key performance features, VeraSeq 2.0 DNA polymerase benefits from Enzymatics' world-renowned record of producing benchmark-quality enzyme products under its ISO 13485:2003 Quality System. Enzymatics uses the same strict quality control processes and proprietary methods for maintaining purity 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. There are no animal derived protein additives, such as BSA, in VeraSeq 2.0 DNA Polymerase.

Sensitivity

One of the current challenges in using the highest fidelity polymerase formulations is a trade off with sensitivity. Competitor products resort to the use of protein additives, to drive performance. Enzymatics unmatched expression and purification methods yield proteins of the highest purity in the industry today and as a result VeraSeq 2.0 reaches unmatched levels of sensitivity (Figure 2).

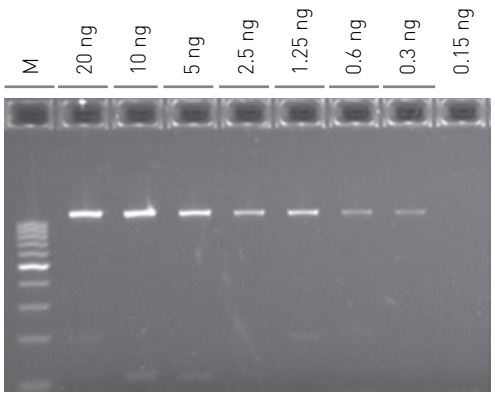

Figure 2. Successful amplification down to 300 pg of human genomic DNA. The use of GC buffer has been shown to take this level of sensitivity further to 150 pg of input DNA

Robust amplification across increasing G:C rich templates

VeraSeq 2.0 DNA Polymerase in VeraSeq buffer II has been shown to yield successful amplifications across a broad range of G:C containing templates. Utilizing the optimized buffer minimizes any loss of fidelity observed when utilizing buffers designed for G:C amplifications. For the highest complexity G:C rich templates, Enzymatics recommends use of the included G:C buffer.

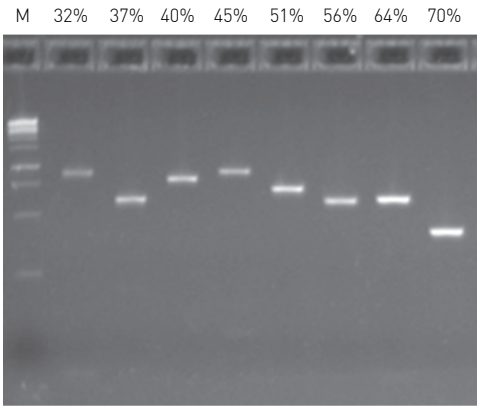

Figure 3. Shows successful amplification up to 70% GC rich templates utilizing VeraSeq buffer II.

Fidelity

VeraSeq 2.0 DNA polymerase is a fusion of a single stranded binding (SSB) protein to a *Pyrococcus*-like polymerase domain to yield a polymerase with fidelity measured at greater than 50x that of Taq DNA polymerase. Fidelity measurements are shown in Figure 2 utilizing the industry standard lacI assay. Two buffers are supplied, VeraSeq buffer II for regular amplifications and VeraSeq GC buffer for G:C rich templates. Fidelity versus Taq DNA polymerase for each product is shown below.

POLYMERASE	BUFFER	ERROR RATE	Fold Better than Taq-B
VeraSeq 2.0	VeraSeq Buffer II	4.0×10^{-7}	61
VeraSeq 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 with respect to Taq B DNA polymerase. Use of the G:C buffer decreases fidelity slightly, however still yields industry leading fidelity for G:C rich templates.

Rapid extension rate minimizing reaction times

The increased affinity for DNA templates from the SSB binding protein increases processivity. VeraSeq 2.0 DNA Polymerase has extension rates of 1 kb in 15 seconds, managing amplifications up to 8 kb with minimized turnaround time. Partnering this with a high amplification success rate, VeraSeq 2.0 DNA polymerase will minimize rework time, making it the most effective high fidelity polymerase in the market today.

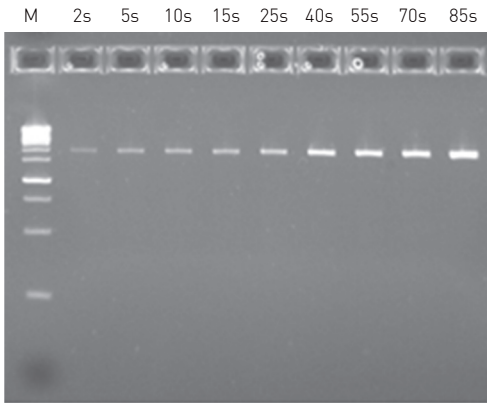

Figure 4. 20 cycles of amplification at 72°C extension temperature. Clear product bands can be observed at an extension time of 2 s, with robust amplification clearly observed at a rate of 15 s/kb.

Simplified optimization

VeraSeq 2.0 DNA polymerase has been developed to simplify optimization of your individual PCR amplifications. The polymerase formulation works under a broad range of Mg^{2+} concentrations (from 1.5-3.0 mM) and is tolerant to routinely used additives known to positively impact PCR success rate, for example the addition of up to 9% DMSO will improve success rate on the most difficult of PCR templates (Figures 5 and 6).

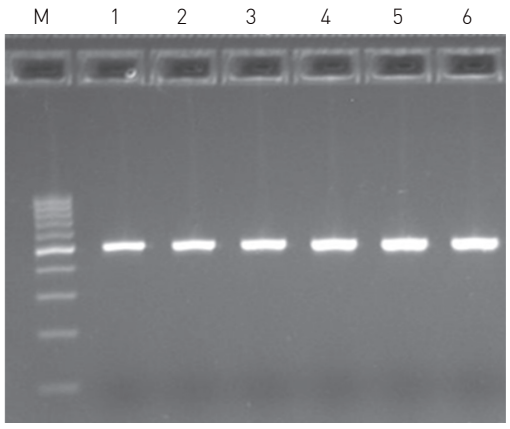

Figure 5. Titration of VeraSeq 2.0 DNA polymerase units and Mg^{2+} shows successful amplification. Lanes 1-3 show amplification with 1U polymerase, lanes 4-6 show amplification using 2U. Lanes 1-3 also show increasing concentration of Mg^{2+}, starting at 1.5 mM, then increasing to 1.8 and 3.0 mM respectively.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

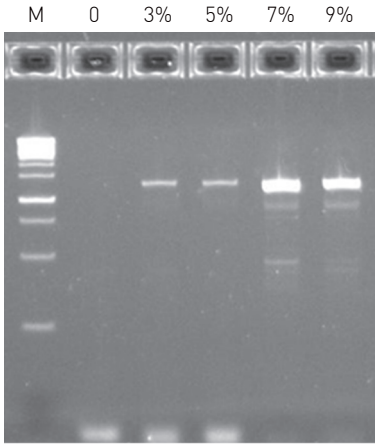

Figure 6. Addition of increasing volume of DMSO on human genomic DNA. No amplification is observed for this difficult target until larger volumes of DMSO are added. Up to 9% v/v can be added with a positive impact on amplification success rate.

Amplification size range

VeraSeq 2.0 DNA polymerase has been demonstrated to routinely 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 pooling of amplicons, VeraSeq 2.0 offers a high level of amplification success rate with the highest possible fidelity as shown in Figure 7 below.

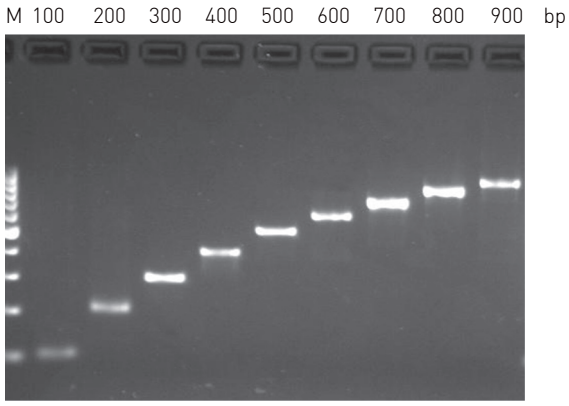

Figure 7. Shows routine amplification up to 1 kb, ideal for NGS enrichment sample preparation.

Quality and Service You Can Count On

Enzymatics manufactures pure, superior enzymes and reagents for molecular biology and other applications. Founded in 2006 by expert enzyme production scientists, Enzymatics has strived to resolve its customers' challenges by providing the highest-quality materials available, an unbreakable supply chain, and paradigm-shifting service. With a manufacturing record unmatched in commercial enzyme production, Enzymatics designs analytical grade quality into all its products to meet the most rigorous specifications.

The introduction of our new, elite-grade VeraSeq 2.0 DNA Polymerase furthers our commitment to identifying, developing, and delivering the very best in protein technologies. If your company has a requirement for a protein product and service partner that stands above the crowd then we want to hear from you.

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Biozym Scientific GmbH
Steinbrinksweg 27
D-31840 Hessisch Oldendorf
Tel.: +49 (0)5152-9020
Fax: +49 (0)5152-2070
support@biozym.com
www.biozym.com

CONTACT US:

To place an order, please email **orders@enzymatics.com,** call Customer Service **(888) 927-7027**, or visit our website at **enzymatics.com**

ORDER DETAILS			
Product Description	Part #	Concentration	Unit Size
VeraSeq 2.0 DNA Polymerase	P7511L	2000 U/ml	625 Units

100 Cummings Center,
Suite 407J,
Beverly, MA 01915

T: (888) 927-7027
www.enzymatics.com

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