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# GenCrispr Cas9-N-NLS Nuclease

Cat. No.: Z03388

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## I Description

Cas9 nuclease is an RNA-guided endonuclease that can catalyze cleavage of double stranded DNA. This kind of targeted nuclease is a powerful tool for genome editing with high precision. Cas9 protein forms a very stable ribonucleoprotein (RNP) complex with the guide RNA (gRNA) component of the CRISPR/Cas9 system. The Cas9 RNP complex can localize to the nucleus immediately upon entering the cell with the addition of a nuclear localization signal (NLS). There is no requirement for transcription and translation compared with mRNA or plasmid systems. Additionally, the Cas9 RNP complex is rapidly cleared from the cell minimizing the chance of off-target cleavage when compared to other systems (Kim, et al. 2014). This DNA-free system avoids the risk of inserting foreign DNA into the genome, which can be quite useful for gene editing-based disease therapy. GenScript has developed a Cas9-N-NLS nuclease which contains a nuclear localization sequence (NLS) on the C-terminus of the protein to meet all the researchers' requirements (e.g. *in vitro* cleavage assay, RNP complex transfection, and micro injection).

Product Source: GenCrispr Cas9-N-NLS is produced by expression in an *E. coli* strain carrying a plasmid encoding the Cas9 gene from *Streptococcus pyogenes* with a C terminal nuclear localization signal (NLS).

## II Contents

Contents	Quantity	Catalog No.	Components/Concentration
GenCrispr Cas9-N-NLS	50 µg	Z03388-50	1 mg/mL
	100 µg	Z03388-100	4 mg/mL
10X Reaction Buffer	1.5 mL		200 mM HEPES, 1 M NaCl, 50 mM MgCl <sub>2</sub> , 1 mM EDTA, pH 6.5 at 25°C

## III Key Features

- ◇ **DNA-free:** no external DNA added to system
- ◇ **High cleavage efficiency:** NLS ensures the entry of Cas9 protein into nuclei
- ◇ **Low off target:** transient expression of Cas9 nuclease
- ◇ **Time-saving:** no need for transcription and translation

## IV Quality Control Analysis

- ◇ **High Protein purity:** GenCrispr Cas9 is > 95% pure as determined by SDS-PAGE using Coomassie Blue detection.
- ◇ **Low Endotoxin:** Endotoxin level is <0.1EU/µg test by gel-clot method: limit test.
- ◇ **Non-specific DNase activity:** A 20 µL reaction in Cas9 reaction buffer containing 100 ng linearized pUC57 plasmid and 0.1 µg GenCrispr Cas9 incubated for 16h at 37°C. No DNA degradation is determined by agarose gel electrophoresis.
- ◇ **Non-specific RNase activity:** A 10 µL reaction in Cas9 reaction buffer containing 1800 ng total RNA and 0.1 µg of GenCrispr Cas9 incubated for 2 h at 37°C. No RNA degradation as determined by Agarose gel electrophoresis.
- ◇ **High Bioactivity:** 20 nM GenCrispr Cas9 incubated for 1 hour at 37°C result in 90% digestion of the substrate DNA as determined by agarose gel electrophoresis.

## V Utilities of Product

1. Screening for highly efficient and specific targeting gRNAs by in vitro DNA cleavage.
2. *In vivo* gene editing when combined with a specific gRNA by electroporation or injection.

## VI Storage

GenCrispr Cas9-N-NLS nuclease is supplied with 1X storage buffer (10 mM Tris, 300 mM NaCl, 0.1 mM EDTA, 1 mM DTT, 50% Glycerol PH 7.4 at 25°C) and recommended to be stored at -20°C.

## VII Diluent Compatibility

Diluent Buffer B: 300 mM NaCl, 10 mM Tris-HCl, 0.1 mM EDTA, 1 mM DTT, 500 µg/ml BSA and 50% glycerol. (pH 7.4 at 25°C).

## VIII Activity test

### Cas9 site-specific digestion:

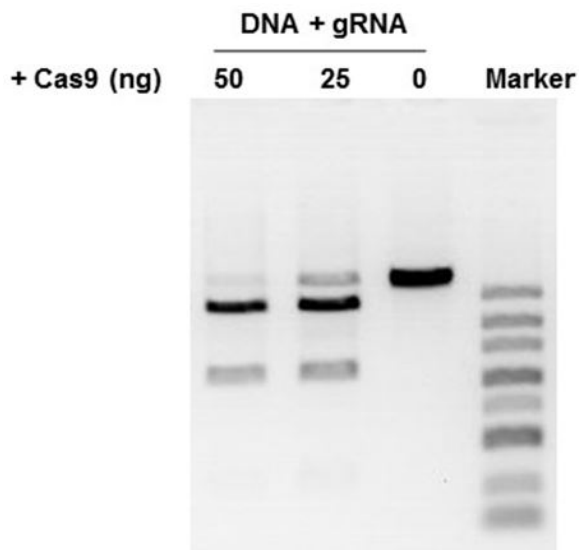
GenScript used *in vitro* digestion of a linearized plasmid to determine the activity of the Cas9 nuclease. It is a sensitive assay for GenCrispr Cas9 quality control. The linearized plasmid containing the target site:

(CATCATTGGAAAACGTTCTT)

can be digested with gRNA:

(CAUCAUUGGAAAACGUUCUUGUUUUAGAGCUAGAAU  
AGCAAGUUAAAAUAAGGCUAGUCCGUUAUCAACUUGAA  
AAAGUGGCACCGAGUCGGUGCUUUUUUUU)

and GenCrispr Cas9. Two cleavage DNA fragments (812 bp and 1898 bp) are determined by agarose gel electrophoresis. A 20 µL reaction in 1xCas9 Nuclease Reaction Buffer containing 160 ng linearized plasmid, 40 nM gRNA and 20 nM GenCrispr Cas9 for 2 hour at 37°C results in 90% digestion of linearized plasmid as determined by agarose gel electrophoresis.



*In vitro* DNA cleavage assay with GenCrispr Cas9-N-NLS nuclease

Reactions were set up according to recommended conditions, and cleavage products were resolved on a 1% agarose gel. Input DNA is EcoRV-linearized pUC57 plasmid DNA

## IX References

1. Jinek et al. A Programmable Dual-RNA-Guided DNA Endonuclease in Adaptive Bacterial Immunity. (2012) *Science* 337 (6096) 816-821 (2012).
2. Larson, M. H., et al. CRISPR interference (CRISPRi) for sequence-specific control of gene expression. *Nature Protocols*. 8, (11), 2180-2196 (2013).
3. Ran, F. A., et al. Genome engineering using the CRISPR-Cas9 system. *Nature Protocols*. 8, (11), 2281-2308 (2013).
4. Kim, S., Kim, D., Cho, S.W., Kim, J., Kim, J.S, (2014) Highly efficient RNA-guided genome editing in human cells via delivery of purified Cas9 ribonucleoprotein. *Genome Res*. 24(6), 1012-1019.

## X Notes

1. This is a basic protocol. The reagent concentrations, conditions, and parameters may need to be optimized.
2. 1000 nM is equal to 160 ng/ul.

## XI Ordering Information

<b>Product Name</b>	<b>Cat. No.</b>
GenCrispr Cas9-C-NLS Nuclease	Z03385
GenCrispr Cas9 Nuclease	Z03386
GenCrispr Cas9-N-NLS Nuclease	Z03388
GenCrispr NLS-Cas9-NLS Nuclease	Z03389
GenCrispr NLS-Cas9-D10A Nickase	Z03390
GenCrispr NLS-Cas9-EGFP Nuclease	Z03393
GenCrispr T7 Endonuclease I	Z03396
GenCrispr Mutation Detection Kit	L00688
GenCrispr sgRNA Screening Kit	L00689
High-Efficiency gRNA-Cas9-GFP Plasmid (linear) Assembly Kit	L00690
High-Efficiency gRNA-Cas9-Puro Plasmid (linear) Assembly Kit	L00691
High-Efficiency gRNA-Cas9-GFP Plasmid Assembly Kit	L00692
High-Efficiency gRNA-Cas9-Puro Plasmid Assembly Kit	L00693

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