



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 26, 2020 – 09:30 pm BST

PDB ID : 1J2P  
Title : alpha-ring from the proteasome from archaeoglobus fulgidus  
Authors : Groll, M.; Brandstetter, H.; Bartunik, H.; Bourenkow, G.; Huber, R.  
Deposited on : 2003-01-08  
Resolution : 2.60 Å(reported)

This is a wwPDB X-ray Structure Validation Summary Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

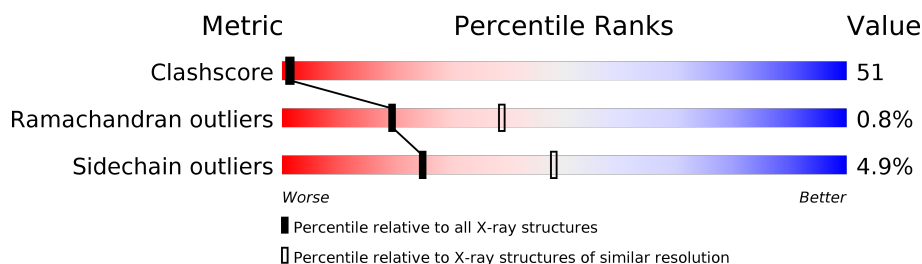
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	246	56% 39% ..
1	B	246	53% 44% ..
1	C	246	46% 51% ..
1	D	246	39% 56% ..
1	E	246	51% 45% ..
1	F	246	51% 45% ..
1	G	246	49% 47% ..

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 14081 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Proteasome alpha subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0
1	B	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0
1	C	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0
1	D	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0
1	E	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0
1	F	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0
1	G	243	Total 1917	C 1221	N 323	O 365	S 8	107	0	0

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	61	LYS	ALA	CONFLICT	UNP O29760
A	105	ILE	GLU	CONFLICT	UNP O29760
A	142	ASN	ASP	CONFLICT	UNP O29760
A	170	MET	ASN	CONFLICT	UNP O29760
B	61	LYS	ALA	CONFLICT	UNP O29760
B	105	ILE	GLU	CONFLICT	UNP O29760
B	142	ASN	ASP	CONFLICT	UNP O29760
B	170	MET	ASN	CONFLICT	UNP O29760
C	61	LYS	ALA	CONFLICT	UNP O29760
C	105	ILE	GLU	CONFLICT	UNP O29760
C	142	ASN	ASP	CONFLICT	UNP O29760
C	170	MET	ASN	CONFLICT	UNP O29760
D	61	LYS	ALA	CONFLICT	UNP O29760
D	105	ILE	GLU	CONFLICT	UNP O29760
D	142	ASN	ASP	CONFLICT	UNP O29760

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Chain	Residue	Modelled	Actual	Comment	Reference
D	170	MET	ASN	CONFLICT	UNP O29760
E	61	LYS	ALA	CONFLICT	UNP O29760
E	105	ILE	GLU	CONFLICT	UNP O29760
E	142	ASN	ASP	CONFLICT	UNP O29760
E	170	MET	ASN	CONFLICT	UNP O29760
F	61	LYS	ALA	CONFLICT	UNP O29760
F	105	ILE	GLU	CONFLICT	UNP O29760
F	142	ASN	ASP	CONFLICT	UNP O29760
F	170	MET	ASN	CONFLICT	UNP O29760
G	61	LYS	ALA	CONFLICT	UNP O29760
G	105	ILE	GLU	CONFLICT	UNP O29760
G	142	ASN	ASP	CONFLICT	UNP O29760
G	170	MET	ASN	CONFLICT	UNP O29760

- Molecule 2 is water.

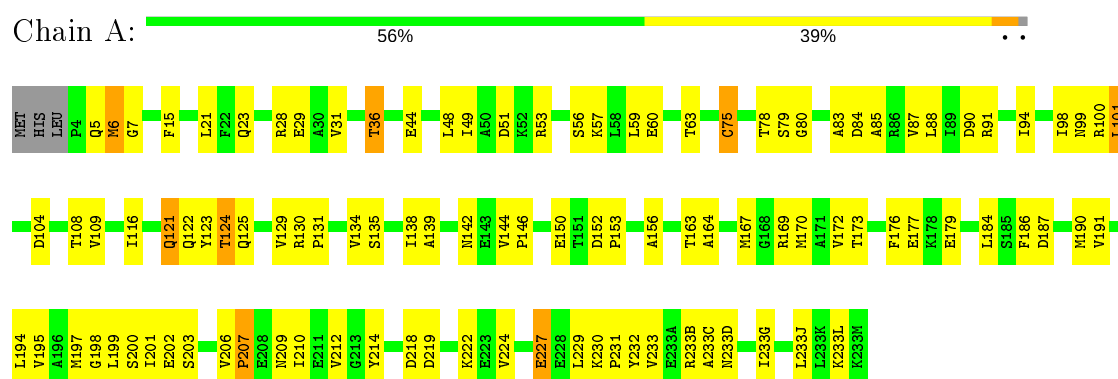
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	93	Total O 93 93	0	0
2	B	84	Total O 84 84	0	0
2	C	92	Total O 92 92	0	0
2	D	116	Total O 116 116	0	0
2	E	92	Total O 92 92	0	0
2	F	91	Total O 91 91	0	0
2	G	94	Total O 94 94	0	0

### 3 Residue-property plots

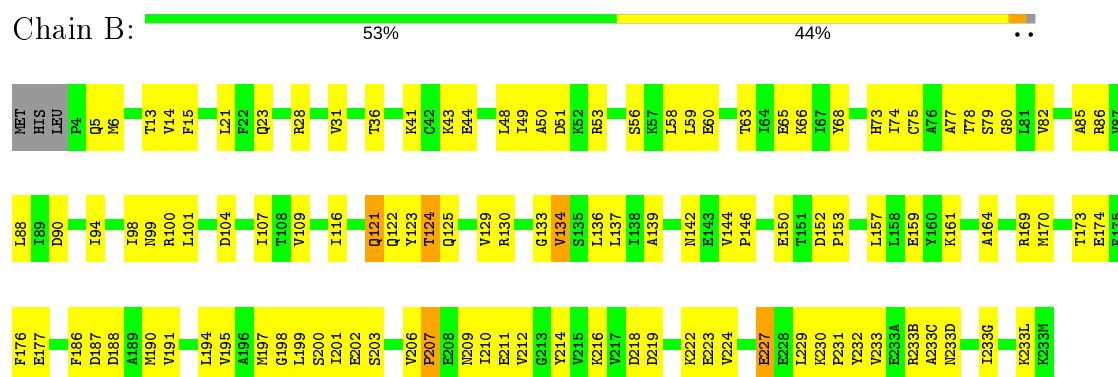
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

Note EDS was not executed.

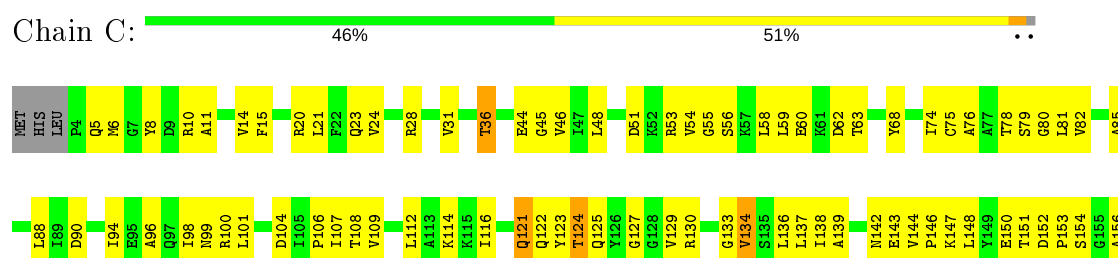
#### • Molecule 1: Proteasome alpha subunit

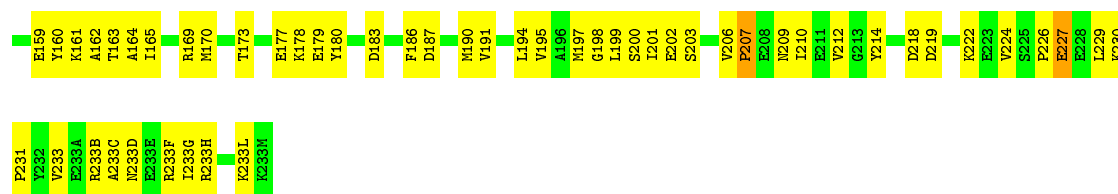


#### • Molecule 1: Proteasome alpha subunit



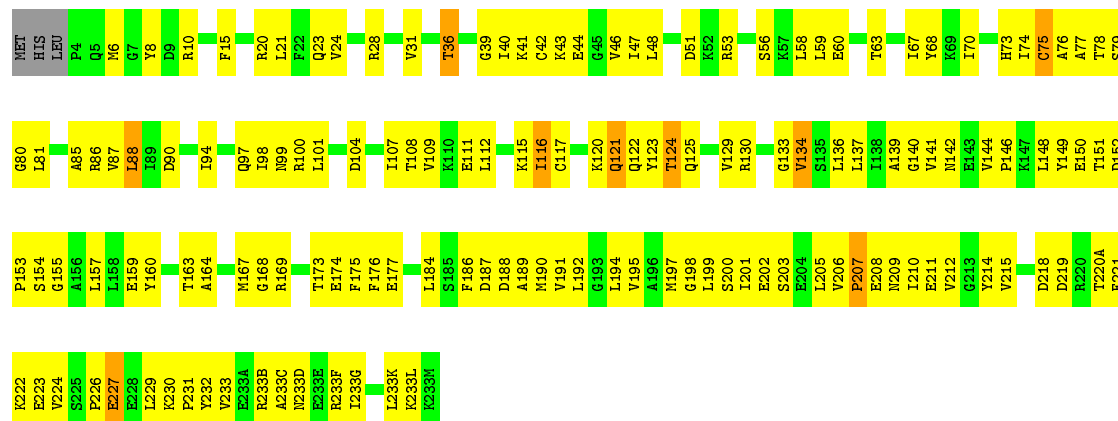
#### • Molecule 1: Proteasome alpha subunit





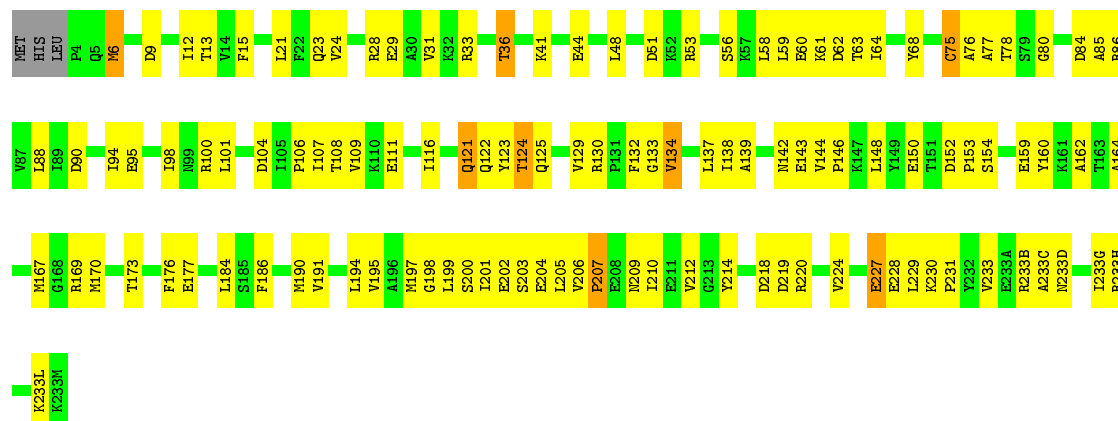
### • Molecule 1: Proteasome alpha subunit

Chain D: 39% 56%



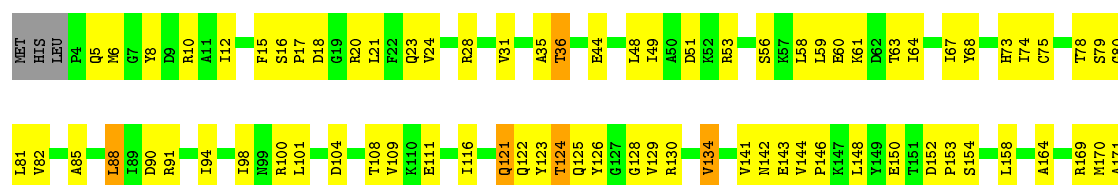
### • Molecule 1: Proteasome alpha subunit

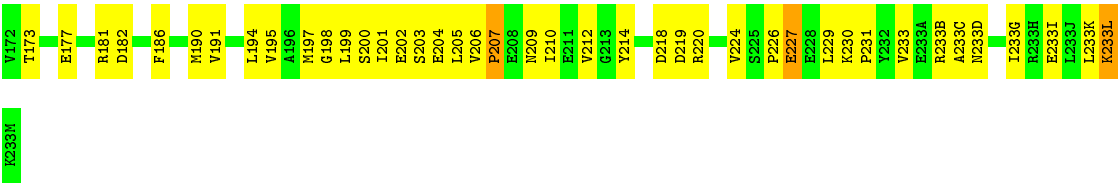
Chain E: 51% 45%



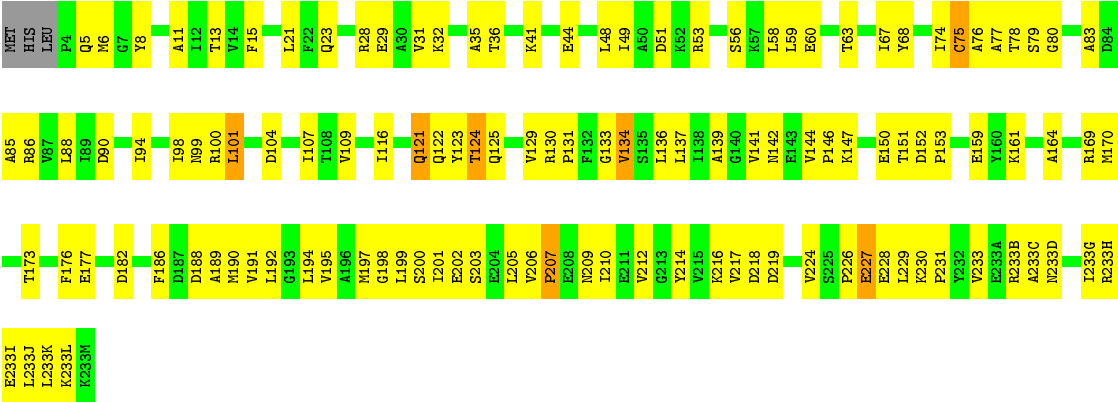
### • Molecule 1: Proteasome alpha subunit

Chain F: 51% 45%





• Molecule 1: Proteasome alpha subunit



## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	193.75Å 214.23Å 43.96Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.60	Depositor
% Data completeness (in resolution range)	97.2 (20.00-2.60)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.257 , 0.289	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	14081	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	57.0	wwPDB-VP



## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.38	1/1945 (0.1%)	0.63	0/2618
1	B	0.36	0/1945	0.63	0/2618
1	C	0.36	0/1945	0.63	0/2618
1	D	0.38	1/1945 (0.1%)	0.63	0/2618
1	E	0.38	1/1945 (0.1%)	0.63	0/2618
1	F	0.37	0/1945	0.63	0/2618
1	G	0.37	1/1945 (0.1%)	0.63	0/2618
All	All	0.37	4/13615 (0.0%)	0.63	0/18326

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	G	75	CYS	CB-SG	-6.09	1.71	1.82
1	A	75	CYS	CB-SG	-5.98	1.72	1.81
1	E	75	CYS	CB-SG	-5.68	1.72	1.81
1	D	75	CYS	CB-SG	-5.35	1.73	1.81

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1917	0	1967	147	2
1	B	1917	0	1967	180	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	1917	0	1967	211	0
1	D	1917	0	1967	291	0
1	E	1917	0	1967	161	1
1	F	1917	0	1967	200	1
1	G	1917	0	1967	163	0
2	A	93	0	0	62	1
2	B	84	0	0	99	0
2	C	92	0	0	127	1
2	D	116	0	0	207	0
2	E	92	0	0	66	0
2	F	91	0	0	108	0
2	G	94	0	0	87	0
All	All	14081	0	13769	1275	3

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 51.

The worst 5 of 1275 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:GLN:HG3	2:A:292:HOH:O	1.25	1.36
1:D:87:VAL:HA	2:D:282:HOH:O	1.21	1.34
1:D:81:LEU:HA	2:D:332:HOH:O	1.29	1.33
1:G:131:PRO:HB2	2:G:288:HOH:O	1.30	1.31
1:A:130:ARG:HA	2:G:297:HOH:O	1.29	1.29

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:177:GLU:O	1:E:233(H):ARG:NE[3_555]	2.01	0.19
1:F:233(L):LYS:NZ	2:C:283:HOH:O[4_455]	2.03	0.17
1:A:29:GLU:OE2	2:A:249:HOH:O[1_554]	2.15	0.05

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	241/246 (98%)	231 (96%)	8 (3%)	2 (1%)	19	39
1	B	241/246 (98%)	230 (95%)	9 (4%)	2 (1%)	19	39
1	C	241/246 (98%)	228 (95%)	11 (5%)	2 (1%)	19	39
1	D	241/246 (98%)	230 (95%)	9 (4%)	2 (1%)	19	39
1	E	241/246 (98%)	229 (95%)	10 (4%)	2 (1%)	19	39
1	F	241/246 (98%)	229 (95%)	10 (4%)	2 (1%)	19	39
1	G	241/246 (98%)	229 (95%)	10 (4%)	2 (1%)	19	39
All	All	1687/1722 (98%)	1606 (95%)	67 (4%)	14 (1%)	19	39

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	233(L)	LYS
1	B	233(L)	LYS
1	C	233(L)	LYS
1	D	233(L)	LYS
1	E	233(L)	LYS

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	205/208 (99%)	195 (95%)	10 (5%)	25	48
1	B	205/208 (99%)	195 (95%)	10 (5%)	25	48

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	205/208 (99%)	195 (95%)	10 (5%)	25	48
1	D	205/208 (99%)	195 (95%)	10 (5%)	25	48
1	E	205/208 (99%)	195 (95%)	10 (5%)	25	48
1	F	205/208 (99%)	195 (95%)	10 (5%)	25	48
1	G	205/208 (99%)	195 (95%)	10 (5%)	25	48
All	All	1435/1456 (99%)	1365 (95%)	70 (5%)	25	48

5 of 70 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	21	LEU
1	D	227	GLU
1	G	101	LEU
1	D	36	THR
1	D	116	ILE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 44 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	99	ASN
1	E	23	GLN
1	G	122	GLN
1	D	121	GLN
1	D	142	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry

There are no ligands in this entry.

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

EDS was not executed - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates ⓘ

EDS was not executed - this section is therefore empty.

### 6.4 Ligands ⓘ

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers ⓘ

EDS was not executed - this section is therefore empty.