



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 07:33 PM GMT

PDB ID : 1G7C  
Title : YEAST EEF1A:EEF1BA IN COMPLEX WITH GDPNP  
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Deposited on : 2000-11-10  
Resolution : 2.05 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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  
<http://wwpdb.org/validation/2016/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  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

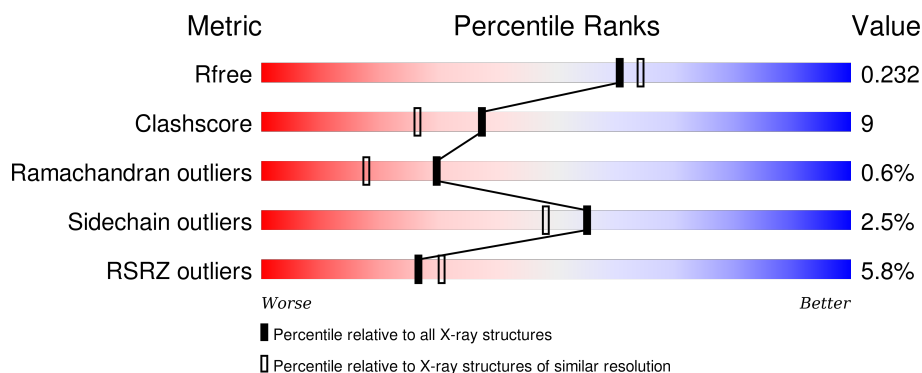
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.05 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))
$R_{free}$	91344	1192 (2.04-2.04)
Clashscore	102246	1269 (2.04-2.04)
Ramachandran outliers	100387	1258 (2.04-2.04)
Sidechain outliers	100360	1258 (2.04-2.04)
RSRZ outliers	91569	1194 (2.04-2.04)

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. 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  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	458	<div> <div>7%</div> <div> <div></div> <div>77%</div> <div>17%</div> <div>• •</div> </div> </div>
2	B	94	<div> <div>%</div> <div> <div></div> <div>82%</div> <div>13%</div> <div>• •</div> </div> </div>

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 4566 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.

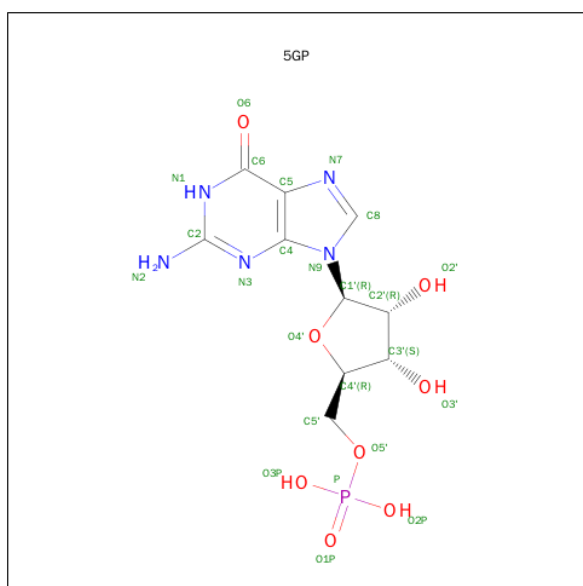
- Molecule 1 is a protein called ELONGATION FACTOR 1-ALPHA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	440	Total	C	N	O	S	0	0	0
			3391	2153	591	633	14			

- Molecule 2 is a protein called ELONGATION FACTOR 1-BETA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	90	Total	C	N	O	S	0	0	0
			703	441	112	146	4			

- Molecule 3 is GUANOSINE-5'-MONOPHOSPHATE (three-letter code: 5GP) (formula:  $C_{10}H_{14}N_5O_8P$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total	C	N	O	P	0	0
			24	10	5	8	1		

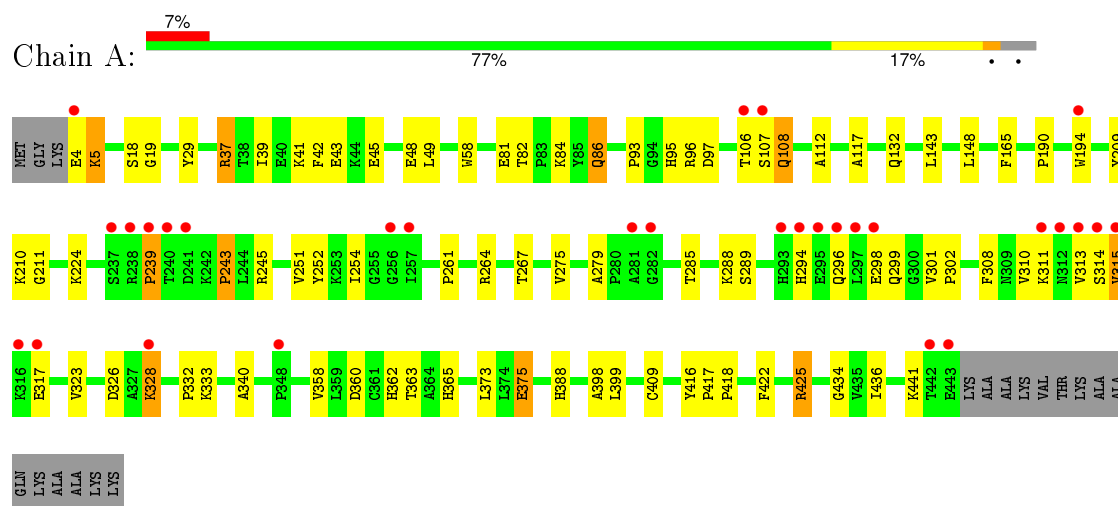
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	355	Total 355	O 355	0	0
4	B	93	Total 93	O 93	0	0

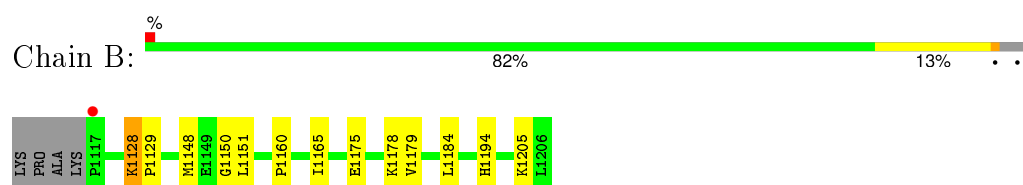
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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.

#### • Molecule 1: ELONGATION FACTOR 1-ALPHA



#### • Molecule 2: ELONGATION FACTOR 1-BETA



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	63.64Å 90.43Å 92.41Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.05 19.88 – 2.02	Depositor EDS
% Data completeness (in resolution range)	(Not available) (20.00-2.05) 97.7 (19.88-2.02)	Depositor EDS
$R_{merge}$	0.06	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	0.00 (at 2.02Å)	Xtriage
Refinement program	CNS 1.0	Depositor
R, $R_{free}$	0.208 , 0.231 0.207 , 0.232	Depositor DCC
$R_{free}$ test set	1801 reflections (5.40%)	DCC
Wilson B-factor (Å <sup>2</sup> )	19.2	Xtriage
Anisotropy	0.574	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 45.1	EDS
Estimated twinning fraction	0.035 for -h,l,k	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.45$ , $\langle L^2 \rangle = 0.27$	Xtriage
Outliers	0 of 34918 reflections	Xtriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	4566	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.96% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

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

Bond lengths and bond angles in the following residue types are not validated in this section: 5GP

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	0.37	0/3461	0.70	1/4680 (0.0%)
2	B	0.36	0/713	0.66	0/964
All	All	0.37	0/4174	0.69	1/5644 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	86	GLN	N-CA-C	-5.65	95.75	111.00

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	3391	0	3437	68	0
2	B	703	0	688	14	0
3	A	24	0	12	1	0
4	A	355	0	0	5	0
4	B	93	0	0	4	0
All	All	4566	0	4137	77	0

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 9.

All (77) 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:279:ALA:HB3	4:A:854:HOH:O	1.67	0.95
1:A:5:LYS:HE2	1:A:81:GLU:OE1	1.67	0.95
1:A:425:ARG:HH11	1:A:425:ARG:CG	1.82	0.92
2:B:1148:MET:HE2	2:B:1151:LEU:HD22	1.54	0.89
1:A:323:VAL:HB	4:A:854:HOH:O	1.72	0.89
1:A:425:ARG:HH11	1:A:425:ARG:HG3	1.38	0.88
1:A:37:ARG:HG2	1:A:37:ARG:HH11	1.39	0.86
1:A:37:ARG:HG2	1:A:37:ARG:NH1	1.92	0.84
1:A:19:GLY:HA2	3:A:507:5GP:O5'	1.78	0.82
2:B:1179:VAL:HG23	4:B:448:HOH:O	1.82	0.80
2:B:1175:GLU:HB2	4:B:448:HOH:O	1.85	0.77
1:A:95:HIS:HD2	1:A:97:ASP:H	1.32	0.76
1:A:37:ARG:CG	1:A:37:ARG:HH11	1.98	0.74
1:A:294:HIS:CE1	2:B:1160:PRO:HG2	2.26	0.70
2:B:1148:MET:CE	2:B:1151:LEU:HD22	2.21	0.70
1:A:417:PRO:HB2	1:A:418:PRO:HD3	1.73	0.69
1:A:332:PRO:HB2	4:A:854:HOH:O	1.93	0.68
1:A:106:THR:HB	1:A:264:ARG:NH1	2.09	0.67
2:B:1178:LYS:HB2	4:B:448:HOH:O	1.94	0.67
1:A:333:LYS:HE3	1:A:441:LYS:HD3	1.77	0.67
1:A:362:HIS:CD2	1:A:363:THR:H	2.14	0.65
1:A:375:GLU:HG3	1:A:399:LEU:HB3	1.82	0.62
1:A:425:ARG:NH1	1:A:425:ARG:HG3	2.13	0.60
1:A:107:SER:H	1:A:264:ARG:HH12	1.47	0.60
1:A:326:ASP:OD1	1:A:328:LYS:HG2	2.02	0.59
1:A:251:VAL:HG12	1:A:315:VAL:HG12	1.85	0.57
1:A:96:ARG:NH1	1:A:132:GLN:OE1	2.38	0.56
1:A:5:LYS:HB3	1:A:86:GLN:HG3	1.89	0.55
1:A:298:GLU:HG3	1:A:299:GLN:HG2	1.88	0.55
1:A:261:PRO:HD2	1:A:308:PHE:O	2.07	0.54
1:A:245:ARG:HB2	1:A:267:THR:OG1	2.07	0.54
1:A:425:ARG:HG2	1:A:425:ARG:HH11	1.67	0.54
1:A:314:SER:O	1:A:317:GLU:HG2	2.07	0.53
2:B:1150:GLY:HA3	4:B:448:HOH:O	2.08	0.53
1:A:108:GLN:OE1	1:A:143:LEU:HD13	2.07	0.53
1:A:275:VAL:HB	1:A:328:LYS:HE3	1.89	0.53
1:A:243:PRO:HB2	1:A:416:TYR:OH	2.09	0.53
1:A:4:GLU:O	1:A:5:LYS:C	2.48	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:5:LYS:HE3	1:A:82:THR:O	2.10	0.52
1:A:340:ALA:HB2	1:A:436:ILE:HA	1.91	0.52
1:A:328:LYS:HD2	4:A:619:HOH:O	2.09	0.52
1:A:362:HIS:HD2	1:A:363:THR:H	1.59	0.51
1:A:362:HIS:HE1	1:A:409:CYS:O	1.95	0.50
1:A:422:PHE:CZ	1:A:434:GLY:HA3	2.46	0.49
1:A:41:LYS:HE2	1:A:42:PHE:CE1	2.47	0.49
1:A:425:ARG:HD2	4:A:696:HOH:O	2.11	0.48
1:A:285:THR:HG21	1:A:310:VAL:HB	1.96	0.48
1:A:107:SER:H	1:A:264:ARG:NH1	2.11	0.47
1:A:95:HIS:HE1	2:B:1179:VAL:O	1.98	0.47
1:A:49:LEU:HD11	1:A:58:TRP:CE2	2.50	0.46
1:A:362:HIS:CD2	1:A:363:THR:N	2.82	0.46
1:A:360:ASP:OD1	1:A:365:HIS:HD2	1.97	0.46
1:A:18:SER:HA	1:A:117:ALA:HB2	1.97	0.46
1:A:108:GLN:OE1	1:A:143:LEU:HB3	2.15	0.46
1:A:252:TYR:CG	2:B:1165:ILE:HD13	2.51	0.46
1:A:373:LEU:O	1:A:388:HIS:HA	2.15	0.45
1:A:288:LYS:HE3	1:A:311:LYS:HG3	1.98	0.45
1:A:45:GLU:O	1:A:48:GLU:HG2	2.16	0.45
1:A:95:HIS:CD2	1:A:97:ASP:H	2.23	0.44
1:A:358:VAL:HG11	1:A:365:HIS:NE2	2.33	0.44
1:A:39:ILE:O	1:A:43:GLU:HG3	2.17	0.44
1:A:93:PRO:HA	2:B:1205:LYS:HB2	1.99	0.44
1:A:375:GLU:O	1:A:398:ALA:HB1	2.17	0.43
1:A:254:ILE:HD11	2:B:1165:ILE:HD11	1.99	0.43
1:A:210:LYS:O	1:A:224:LYS:NZ	2.45	0.42
2:B:1128:LYS:N	2:B:1128:LYS:HD3	2.33	0.42
2:B:1148:MET:CE	2:B:1184:LEU:HD13	2.49	0.42
1:A:106:THR:CG2	1:A:264:ARG:HD2	2.49	0.42
1:A:289:SER:HB2	1:A:296:GLN:HE21	1.83	0.42
1:A:37:ARG:HD3	1:A:37:ARG:HA	1.72	0.42
2:B:1129:PRO:HA	2:B:1194:HIS:O	2.20	0.42
1:A:425:ARG:NH1	1:A:425:ARG:CG	2.53	0.41
1:A:112:ALA:O	1:A:148:LEU:HD12	2.21	0.41
1:A:84:LYS:HB3	1:A:84:LYS:HE2	1.96	0.41
1:A:209:TYR:CZ	1:A:211:GLY:HA2	2.57	0.41
1:A:301:VAL:HB	1:A:302:PRO:HD2	2.03	0.40
1:A:165:PHE:CE1	1:A:190:PRO:HB3	2.56	0.40

There are no symmetry-related clashes.

## 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	438/458 (96%)	420 (96%)	15 (3%)	3 (1%)	26	15
2	B	88/94 (94%)	86 (98%)	2 (2%)	0	100	100
All	All	526/552 (95%)	506 (96%)	17 (3%)	3 (1%)	30	18

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	5	LYS
1	A	313	VAL
1	A	239	PRO

### 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	368/379 (97%)	358 (97%)	10 (3%)	52	45
2	B	79/82 (96%)	78 (99%)	1 (1%)	76	74
All	All	447/461 (97%)	436 (98%)	11 (2%)	55	48

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	29	TYR
1	A	37	ARG
1	A	108	GLN

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Mol	Chain	Res	Type
1	A	194	TRP
1	A	239	PRO
1	A	243	PRO
1	A	315	VAL
1	A	328	LYS
1	A	375	GLU
1	A	425	ARG
2	B	1128	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	26	HIS
1	A	95	HIS
1	A	235	GLN
1	A	294	HIS
1	A	296	GLN
1	A	362	HIS
1	A	365	HIS
1	A	377	ASN
2	B	1142	ASN
2	B	1156	HIS
2	B	1157	GLN

### 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 ⓘ

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
3	5GP	A	507	-	21,26,26	1.55	3 (14%)	25,40,40	3.18	10 (40%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	5GP	A	507	-	-	0/6/26/26	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	507	5GP	O5'-C5'	-3.90	1.28	1.44
3	A	507	5GP	C2-N1	2.74	1.40	1.35
3	A	507	5GP	C6-N1	3.61	1.39	1.33

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	507	5GP	C5-C6-N1	-7.04	113.96	123.59
3	A	507	5GP	C5'-C4'-C3'	-4.62	96.87	115.21
3	A	507	5GP	N3-C2-N1	-3.51	122.09	127.44
3	A	507	5GP	C6-C5-C4	-2.60	117.80	120.90
3	A	507	5GP	O3P-P-O5'	-2.06	100.64	106.56
3	A	507	5GP	O3P-P-O2P	2.24	115.92	107.38
3	A	507	5GP	O4'-C4'-C3'	2.63	110.45	105.15
3	A	507	5GP	O3'-C3'-C2'	2.64	120.40	111.83
3	A	507	5GP	C6-N1-C2	6.30	124.68	115.94
3	A	507	5GP	O5'-C5'-C4'	8.75	141.37	109.12

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	507	5GP	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	440/458 (96%)	0.37	30 (6%) 20 23	10, 19, 38, 49	0
2	B	90/94 (95%)	0.06	1 (1%) 82 86	12, 18, 28, 33	0
All	All	530/552 (96%)	0.32	31 (5%) 26 30	10, 19, 37, 49	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	294	HIS	7.3
1	A	239	PRO	6.4
1	A	106	THR	6.3
1	A	443	GLU	6.0
1	A	348	PRO	5.5
1	A	4	GLU	5.3
1	A	313	VAL	5.2
1	A	293	HIS	4.7
1	A	282	GLY	4.6
1	A	314	SER	4.4
1	A	295	GLU	4.3
1	A	107	SER	4.2
1	A	315	VAL	4.0
1	A	312	ASN	3.8
1	A	442	THR	3.5
1	A	194	TRP	3.2
1	A	328	LYS	3.2
1	A	296	GLN	3.1
1	A	237	SER	3.1
1	A	256	GLY	3.1
1	A	257	ILE	3.1
1	A	316	LYS	3.0
1	A	297	LEU	3.0
2	B	1117	PRO	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	241	ASP	2.9
1	A	238	ARG	2.8
1	A	240	THR	2.7
1	A	281	ALA	2.3
1	A	311	LYS	2.2
1	A	298	GLU	2.1
1	A	317	GLU	2.1

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

## 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
3	5GP	A	507	24/24	0.91	0.15	0.62	19,27,37,37	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.