



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 15, 2024 – 07:00 PM EDT

PDB ID : 8T6E
Title : Crystal structure of T33-28.3: Deep-learning sequence design of co-assembling tetrahedron protein nanoparticles
Authors : Bera, A.K.; de Haas, R.J.; Kang, A.; Sankaran, B.; King, N.P.
Deposited on : 2023-06-15
Resolution : 2.48 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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.36.1
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36.1

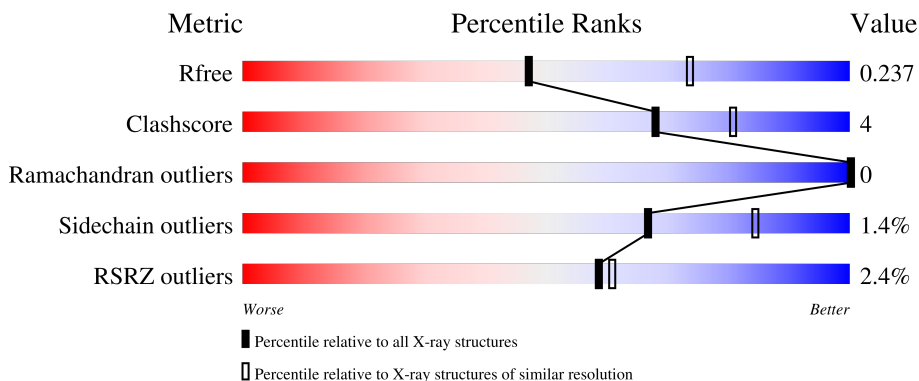
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION


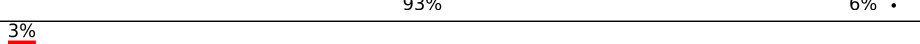


The reported resolution of this entry is 2.48 Å.

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.





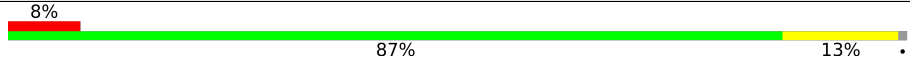
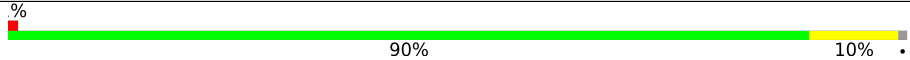
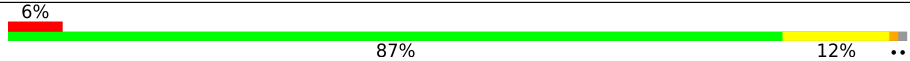
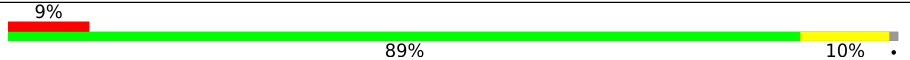
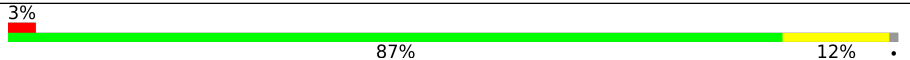
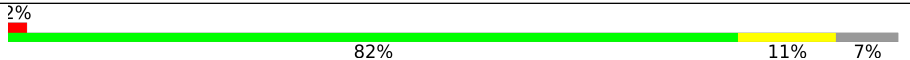
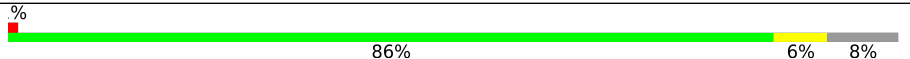
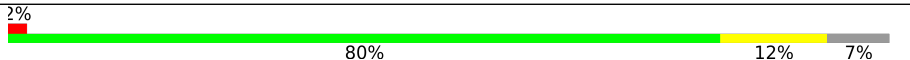


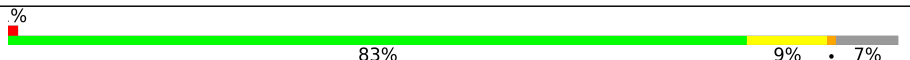
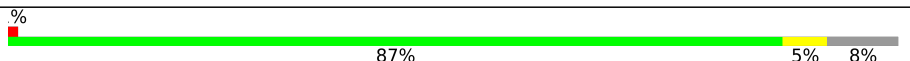
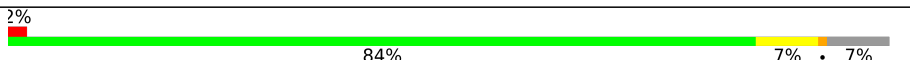
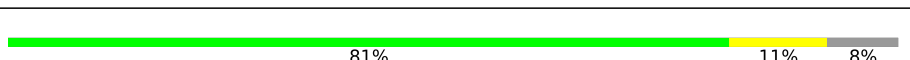
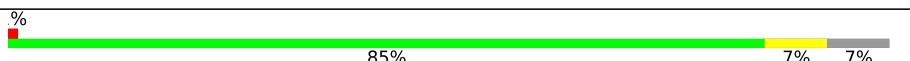
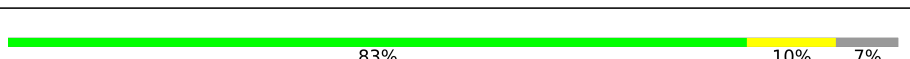
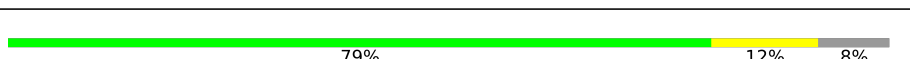
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	5857 (2.50-2.46)
Clashscore	141614	6594 (2.50-2.46)
Ramachandran outliers	138981	6469 (2.50-2.46)
Sidechain outliers	138945	6471 (2.50-2.46)
RSRZ outliers	127900	5738 (2.50-2.46)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 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 $\leq 5\%$. 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	157	 89% 10% ..
1	C	157	 2% 93% 6% .
1	E	157	 3% 83% 15% ..
1	G	157	 % 86% 13% .
1	I	157	 89% 10% ..

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Mol	Chain	Length	Quality of chain
1	K	157	 % 90% 9% ..
1	M	157	 4% 82% 18% .
1	O	157	 8% 87% 13% .
1	Q	157	 % 90% 10% .
1	S	157	 6% 87% 12% ..
1	U	157	 9% 89% 10% .
1	W	157	 3% 87% 12% .
2	B	121	 2% 82% 11% 7%
2	D	121	 % 86% 6% 8%
2	F	121	 2% 80% 12% 7%
2	H	121	 % 87% 5% 8%
2	J	121	 5% 79% 13% . 7%
2	L	121	 % 83% 9% . 7%
2	N	121	 % 87% 5% 8%
2	P	121	 2% 84% 7% . 7%
2	R	121	 % 81% 11% 8%
2	T	121	 % 85% 7% 7%
2	V	121	 % 83% 10% 7%
2	X	121	 % 79% 12% 8%

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 25788 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 T33-28.3: A.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	156	1233	772	214	241	6	0	0	0
1	C	156	1244	778	218	242	6	0	1	0
1	E	156	1233	772	214	241	6	0	0	0
1	G	156	1233	772	214	241	6	0	0	0
1	I	156	1233	772	214	241	6	0	0	0
1	K	156	1233	772	214	241	6	0	0	0
1	M	156	1233	772	214	241	6	0	0	0
1	O	156	1233	772	214	241	6	0	0	0
1	Q	156	1233	772	214	241	6	0	0	0
1	S	156	1233	772	214	241	6	0	0	0
1	U	156	1233	772	214	241	6	0	0	0
1	W	156	1233	772	214	241	6	0	0	0

- Molecule 2 is a protein called T33-28.3: B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	112	869	561	142	159	7	0	0	0
2	D	111	861	555	141	158	7	0	0	0

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	F	112	Total	C	N	O	S	0	0	0
			869	561	142	159	7			
2	H	111	Total	C	N	O	S	0	0	0
			861	555	141	158	7			
2	J	112	Total	C	N	O	S	0	0	0
			869	561	142	159	7			
2	L	112	Total	C	N	O	S	0	0	0
			869	561	142	159	7			
2	N	111	Total	C	N	O	S	0	0	0
			861	555	141	158	7			
2	P	112	Total	C	N	O	S	0	0	0
			869	561	142	159	7			
2	R	111	Total	C	N	O	S	0	0	0
			861	555	141	158	7			
2	T	112	Total	C	N	O	S	0	0	0
			869	561	142	159	7			
2	V	112	Total	C	N	O	S	0	0	0
			869	561	142	159	7			
2	X	111	Total	C	N	O	S	0	0	0
			861	555	141	158	7			

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	62	Total	O	0	0
			62	62		
3	B	20	Total	O	0	0
			20	20		
3	C	46	Total	O	0	0
			46	46		
3	D	15	Total	O	0	0
			15	15		
3	E	30	Total	O	0	0
			30	30		
3	F	14	Total	O	0	0
			14	14		
3	G	31	Total	O	0	0
			31	31		
3	H	13	Total	O	0	0
			13	13		
3	I	29	Total	O	0	0
			29	29		

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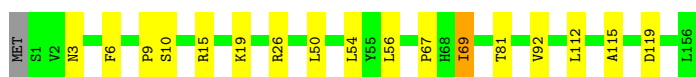
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	J	10	Total O 10 10	0	0
3	K	39	Total O 39 39	0	0
3	L	22	Total O 22 22	0	0
3	M	47	Total O 47 47	0	0
3	N	16	Total O 16 16	0	0
3	O	28	Total O 28 28	0	0
3	P	11	Total O 11 11	0	0
3	Q	35	Total O 35 35	0	0
3	R	17	Total O 17 17	0	0
3	S	21	Total O 21 21	0	0
3	T	10	Total O 10 10	0	0
3	U	16	Total O 16 16	0	0
3	V	17	Total O 17 17	0	0
3	W	25	Total O 25 25	0	0
3	X	19	Total O 19 19	0	0

3 Residue-property plots [i](#)

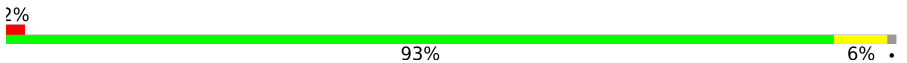
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: T33-28.3: A

Chain A:  89% 10% ..




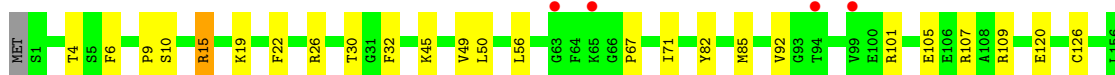
- Molecule 1: T33-28.3: A

Chain C:  2% 93% 6% ..




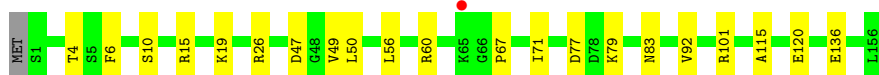
- Molecule 1: T33-28.3: A

Chain E:  3% 83% 15% ..




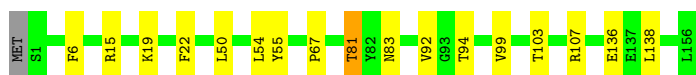
- Molecule 1: T33-28.3: A

Chain G:  % 86% 13% ..




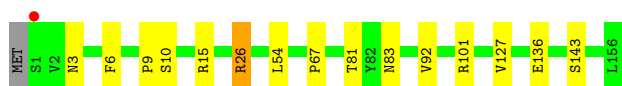
- Molecule 1: T33-28.3: A

Chain I:  89% 10% ..

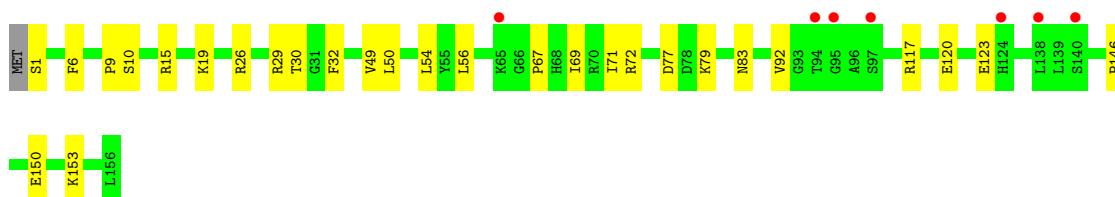
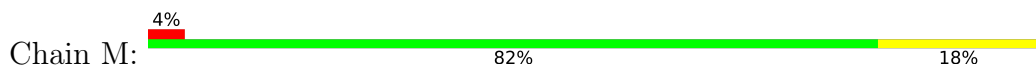


- Molecule 1: T33-28.3: A

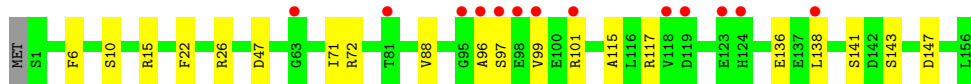
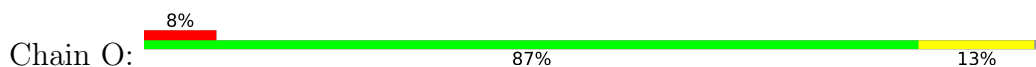
Chain K:  % 90% 9% ..



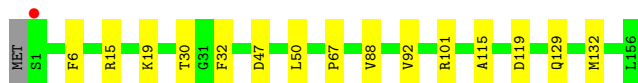
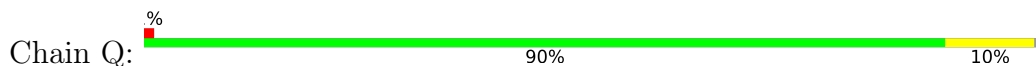
- Molecule 1: T33-28.3: A



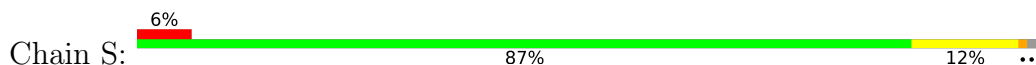
- Molecule 1: T33-28.3: A



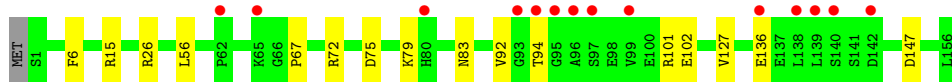
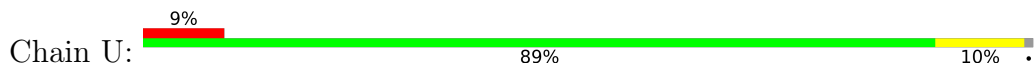
- Molecule 1: T33-28.3: A



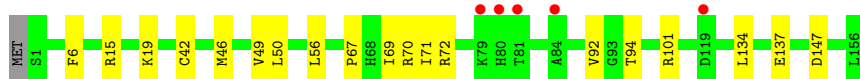
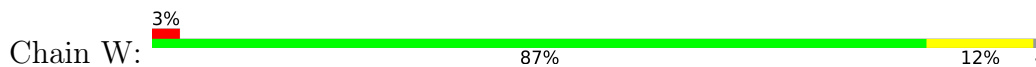
- Molecule 1: T33-28.3: A



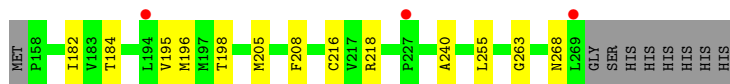
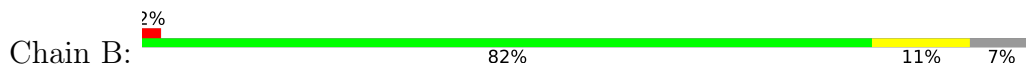
- Molecule 1: T33-28.3: A



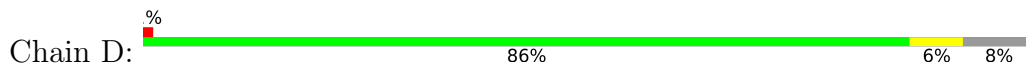
- Molecule 1: T33-28.3: A



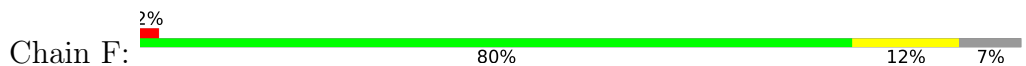
- Molecule 2: T33-28.3: B



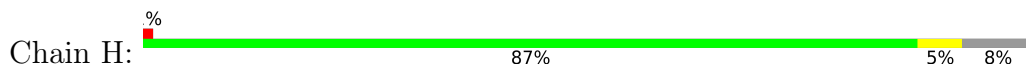
- Molecule 2: T33-28.3: B



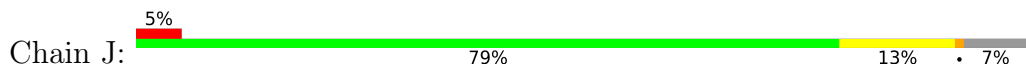
- Molecule 2: T33-28.3: B



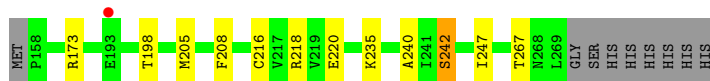
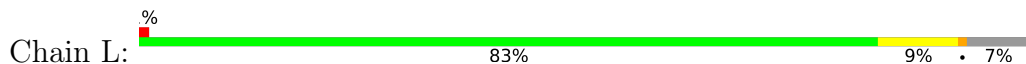
- Molecule 2: T33-28.3: B



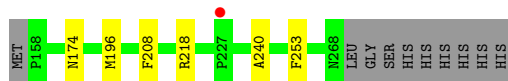
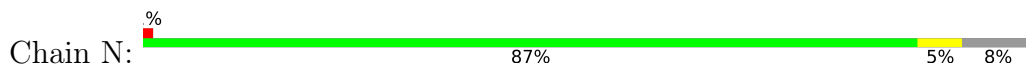
- Molecule 2: T33-28.3: B



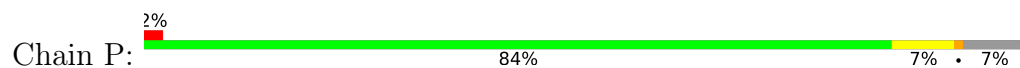
- Molecule 2: T33-28.3: B



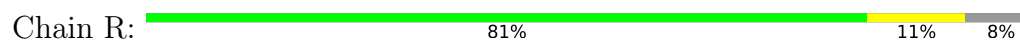
- Molecule 2: T33-28.3: B



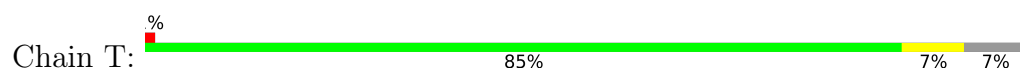
- Molecule 2: T33-28.3: B



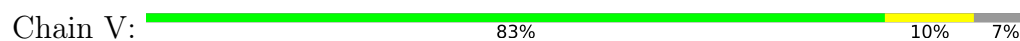
- Molecule 2: T33-28.3: B



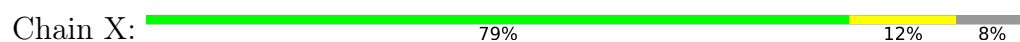
- Molecule 2: T33-28.3: B



- Molecule 2: T33-28.3: B



- Molecule 2: T33-28.3: B



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	113.74Å 114.05Å 114.20Å 62.09° 77.86° 89.41°	Depositor
Resolution (Å)	48.47 – 2.48 48.47 – 2.48	Depositor EDS
% Data completeness (in resolution range)	98.0 (48.47-2.48) 97.9 (48.47-2.48)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.19 (at 2.48Å)	Xtrriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.205 , 0.240 0.203 , 0.237	Depositor DCC
R_{free} test set	1993 reflections (1.16%)	wwPDB-VP
Wilson B-factor (Å ²)	50.8	Xtrriage
Anisotropy	0.137	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 39.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.004 for -h,k,k-l	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	25788	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.51% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

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	0.25	0/1255	0.49	0/1692
1	C	0.24	0/1266	0.50	0/1706
1	E	0.25	0/1255	0.50	0/1692
1	G	0.25	0/1255	0.51	0/1692
1	I	0.24	0/1255	0.51	0/1692
1	K	0.25	0/1255	0.49	0/1692
1	M	0.25	0/1255	0.49	0/1692
1	O	0.24	0/1255	0.50	0/1692
1	Q	0.24	0/1255	0.50	0/1692
1	S	0.24	0/1255	0.49	0/1692
1	U	0.24	0/1255	0.49	0/1692
1	W	0.25	0/1255	0.50	0/1692
2	B	0.25	0/892	0.45	0/1216
2	D	0.25	0/884	0.45	0/1205
2	F	0.24	0/892	0.44	0/1216
2	H	0.24	0/884	0.45	0/1205
2	J	0.25	0/892	0.46	0/1216
2	L	0.25	0/892	0.45	0/1216
2	N	0.25	0/884	0.45	0/1205
2	P	0.24	0/892	0.45	0/1216
2	R	0.24	0/884	0.46	0/1205
2	T	0.24	0/892	0.45	0/1216
2	V	0.24	0/892	0.46	0/1216
2	X	0.24	0/884	0.45	0/1205
All	All	0.24	0/25735	0.48	0/34855

There are no bond length outliers.

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	1233	0	1208	10	0
1	C	1244	0	1220	7	0
1	E	1233	0	1208	18	0
1	G	1233	0	1208	14	0
1	I	1233	0	1208	14	0
1	K	1233	0	1208	12	0
1	M	1233	0	1208	19	0
1	O	1233	0	1208	13	0
1	Q	1233	0	1208	10	0
1	S	1233	0	1208	14	0
1	U	1233	0	1208	11	0
1	W	1233	0	1208	12	0
2	B	869	0	868	10	0
2	D	861	0	857	5	0
2	F	869	0	868	10	0
2	H	861	0	857	4	0
2	J	869	0	868	12	0
2	L	869	0	868	8	0
2	N	861	0	857	5	0
2	P	869	0	868	7	0
2	R	861	0	857	10	0
2	T	869	0	868	8	0
2	V	869	0	868	8	0
2	X	861	0	857	11	0
3	A	62	0	0	0	0
3	B	20	0	0	0	0
3	C	46	0	0	0	0
3	D	15	0	0	0	0
3	E	30	0	0	2	0
3	F	14	0	0	1	0
3	G	31	0	0	1	0
3	H	13	0	0	0	0
3	I	29	0	0	1	0
3	J	10	0	0	0	0
3	K	39	0	0	1	0
3	L	22	0	0	1	0
3	M	47	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	N	16	0	0	0	0
3	O	28	0	0	1	0
3	P	11	0	0	0	0
3	Q	35	0	0	0	0
3	R	17	0	0	0	0
3	S	21	0	0	1	0
3	T	10	0	0	0	0
3	U	16	0	0	0	0
3	V	17	0	0	0	0
3	W	25	0	0	1	0
3	X	19	0	0	1	0
All	All	25788	0	24869	192	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 4.

All (192) 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:U:56:LEU:HD23	1:U:67:PRO:HG2	1.64	0.79
1:M:56:LEU:HD13	1:M:67:PRO:HG2	1.67	0.77
1:G:92:VAL:HG21	1:G:101:ARG:HG3	1.73	0.71
1:S:19:LYS:NZ	1:S:47:ASP:OD1	2.23	0.70
1:Q:19:LYS:NZ	1:Q:47:ASP:OD1	2.28	0.66
2:J:220:GLU:OE1	2:P:218:ARG:NH1	2.29	0.65
1:I:99:VAL:O	1:I:103:THR:OG1	2.14	0.65
1:S:101:ARG:NE	1:S:136:GLU:OE2	2.30	0.64
1:G:101:ARG:NH1	1:G:136:GLU:OE2	2.31	0.63
2:J:193:GLU:HG2	2:J:194:LEU:HD22	1.81	0.62
1:E:56:LEU:HD13	1:E:67:PRO:HG2	1.80	0.62
2:J:198:THR:HG22	2:P:205:MET:HG2	1.82	0.61
2:D:158:PRO:HD3	2:D:190:LYS:HD3	1.83	0.61
1:U:83:ASN:HD22	1:U:127:VAL:HB	1.66	0.61
2:B:198:THR:HG22	2:R:205:MET:HG2	1.82	0.60
2:R:198:THR:HG22	2:X:205:MET:HG2	1.82	0.60
1:M:67:PRO:HB3	1:M:92:VAL:HG12	1.83	0.60
2:L:173:ARG:NH2	3:L:301:HOH:O	2.34	0.59
1:C:69:ILE:HD11	1:C:112:LEU:HD11	1.83	0.59
2:B:263:GLY:HA2	2:B:268:ASN:HA	1.85	0.59
1:K:101:ARG:NH2	1:K:136:GLU:OE2	2.36	0.58
1:S:101:ARG:HD3	1:S:134:LEU:HD21	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:205:MET:HG2	2:P:198:THR:HG22	1.86	0.58
2:V:264:TRP:HE3	2:V:269:LEU:HD21	1.69	0.58
1:M:54:LEU:HD13	2:N:240:ALA:HA	1.86	0.58
1:A:56:LEU:HD13	1:A:67:PRO:HG2	1.85	0.57
1:A:67:PRO:HB3	1:A:92:VAL:HG12	1.87	0.56
2:D:220:GLU:OE1	2:V:218:ARG:NH2	2.38	0.56
1:Q:92:VAL:HG21	1:Q:101:ARG:HG2	1.86	0.56
1:W:56:LEU:HD13	1:W:67:PRO:HG2	1.86	0.56
1:G:56:LEU:HD13	1:G:67:PRO:HG2	1.87	0.56
1:O:138:LEU:HD23	1:O:141:SER:HB2	1.88	0.56
2:R:177:THR:HA	2:R:197:MET:HE1	1.87	0.56
2:N:218:ARG:NH2	2:T:220:GLU:OE1	2.29	0.56
2:R:220:GLU:OE2	2:X:218:ARG:NH2	2.31	0.55
1:I:94:THR:HA	1:I:136:GLU:HG2	1.88	0.55
1:M:49:VAL:HG13	1:M:69:ILE:HG22	1.89	0.55
1:M:1:SER:N	3:M:203:HOH:O	2.37	0.54
1:A:19:LYS:HB3	1:A:50:LEU:HD11	1.88	0.54
1:I:94:THR:HG21	1:I:138:LEU:HD23	1.90	0.54
1:Q:119:ASP:OD1	1:Q:129:GLN:NE2	2.39	0.54
1:G:60:ARG:NH1	2:H:243:TYR:O	2.41	0.54
1:I:19:LYS:HB3	1:I:50:LEU:HD11	1.89	0.54
1:E:19:LYS:HB3	1:E:50:LEU:HD11	1.90	0.53
2:F:158:PRO:HD3	2:F:190:LYS:HE3	1.89	0.53
1:W:49:VAL:HG13	1:W:69:ILE:HG22	1.88	0.53
1:K:67:PRO:HB3	1:K:92:VAL:HG12	1.90	0.53
1:E:15:ARG:HG2	1:E:22:PHE:HD2	1.72	0.53
1:G:79:LYS:HE3	1:K:143:SER:HB3	1.89	0.53
1:Q:115:ALA:HB2	2:R:182:ILE:HD11	1.92	0.52
1:A:115:ALA:HB2	2:B:182:ILE:HD11	1.91	0.52
1:O:72:ARG:NH1	1:O:147:ASP:OD1	2.36	0.52
2:F:198:THR:HG22	2:J:205:MET:HG2	1.92	0.51
1:W:67:PRO:HB3	1:W:92:VAL:HG12	1.93	0.51
2:D:205:MET:HG2	2:L:198:THR:HG22	1.93	0.51
1:O:71:ILE:HA	1:O:88:VAL:HG12	1.91	0.51
1:O:115:ALA:HB2	2:P:182:ILE:HD11	1.91	0.51
2:D:218:ARG:NH2	2:L:220:GLU:OE1	2.39	0.51
2:F:268:ASN:HB2	2:J:231:GLU:HG2	1.93	0.51
1:M:6:PHE:CZ	1:O:15:ARG:HG2	2.46	0.51
1:A:54:LEU:HD13	2:B:240:ALA:HA	1.92	0.51
1:C:101:ARG:HD3	1:C:134:LEU:HD21	1.93	0.51
1:U:92:VAL:HG21	1:U:101:ARG:HG2	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:M:150:GLU:HA	1:M:153:LYS:HD2	1.93	0.50
2:R:177:THR:HA	2:R:197:MET:CE	2.41	0.50
2:V:179:VAL:HG11	2:V:240:ALA:HB2	1.93	0.50
1:S:54:LEU:HD13	2:T:240:ALA:HA	1.92	0.50
1:I:55:TYR:HE2	1:I:107:ARG:HG2	1.75	0.50
2:D:198:THR:HG22	2:V:205:MET:HG2	1.94	0.50
2:H:268:ASN:N	2:T:231:GLU:OE2	2.44	0.50
2:B:218:ARG:NH1	2:X:220:GLU:OE1	2.43	0.50
2:F:218:ARG:NH1	2:P:220:GLU:OE1	2.45	0.50
2:F:220:GLU:HG2	2:F:257:PHE:HB2	1.93	0.49
1:G:115:ALA:HB2	2:H:182:ILE:HD11	1.94	0.49
1:A:15:ARG:HG2	1:C:6:PHE:CZ	2.47	0.49
2:F:222:LEU:HD22	2:F:262:CYS:HB3	1.92	0.49
2:R:184:THR:HA	2:R:188:LEU:HD12	1.94	0.49
1:W:42:CYS:O	1:W:46:MET:HG3	2.13	0.49
2:L:242:SER:OG	2:L:247:ILE:O	2.29	0.49
2:B:196:MET:SD	2:R:216:CYS:HB2	2.53	0.48
1:K:54:LEU:HD13	2:L:240:ALA:HA	1.94	0.48
1:G:4:THR:OG1	1:K:3:ASN:ND2	2.46	0.48
2:J:179:VAL:HG11	2:J:240:ALA:HB2	1.94	0.48
1:G:6:PHE:CZ	1:K:15:ARG:HG2	2.49	0.48
2:L:205:MET:HG2	2:V:198:THR:HG22	1.95	0.48
1:Q:67:PRO:HB3	1:Q:92:VAL:HG12	1.95	0.48
1:M:77:ASP:HB3	1:M:83:ASN:HB2	1.95	0.47
1:C:15:ARG:HG2	1:E:6:PHE:CZ	2.49	0.47
1:S:1:SER:OG	1:S:2:VAL:N	2.46	0.47
1:M:10:SER:O	1:M:26:ARG:HA	2.12	0.47
1:O:117:ARG:NH1	3:O:202:HOH:O	2.33	0.47
1:E:45:LYS:NZ	3:E:201:HOH:O	2.39	0.47
1:K:81:THR:HG23	1:K:83:ASN:HD21	1.79	0.47
1:G:15:ARG:HG2	1:I:6:PHE:CZ	2.50	0.47
1:U:67:PRO:HB3	1:U:92:VAL:HG12	1.98	0.46
1:W:101:ARG:NH1	3:W:202:HOH:O	2.47	0.46
1:I:55:TYR:CE2	1:I:107:ARG:HG2	2.50	0.46
2:J:220:GLU:HG2	2:J:257:PHE:HB2	1.96	0.46
2:R:180:TYR:HD2	2:R:197:MET:HE3	1.80	0.46
1:E:67:PRO:HB3	1:E:92:VAL:HG12	1.98	0.46
1:E:10:SER:O	1:E:26:ARG:HA	2.16	0.46
1:U:92:VAL:HG23	1:U:136:GLU:HG3	1.98	0.46
1:G:15:ARG:NH1	3:G:203:HOH:O	2.49	0.46
1:I:15:ARG:HG2	1:K:6:PHE:CZ	2.51	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:I:67:PRO:HB3	1:I:92:VAL:HG12	1.97	0.46
1:K:26:ARG:O	1:K:26:ARG:HG2	2.16	0.46
1:O:6:PHE:CZ	1:Q:15:ARG:HG2	2.50	0.46
1:I:81:THR:HG23	1:I:83:ASN:HD21	1.81	0.46
1:A:69:ILE:HD11	1:A:112:LEU:HD21	1.97	0.46
2:B:205:MET:HG2	2:X:198:THR:HG22	1.97	0.46
1:S:56:LEU:HD13	1:S:67:PRO:HG2	1.98	0.46
1:Q:19:LYS:HB3	1:Q:50:LEU:HD11	1.98	0.46
1:M:15:ARG:HG2	1:Q:6:PHE:CZ	2.51	0.46
2:J:184:THR:HA	2:J:188:LEU:HB2	1.98	0.45
1:M:72:ARG:NH2	1:M:146:PRO:O	2.46	0.45
2:L:218:ARG:NH2	2:V:220:GLU:OE1	2.45	0.45
1:G:77:ASP:HB3	1:G:83:ASN:HB2	1.98	0.45
1:S:20:GLY:O	1:S:70:ARG:NH2	2.49	0.45
1:A:6:PHE:CZ	1:E:15:ARG:HG3	2.51	0.45
1:U:15:ARG:HG2	1:W:6:PHE:CZ	2.51	0.45
1:E:120:GLU:N	1:E:120:GLU:OE1	2.49	0.45
1:G:19:LYS:HD3	1:G:50:LEU:HD12	1.98	0.45
1:O:101:ARG:NE	1:O:136:GLU:OE2	2.49	0.45
1:I:55:TYR:O	1:I:107:ARG:NH1	2.50	0.45
1:U:94:THR:HA	1:U:136:GLU:HG2	1.98	0.45
2:B:184:THR:HG21	2:B:195:VAL:HG22	1.99	0.44
2:P:179:VAL:HG11	2:P:240:ALA:HB2	2.00	0.44
1:A:10:SER:O	1:A:26:ARG:HA	2.17	0.44
1:G:49:VAL:HG21	1:G:71:ILE:HB	2.00	0.44
2:T:227:PRO:O	2:T:228:SER:OG	2.31	0.44
1:W:101:ARG:HD2	1:W:134:LEU:HD21	1.99	0.44
1:M:29:ARG:HD3	1:M:77:ASP:OD1	2.18	0.44
1:M:79:LYS:HE3	1:O:143:SER:HB3	1.99	0.44
2:V:183:VAL:HG13	2:V:187:ILE:HD12	1.98	0.44
2:H:216:CYS:HB2	2:N:196:MET:SD	2.57	0.44
1:U:26:ARG:NE	1:U:75:ASP:OD2	2.50	0.44
2:X:191:PRO:HB2	2:X:194:LEU:HD23	2.00	0.44
2:L:216:CYS:HB2	2:V:196:MET:SD	2.58	0.44
2:N:253:PHE:CD2	2:T:196:MET:HE2	2.52	0.44
1:I:54:LEU:HD13	2:J:240:ALA:HA	2.00	0.43
1:W:72:ARG:NH1	1:W:147:ASP:OD1	2.49	0.43
1:M:19:LYS:HB3	1:M:50:LEU:HD11	2.00	0.43
2:T:191:PRO:HB2	2:T:194:LEU:HD23	2.00	0.43
1:U:72:ARG:NH1	1:U:147:ASP:OD1	2.49	0.43
1:C:3:ASN:ND2	1:E:4:THR:OG1	2.51	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:M:49:VAL:HG21	1:M:71:ILE:HB	2.00	0.43
1:O:10:SER:O	1:O:26:ARG:HA	2.18	0.43
1:E:105:GLU:HG2	1:E:109:ARG:NH1	2.33	0.43
1:G:10:SER:O	1:G:26:ARG:HA	2.18	0.43
1:C:72:ARG:NH2	1:C:146:PRO:O	2.39	0.43
1:M:9:PRO:HG3	1:O:22:PHE:CD1	2.54	0.43
1:M:30:THR:HB	1:M:32:PHE:CE1	2.53	0.43
1:E:30:THR:HB	1:E:32:PHE:CE1	2.54	0.43
1:W:94:THR:HG23	1:W:137:GLU:C	2.39	0.43
1:W:46:MET:HG2	1:W:71:ILE:HD13	2.00	0.43
2:X:193:GLU:HG2	2:X:194:LEU:HD22	2.01	0.43
1:Q:30:THR:HB	1:Q:32:PHE:CE1	2.54	0.43
2:B:255:LEU:HD11	2:X:159:VAL:HG21	2.00	0.43
2:F:179:VAL:HG11	2:F:240:ALA:HB2	2.00	0.42
2:J:159:VAL:HG21	2:P:255:LEU:HD11	2.00	0.42
1:W:19:LYS:HB3	1:W:50:LEU:HD11	2.01	0.42
1:M:117:ARG:NH1	1:M:120:GLU:OE2	2.52	0.42
1:E:107:ARG:NH1	3:E:206:HOH:O	2.52	0.42
1:I:19:LYS:NZ	3:I:203:HOH:O	2.52	0.42
2:F:173:ARG:NH2	3:F:302:HOH:O	2.39	0.42
1:S:143:SER:HB3	1:U:79:LYS:HE3	2.01	0.42
2:F:255:LEU:HB3	2:F:257:PHE:CE2	2.55	0.42
2:N:253:PHE:HB2	2:T:196:MET:HE1	2.02	0.42
1:S:6:PHE:CZ	1:W:15:ARG:HG2	2.55	0.42
1:K:101:ARG:NH2	3:K:202:HOH:O	2.44	0.42
1:S:71:ILE:HA	1:S:88:VAL:HG13	2.01	0.42
1:K:10:SER:O	1:K:26:ARG:HA	2.20	0.41
1:A:9:PRO:HG3	1:E:22:PHE:CD1	2.55	0.41
1:Q:88:VAL:HG23	1:Q:132:MET:HG3	2.03	0.41
2:J:177:THR:HA	2:J:197:MET:CE	2.50	0.41
2:J:180:TYR:HB2	2:J:197:MET:HE1	2.02	0.41
1:C:22:PHE:CD1	1:E:9:PRO:HG3	2.56	0.41
2:R:196:MET:SD	2:X:216:CYS:HB2	2.60	0.41
1:S:115:ALA:HB2	2:T:182:ILE:HD11	2.02	0.41
1:O:97:SER:C	1:O:99:VAL:H	2.23	0.41
1:E:82:TYR:CD2	1:E:126:CYS:HB2	2.55	0.41
1:M:123:GLU:H	1:M:123:GLU:CD	2.24	0.41
1:O:96:ALA:HB3	1:O:101:ARG:CZ	2.50	0.41
2:B:216:CYS:HB2	2:X:196:MET:SD	2.60	0.41
1:E:49:VAL:HG21	1:E:71:ILE:HB	2.02	0.40
1:I:22:PHE:CD1	1:K:9:PRO:HG3	2.56	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:S:15:ARG:HG2	1:U:6:PHE:CZ	2.56	0.40
1:S:15:ARG:NH1	3:S:203:HOH:O	2.54	0.40
2:X:161:GLN:NE2	3:X:303:HOH:O	2.52	0.40
2:X:174:ASN:O	2:X:178:LYS:HG3	2.22	0.40
1:S:67:PRO:HB3	1:S:92:VAL:HG12	2.03	0.40
1:E:92:VAL:HG21	1:E:101:ARG:HG2	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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	154/157 (98%)	148 (96%)	6 (4%)	0	100 100
1	C	155/157 (99%)	150 (97%)	5 (3%)	0	100 100
1	E	154/157 (98%)	150 (97%)	4 (3%)	0	100 100
1	G	154/157 (98%)	149 (97%)	5 (3%)	0	100 100
1	I	154/157 (98%)	148 (96%)	6 (4%)	0	100 100
1	K	154/157 (98%)	149 (97%)	5 (3%)	0	100 100
1	M	154/157 (98%)	148 (96%)	6 (4%)	0	100 100
1	O	154/157 (98%)	149 (97%)	5 (3%)	0	100 100
1	Q	154/157 (98%)	150 (97%)	4 (3%)	0	100 100
1	S	154/157 (98%)	149 (97%)	5 (3%)	0	100 100
1	U	154/157 (98%)	148 (96%)	6 (4%)	0	100 100
1	W	154/157 (98%)	149 (97%)	5 (3%)	0	100 100
2	B	110/121 (91%)	107 (97%)	3 (3%)	0	100 100
2	D	109/121 (90%)	107 (98%)	2 (2%)	0	100 100
2	F	110/121 (91%)	108 (98%)	2 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	109/121 (90%)	105 (96%)	4 (4%)	0	100	100
2	J	110/121 (91%)	108 (98%)	2 (2%)	0	100	100
2	L	110/121 (91%)	108 (98%)	2 (2%)	0	100	100
2	N	109/121 (90%)	106 (97%)	3 (3%)	0	100	100
2	P	110/121 (91%)	108 (98%)	2 (2%)	0	100	100
2	R	109/121 (90%)	106 (97%)	3 (3%)	0	100	100
2	T	110/121 (91%)	107 (97%)	3 (3%)	0	100	100
2	V	110/121 (91%)	109 (99%)	1 (1%)	0	100	100
2	X	109/121 (90%)	106 (97%)	3 (3%)	0	100	100
All	All	3164/3336 (95%)	3072 (97%)	92 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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	134/135 (99%)	130 (97%)	4 (3%)	41	65
1	C	135/135 (100%)	135 (100%)	0	100	100
1	E	134/135 (99%)	132 (98%)	2 (2%)	65	83
1	G	134/135 (99%)	132 (98%)	2 (2%)	65	83
1	I	134/135 (99%)	133 (99%)	1 (1%)	84	93
1	K	134/135 (99%)	132 (98%)	2 (2%)	65	83
1	M	134/135 (99%)	134 (100%)	0	100	100
1	O	134/135 (99%)	133 (99%)	1 (1%)	84	93
1	Q	134/135 (99%)	134 (100%)	0	100	100
1	S	134/135 (99%)	132 (98%)	2 (2%)	65	83
1	U	134/135 (99%)	133 (99%)	1 (1%)	84	93
1	W	134/135 (99%)	133 (99%)	1 (1%)	84	93

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	B	99/107 (92%)	98 (99%)	1 (1%)	76	89
2	D	98/107 (92%)	97 (99%)	1 (1%)	76	89
2	F	99/107 (92%)	98 (99%)	1 (1%)	76	89
2	H	98/107 (92%)	96 (98%)	2 (2%)	55	77
2	J	99/107 (92%)	96 (97%)	3 (3%)	41	65
2	L	99/107 (92%)	95 (96%)	4 (4%)	31	53
2	N	98/107 (92%)	96 (98%)	2 (2%)	55	77
2	P	99/107 (92%)	96 (97%)	3 (3%)	41	65
2	R	98/107 (92%)	96 (98%)	2 (2%)	55	77
2	T	99/107 (92%)	99 (100%)	0	100	100
2	V	99/107 (92%)	98 (99%)	1 (1%)	76	89
2	X	98/107 (92%)	96 (98%)	2 (2%)	55	77
All	All	2792/2904 (96%)	2754 (99%)	38 (1%)	67	84

All (38) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3	ASN
1	A	69	ILE
1	A	81	THR
1	A	119	ASP
2	B	208	PHE
2	D	208	PHE
1	E	15	ARG
1	E	85	MET
2	F	208	PHE
1	G	47	ASP
1	G	120	GLU
2	H	208	PHE
2	H	267	THR
1	I	81	THR
2	J	174	ASN
2	J	208	PHE
2	J	231	GLU
1	K	26	ARG
1	K	127	VAL
2	L	208	PHE
2	L	235	LYS

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Mol	Chain	Res	Type
2	L	242	SER
2	L	267	THR
2	N	174	ASN
2	N	208	PHE
1	O	47	ASP
2	P	208	PHE
2	P	218	ARG
2	P	253	PHE
2	R	208	PHE
2	R	267	THR
1	S	81	THR
1	S	88	VAL
1	U	102	GLU
2	V	242	SER
1	W	70	ARG
2	X	208	PHE
2	X	242	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

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 i

6.1 Protein, DNA and RNA chains i

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, 95th 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 ²)	Q<0.9
1	A	156/157 (99%)	-0.23	0 100 100	29, 40, 60, 84	0
1	C	156/157 (99%)	-0.16	3 (1%) 66 68	32, 47, 69, 85	0
1	E	156/157 (99%)	0.05	4 (2%) 56 58	32, 49, 80, 89	0
1	G	156/157 (99%)	-0.23	1 (0%) 89 90	34, 48, 67, 86	0
1	I	156/157 (99%)	-0.12	0 100 100	37, 56, 85, 91	0
1	K	156/157 (99%)	-0.22	1 (0%) 89 90	33, 46, 67, 87	0
1	M	156/157 (99%)	0.13	7 (4%) 33 35	33, 47, 78, 88	0
1	O	156/157 (99%)	0.22	13 (8%) 11 10	37, 56, 85, 107	0
1	Q	156/157 (99%)	-0.06	1 (0%) 89 90	34, 49, 69, 81	0
1	S	156/157 (99%)	0.17	9 (5%) 23 23	44, 58, 78, 91	0
1	U	156/157 (99%)	0.43	14 (8%) 9 9	48, 66, 90, 107	0
1	W	156/157 (99%)	-0.06	5 (3%) 47 50	41, 55, 75, 87	0
2	B	112/121 (92%)	-0.14	3 (2%) 54 56	37, 49, 65, 91	0
2	D	111/121 (91%)	-0.05	1 (0%) 84 86	39, 54, 80, 89	0
2	F	112/121 (92%)	0.12	3 (2%) 54 56	49, 59, 78, 89	0
2	H	111/121 (91%)	-0.16	1 (0%) 84 86	43, 55, 73, 81	0
2	J	112/121 (92%)	0.09	6 (5%) 25 26	49, 62, 87, 95	0
2	L	112/121 (92%)	-0.04	1 (0%) 84 86	44, 52, 71, 83	0
2	N	111/121 (91%)	-0.21	1 (0%) 84 86	42, 54, 69, 81	0
2	P	112/121 (92%)	0.16	2 (1%) 68 70	48, 61, 80, 89	0
2	R	111/121 (91%)	-0.21	0 100 100	42, 52, 72, 82	0
2	T	112/121 (92%)	-0.13	1 (0%) 84 86	50, 59, 75, 82	0
2	V	112/121 (92%)	0.03	0 100 100	47, 59, 78, 85	0
2	X	111/121 (91%)	-0.02	0 100 100	46, 54, 73, 80	0

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Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
All	All	3211/3336 (96%)	-0.02	77 (2%) 59 61	29, 54, 78, 107	0

All (77) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	U	99	VAL	5.5
1	U	95	GLY	5.2
1	U	96	ALA	4.6
1	S	63	GLY	4.0
2	F	269	LEU	3.9
1	U	142	ASP	3.7
1	O	123	GLU	3.7
1	O	98	GLU	3.6
1	M	95	GLY	3.6
1	O	81	THR	3.5
1	O	97	SER	3.5
1	U	97	SER	3.4
2	J	190	LYS	3.4
1	M	138	LEU	3.3
1	W	81	THR	3.3
1	S	65	LYS	3.3
1	M	94	THR	3.3
2	B	269	LEU	3.1
1	O	119	ASP	3.0
1	E	63	GLY	3.0
1	S	138	LEU	2.9
1	C	94	THR	2.9
1	O	99	VAL	2.9
1	W	79	LYS	2.8
1	U	94	THR	2.8
2	F	222	LEU	2.8
2	J	223	GLY	2.7
1	K	1	SER	2.7
1	S	95	GLY	2.7
2	N	227	PRO	2.7
2	L	193	GLU	2.6
2	F	227	PRO	2.6
2	D	193	GLU	2.6
1	U	138	LEU	2.6
1	U	62	PRO	2.6
1	M	140	SER	2.6
1	E	99	VAL	2.6

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Mol	Chain	Res	Type	RSRZ
1	U	136	GLU	2.6
1	U	80	HIS	2.6
1	M	65	LYS	2.5
1	S	94	THR	2.5
1	O	118	VAL	2.5
1	C	95	GLY	2.5
2	J	194	LEU	2.5
2	B	194	LEU	2.5
1	O	101	ARG	2.5
1	Q	1	SER	2.5
1	O	63	GLY	2.4
1	S	140	SER	2.4
1	S	62	PRO	2.4
1	E	65	LYS	2.3
1	S	64	PHE	2.3
2	P	198	THR	2.3
1	W	84	ALA	2.3
1	O	95	GLY	2.2
1	M	97	SER	2.2
2	J	193	GLU	2.2
1	U	140	SER	2.2
1	O	124	HIS	2.2
1	E	94	THR	2.2
1	U	65	LYS	2.2
2	J	227	PRO	2.2
1	W	119	ASP	2.2
1	U	93	GLY	2.2
1	M	124	HIS	2.1
1	O	96	ALA	2.1
1	G	65	LYS	2.1
1	U	139	LEU	2.1
1	W	80	HIS	2.1
2	T	208	PHE	2.1
1	C	65	LYS	2.1
2	B	227	PRO	2.1
2	H	226	GLY	2.1
2	P	160	ILE	2.1
1	O	138	LEU	2.0
2	J	264	TRP	2.0
1	S	101	ARG	2.0

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 monosaccharides in this entry.

6.4 Ligands [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.