



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 11:03 AM UTC

PDB ID : 5AWF / pdb_00005awf
Title : Crystal structure of SufB-SufC-SufD complex from Escherichia coli
Authors : Hirabayashi, K.; Wada, K.
Deposited on : 2015-07-03
Resolution : 2.96 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	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

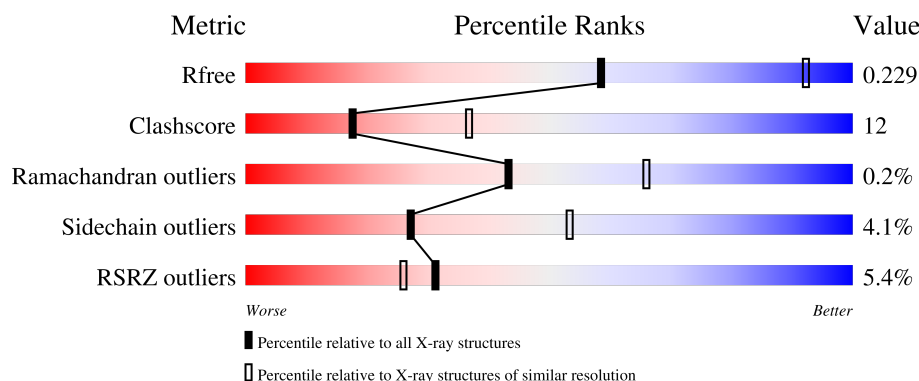
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.96 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}	180053	1130 (2.98-2.94)
Clashscore	190562	1157 (2.98-2.94)
Ramachandran outliers	187476	1101 (2.98-2.94)
Sidechain outliers	187428	1101 (2.98-2.94)
RSRZ outliers	180081	1130 (2.98-2.94)

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	495	5% 58% 18% .. 22%
1	E	495	5% 52% 23% . 23%
2	B	423	% 81% 16% .
2	F	423	4% 76% 20% ..
3	C	248	6% 74% 21% ..

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Mol	Chain	Length	Quality of chain
3	D	248	6% 64% 24% 6% 5%
3	G	248	4% 76% 19%
3	H	248	11% 56% 31% 6% 5%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 19914 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 FeS cluster assembly protein SufB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	385	Total	C	N	O	S	0	0	0
			3004	1892	517	577	18			
1	E	381	Total	C	N	O	S	0	0	0
			2972	1872	511	571	18			

- Molecule 2 is a protein called FeS cluster assembly protein SufD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	414	Total	C	N	O	S	0	0	0
			3238	2019	599	612	8			
2	F	414	Total	C	N	O	S	0	0	0
			3238	2019	599	612	8			

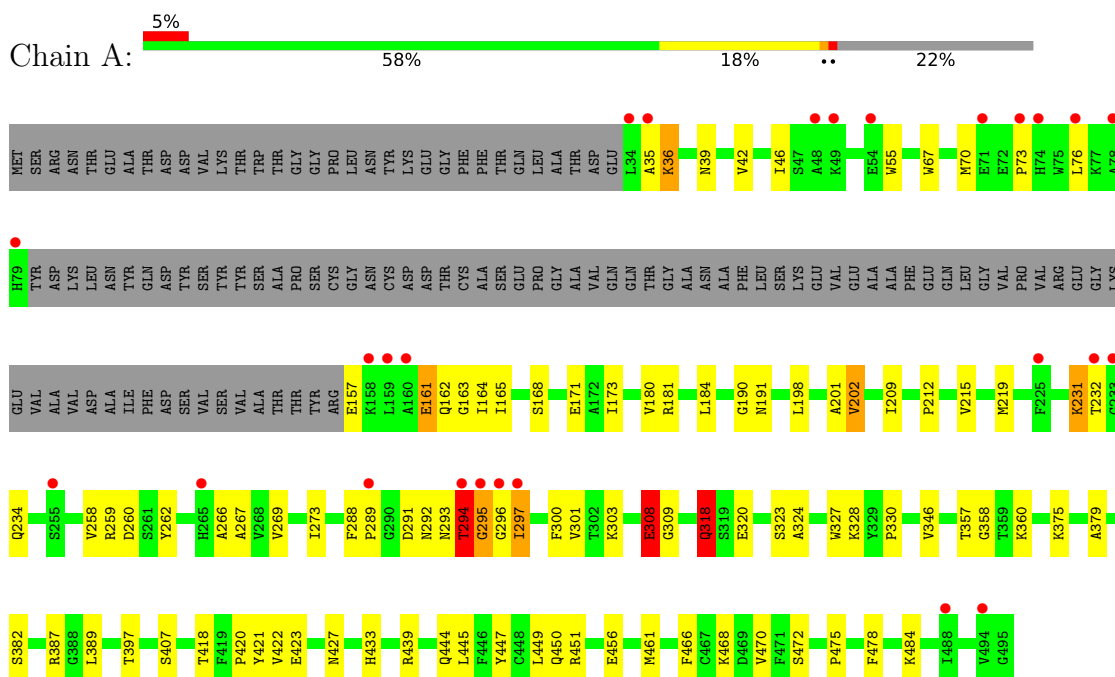
- Molecule 3 is a protein called Probable ATP-dependent transporter SufC.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	243	Total	C	N	O	S	0	0	0
			1898	1203	320	368	7			
3	D	235	Total	C	N	O	S	0	0	0
			1829	1158	310	354	7			
3	G	243	Total	C	N	O	S	0	0	0
			1898	1203	320	368	7			
3	H	236	Total	C	N	O	S	0	0	0
			1837	1164	311	355	7			

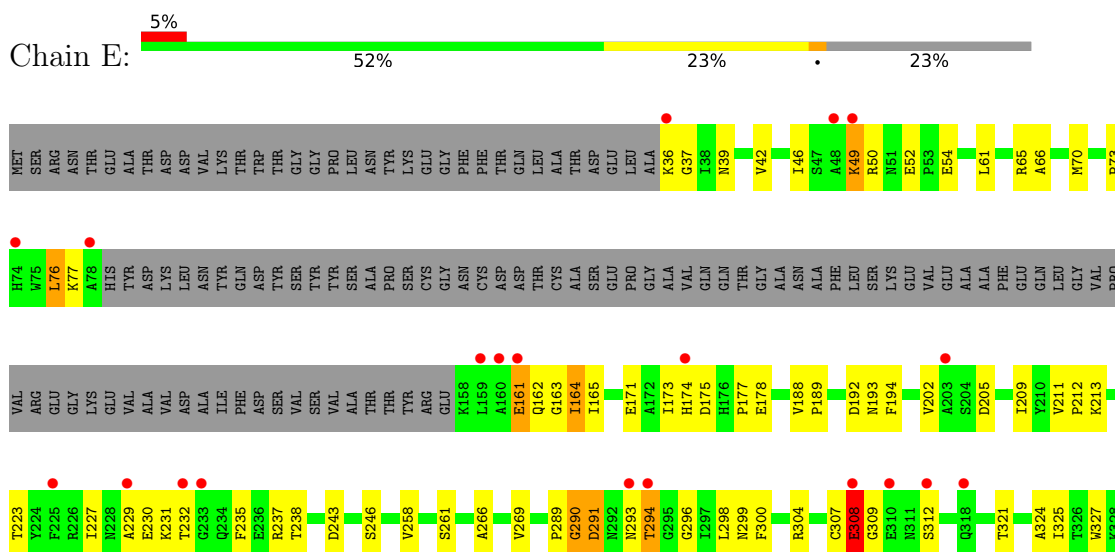
3 Residue-property plots

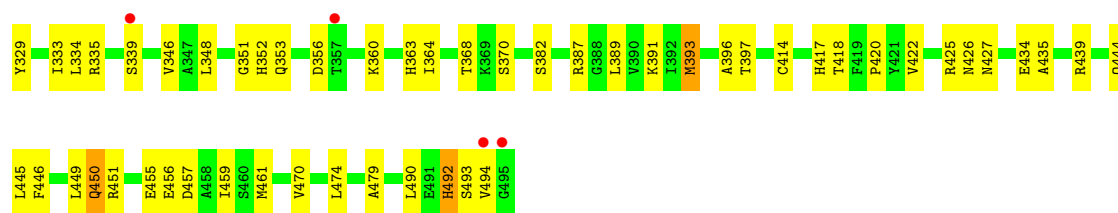
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

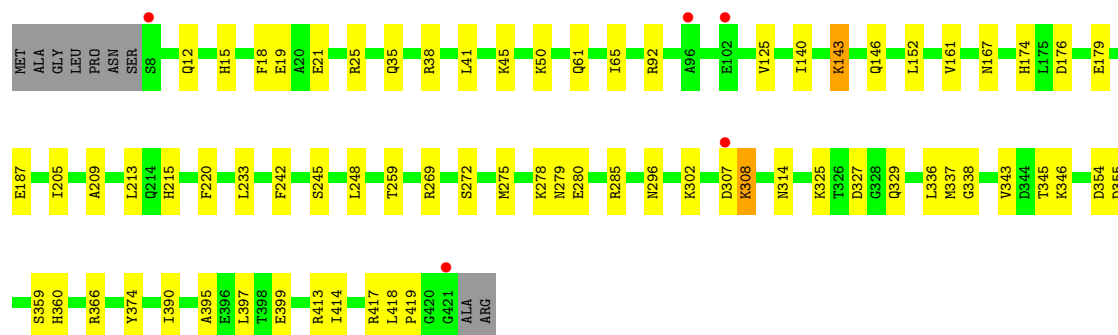
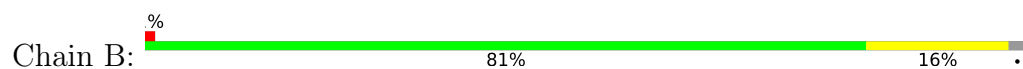


• Molecule 1: FeS cluster assembly protein SufB

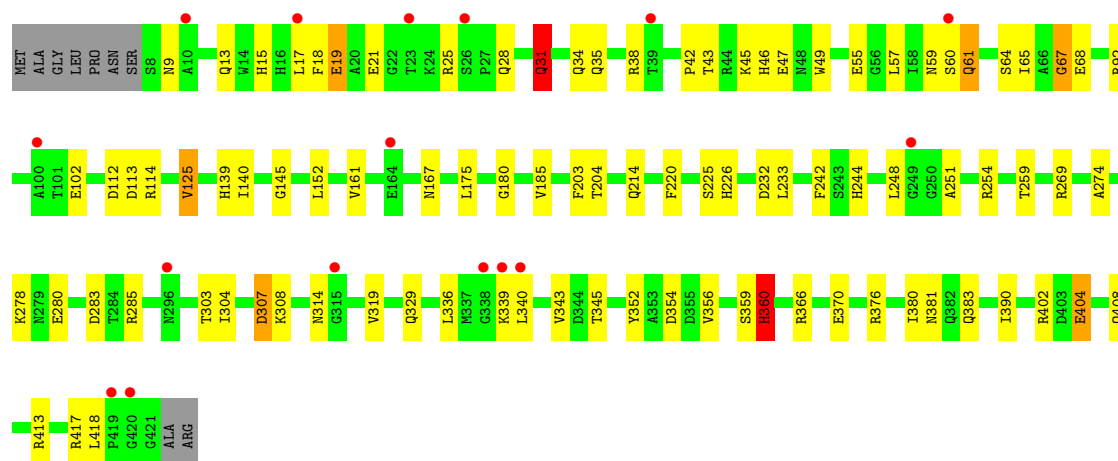
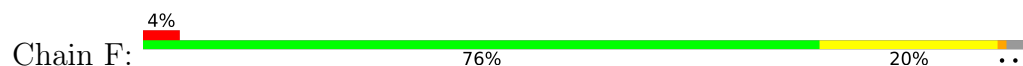




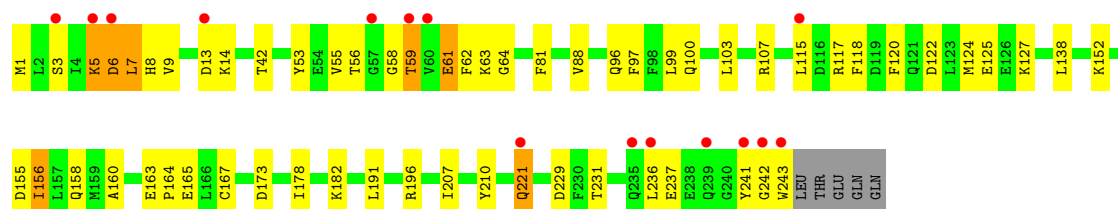
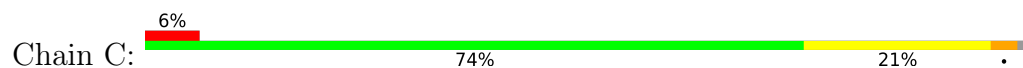
• Molecule 2: FeS cluster assembly protein SufD



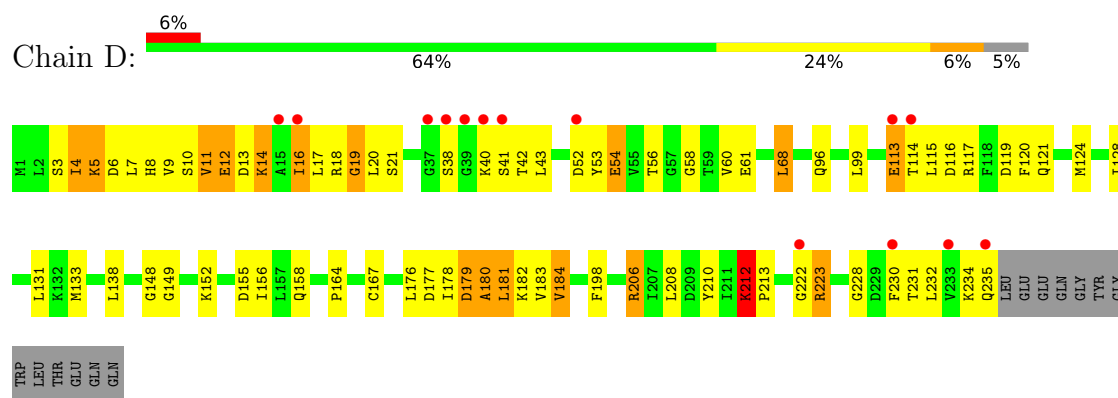
• Molecule 2: FeS cluster assembly protein SufD



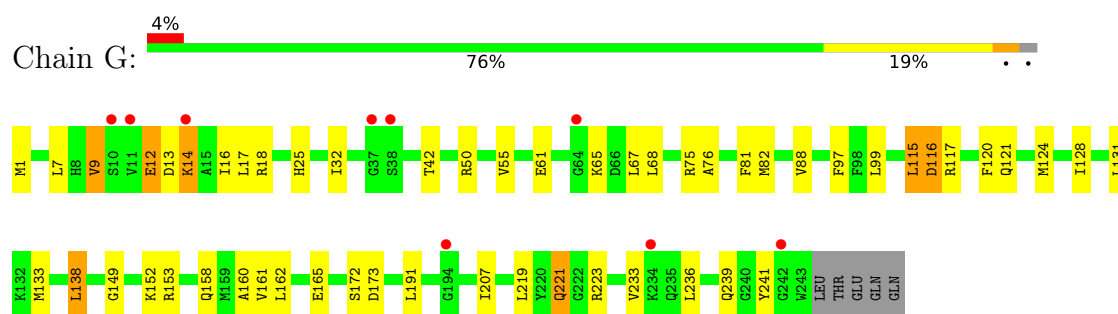
• Molecule 3: Probable ATP-dependent transporter SufC



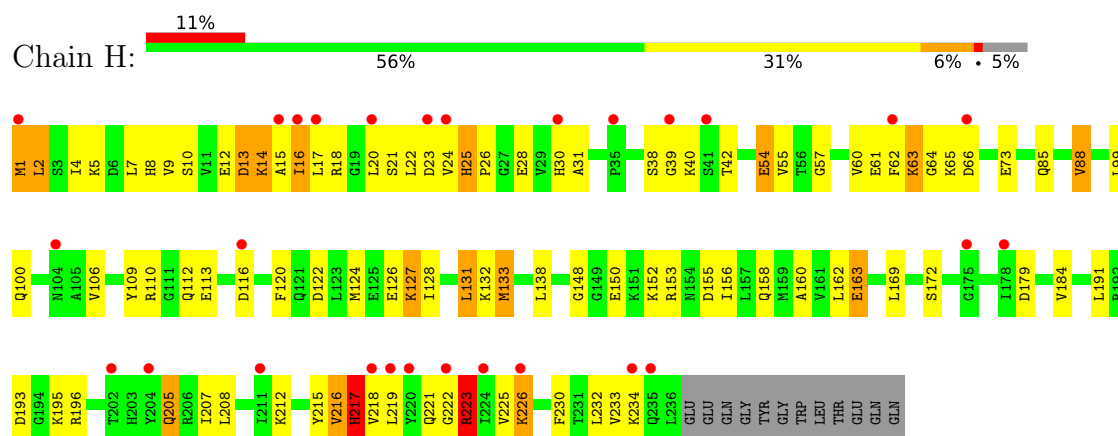
• Molecule 3: Probable ATP-dependent transporter SufC



• Molecule 3: Probable ATP-dependent transporter SufC



• Molecule 3: Probable ATP-dependent transporter SufC



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	119.47Å 139.56Å 124.68Å 90.00° 113.10° 90.00°	Depositor
Resolution (Å)	41.11 – 2.96 41.11 – 2.96	Depositor EDS
% Data completeness (in resolution range)	98.2 (41.11-2.96) 94.7 (41.11-2.96)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.08 (at 2.95Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.9_1692)	Depositor
R, R_{free}	0.187 , 0.226 0.192 , 0.229	Depositor DCC
R_{free} test set	1995 reflections (2.53%)	wwPDB-VP
Wilson B-factor (Å ²)	63.4	Xtriage
Anisotropy	0.541	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 78.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.015 for l,-k,h	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	19914	wwPDB-VP
Average B, all atoms (Å ²)	83.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.88% 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

5.1 Standard geometry

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	0.41	1/3068 (0.0%)	0.92	9/4153 (0.2%)
1	E	0.40	0/3035	0.92	11/4108 (0.3%)
2	B	0.34	0/3300	0.79	0/4473
2	F	0.38	0/3300	0.87	5/4473 (0.1%)
3	C	0.42	0/1930	0.89	4/2604 (0.2%)
3	D	0.45	0/1858	0.97	6/2506 (0.2%)
3	G	0.39	0/1930	0.86	2/2604 (0.1%)
3	H	0.64	2/1866 (0.1%)	1.26	21/2517 (0.8%)
All	All	0.42	3/20287 (0.0%)	0.93	58/27438 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	E	0	3
3	D	0	3
3	G	0	1
3	H	0	2
All	All	0	11

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	217	HIS	CA-CB	5.65	1.62	1.53
3	H	217	HIS	CA-C	5.60	1.59	1.52
1	A	294	THR	CA-C	5.22	1.59	1.52

All (58) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	H	14	LYS	CA-C-N	-12.13	106.28	122.42
3	H	14	LYS	C-N-CA	-12.13	106.28	122.42
1	A	288	PHE	CA-C-N	9.23	131.37	119.84
1	A	288	PHE	C-N-CA	9.23	131.37	119.84
3	H	131	LEU	N-CA-C	9.18	124.21	112.92
1	A	190	GLY	N-CA-C	-8.75	101.12	111.36
3	D	180	ALA	N-CA-C	-8.55	102.04	111.36
2	F	31	GLN	N-CA-C	-7.99	102.51	111.14
3	H	25	HIS	CA-C-N	-7.58	112.19	119.76
3	H	25	HIS	C-N-CA	-7.58	112.19	119.76
3	H	39	GLY	N-CA-C	7.23	125.14	114.95
3	H	2	LEU	N-CA-C	7.16	120.19	108.52
3	H	163	GLU	CA-C-N	-7.11	112.60	120.14
3	H	163	GLU	C-N-CA	-7.11	112.60	120.14
3	H	217	HIS	CA-CB-CG	7.00	120.80	113.80
1	A	318	GLN	N-CA-C	6.97	120.92	109.06
1	E	261	SER	N-CA-C	-6.63	98.28	108.76
3	H	133	MET	N-CA-C	6.62	118.04	109.64
3	D	19	GLY	N-CA-C	6.57	128.74	113.18
3	H	223	ARG	CA-C-N	-6.46	114.30	122.37
3	H	223	ARG	C-N-CA	-6.46	114.30	122.37
1	E	308	GLU	N-CA-C	6.36	120.84	112.13
3	H	216	VAL	CA-C-N	-6.32	111.71	123.03
3	H	216	VAL	C-N-CA	-6.32	111.71	123.03
3	H	217	HIS	N-CA-CB	6.23	120.39	111.05
3	H	222	GLY	N-CA-C	6.13	123.82	115.30
1	E	291	ASP	N-CA-C	-6.04	100.78	110.14
1	A	308	GLU	N-CA-C	5.94	120.34	111.96
2	F	360	HIS	CB-CA-C	5.94	121.03	110.16
3	D	212	LYS	CA-C-N	5.93	125.69	119.76
3	D	212	LYS	C-N-CA	5.93	125.69	119.76
3	H	162	LEU	N-CA-C	5.83	120.01	113.02
3	H	63	LYS	N-CA-C	5.75	121.56	113.56
3	C	7	LEU	N-CA-C	5.70	117.97	109.59
3	C	6	ASP	N-CA-C	5.68	119.40	111.90
1	A	161	GLU	CA-C-N	5.59	131.77	121.70
1	A	161	GLU	C-N-CA	5.59	131.77	121.70
2	F	31	GLN	N-CA-CB	5.57	118.15	110.07
1	E	261	SER	CA-C-N	-5.57	115.02	122.42
1	E	261	SER	C-N-CA	-5.57	115.02	122.42
1	E	161	GLU	CA-C-N	5.55	131.68	121.70
1	E	161	GLU	C-N-CA	5.55	131.68	121.70
2	F	67	GLY	N-CA-C	-5.54	104.97	112.57

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	294	THR	N-CA-C	5.49	122.50	110.80
3	C	122	ASP	N-CA-C	-5.49	104.32	111.02
1	E	231	LYS	N-CA-C	5.48	118.18	110.23
3	D	16	ILE	CB-CA-C	-5.45	102.36	111.29
1	A	234	GLN	N-CA-C	5.44	118.38	111.69
3	H	205	GLN	N-CA-C	5.41	117.60	111.11
3	C	125	GLU	N-CA-C	-5.38	105.41	111.28
3	G	116	ASP	N-CA-C	5.36	114.92	107.73
1	E	202	VAL	N-CA-C	5.35	118.13	112.83
1	A	295	GLY	N-CA-C	5.30	128.66	113.30
2	F	125	VAL	N-CA-C	5.17	115.61	110.23
3	G	14	LYS	N-CA-C	5.13	117.77	108.69
1	E	49	LYS	N-CA-C	-5.12	105.77	112.23
3	D	223	ARG	NE-CZ-NH2	5.11	123.80	119.20
3	H	13	ASP	N-CA-C	5.11	118.49	111.54

There are no chirality outliers.

All (11) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	294	THR	Peptide
1	A	308	GLU	Peptide
3	D	113	GLU	Peptide
3	D	12	GLU	Peptide
3	D	14	LYS	Peptide
1	E	232	THR	Peptide
1	E	290	GLY	Peptide
1	E	308	GLU	Peptide
3	G	115	LEU	Peptide
3	H	1	MET	Peptide
3	H	217	HIS	Mainchain

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	3004	0	2916	64	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	E	2972	0	2887	88	0
2	B	3238	0	3184	43	0
2	F	3238	0	3184	64	0
3	C	1898	0	1896	44	0
3	D	1829	0	1840	83	0
3	G	1898	0	1896	37	0
3	H	1837	0	1851	95	0
All	All	19914	0	19654	489	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 12.

All (489) 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:E:492:HIS:CE1	1:E:493:SER:HB3	1.82	1.13
3:H:30:HIS:HD1	3:H:215:TYR:HB2	1.22	1.03
3:H:61:GLU:OE2	3:H:64:GLY:N	1.96	0.97
3:D:12:GLU:HG3	3:D:14:LYS:HG3	1.42	0.97
2:F:381:ASN:HA	3:H:73:GLU:HG2	1.49	0.95
3:H:30:HIS:ND1	3:H:215:TYR:HB2	1.85	0.92
3:H:217:HIS:HB3	3:H:226:LYS:O	1.70	0.90
3:D:11:VAL:O	3:D:14:LYS:N	2.04	0.89
3:D:14:LYS:HD3	3:D:16:ILE:HG12	1.56	0.88
3:H:30:HIS:CE1	3:H:217:HIS:CE1	2.63	0.86
3:D:117:ARG:HE	3:D:121:GLN:HE22	1.19	0.86
1:E:435:ALA:HB3	2:F:360:HIS:CD2	2.13	0.83
1:E:294:THR:HG23	1:E:296:GLY:H	1.43	0.83
3:D:20:LEU:N	3:D:223:ARG:HH21	1.77	0.82
3:H:124:MET:HG2	3:H:138:LEU:HD21	1.61	0.82
1:E:492:HIS:ND1	1:E:493:SER:N	2.29	0.81
3:H:16:ILE:HG21	3:H:42:THR:OG1	1.83	0.79
3:D:113:GLU:HG2	3:D:114:THR:HB	1.65	0.79
3:H:30:HIS:CE1	3:H:217:HIS:ND1	2.51	0.79
3:H:16:ILE:HD12	3:H:42:THR:HG21	1.66	0.77
1:A:320:GLU:OE1	1:A:328:LYS:NZ	2.18	0.77
2:F:67:GLY:O	2:F:92:ARG:NH2	2.18	0.76
1:A:163:GLY:HA3	1:A:212:PRO:HG3	1.66	0.76
3:H:30:HIS:NE2	3:H:217:HIS:ND1	2.33	0.76
1:E:321:THR:HG22	1:E:348:LEU:HB3	1.67	0.76
3:D:11:VAL:HG23	3:D:16:ILE:HD11	1.65	0.76

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:124:MET:HG2	3:D:138:LEU:HD21	1.65	0.76
3:H:223:ARG:HH11	3:H:223:ARG:HB3	1.49	0.75
2:F:42:PRO:HD3	2:F:125:VAL:HG21	1.69	0.74
3:C:6:ASP:OD1	3:C:58:GLY:HA2	1.87	0.74
1:A:291:ASP:CG	1:A:292:ASN:H	1.95	0.74
3:H:223:ARG:HH11	3:H:223:ARG:CB	2.00	0.74
1:A:231:LYS:HD2	1:A:232:THR:H	1.51	0.74
3:H:223:ARG:NH1	3:H:223:ARG:HB2	2.03	0.73
3:D:10:SER:HA	3:D:16:ILE:HG13	1.70	0.73
3:H:112:GLN:NE2	3:H:163:GLU:OE2	2.20	0.72
3:H:223:ARG:CB	3:H:223:ARG:NH1	2.52	0.72
1:A:418:THR:HG22	1:A:420:PRO:HD3	1.70	0.72
1:E:289:PRO:HG3	1:E:294:THR:HA	1.70	0.72
1:A:260:ASP:HA	1:A:293:ASN:HD22	1.54	0.72
3:D:11:VAL:HB	3:D:14:LYS:HZ2	1.56	0.70
2:F:280:GLU:OE2	2:F:417:ARG:NH2	2.24	0.70
1:E:163:GLY:HA3	1:E:212:PRO:HG2	1.74	0.70
3:G:18:ARG:NH1	3:G:221:GLN:OE1	2.25	0.69
2:F:214:GLN:HG2	2:F:402:ARG:HH22	1.57	0.69
2:B:35:GLN:OE1	2:B:38:ARG:NH2	2.23	0.69
3:C:5:LYS:HE2	3:C:61:GLU:HB3	1.74	0.69
3:D:18:ARG:H	3:D:223:ARG:NH1	1.89	0.69
3:H:38:SER:OG	3:H:221:GLN:N	2.25	0.69
3:D:17:LEU:HA	3:D:223:ARG:HH12	1.59	0.68
2:F:13:GLN:HE22	2:F:61:GLN:HA	1.58	0.68
3:D:8:HIS:HA	3:D:17:LEU:O	1.93	0.67
3:H:61:GLU:OE1	3:H:62:PHE:N	2.28	0.67
3:H:85:GLN:O	3:H:152:LYS:NZ	2.27	0.67
3:D:149:GLY:HA2	3:D:176:LEU:HD21	1.77	0.67
3:G:9:VAL:HG13	3:G:17:LEU:HB2	1.77	0.67
1:A:318:GLN:OE1	1:A:330:PRO:HG2	1.94	0.67
2:F:55:GLU:O	2:F:59:ASN:HB2	1.95	0.67
2:B:143:LYS:HG3	2:B:146:GLN:HG3	1.77	0.67
3:H:122:ASP:O	3:H:126:GLU:HG3	1.95	0.66
2:B:140:ILE:HD13	2:B:152:LEU:HD21	1.77	0.66
3:D:12:GLU:CG	3:D:14:LYS:HG3	2.22	0.66
2:F:46:HIS:HD1	2:F:49:TRP:HD1	1.44	0.66
2:F:204:THR:HG22	2:F:232:ASP:HB2	1.78	0.65
1:A:161:GLU:HB3	1:A:164:ILE:H	1.63	0.64
3:H:4:ILE:HG23	3:H:60:VAL:HG12	1.78	0.64
2:F:220:PHE:O	2:F:413:ARG:NH2	2.30	0.64

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:113:ASP:OD1	2:F:139:HIS:NE2	2.31	0.64
1:E:450:GLN:HA	1:E:450:GLN:HE21	1.62	0.63
3:H:8:HIS:HA	3:H:17:LEU:O	1.98	0.63
2:F:65:ILE:HD12	2:F:161:VAL:HG11	1.80	0.63
1:E:360:LYS:HG2	1:E:389:LEU:HB3	1.80	0.63
1:A:161:GLU:HG3	1:A:164:ILE:O	1.99	0.63
1:E:189:PRO:HD2	1:E:192:ASP:HB2	1.80	0.63
3:D:11:VAL:HB	3:D:14:LYS:HD2	1.81	0.63
3:D:11:VAL:H	3:D:16:ILE:HD11	1.64	0.63
1:E:193:ASN:OD1	1:E:194:PHE:N	2.32	0.62
1:E:294:THR:HG21	1:E:324:ALA:HA	1.80	0.62
2:F:9:ASN:OD1	2:F:13:GLN:NE2	2.32	0.62
1:A:450:GLN:OE1	1:A:451:ARG:NH1	2.31	0.62
3:C:9:VAL:HG22	3:C:55:VAL:HG22	1.82	0.62
1:E:396:ALA:O	1:E:426:ASN:ND2	2.33	0.62
3:G:115:LEU:HD12	3:G:116:ASP:HA	1.81	0.62
3:C:236:LEU:HB3	3:C:241:TYR:O	2.00	0.61
1:E:73:PRO:HB2	1:E:327:TRP:HH2	1.64	0.61
3:C:124:MET:HG2	3:C:138:LEU:HD21	1.83	0.61
3:H:61:GLU:OE2	3:H:65:LYS:N	2.30	0.61
3:C:237:GLU:N	3:C:237:GLU:OE1	2.34	0.60
3:H:31:ALA:HB2	3:H:208:LEU:HD21	1.83	0.60
2:F:304:ILE:HD13	2:F:390:ILE:HG23	1.83	0.60
2:B:280:GLU:OE2	2:B:417:ARG:NH2	2.34	0.60
1:A:262:TYR:HD1	1:A:294:THR:HG22	1.67	0.60
3:D:60:VAL:HB	3:D:68:LEU:HD13	1.84	0.60
2:F:404:GLU:O	2:F:408:GLN:HG2	2.02	0.60
1:E:76:LEU:HD12	1:E:77:LYS:N	2.17	0.60
3:D:156:ILE:HG13	3:D:184:VAL:HG23	1.83	0.59
3:H:1:MET:HG2	3:H:26:PRO:HD3	1.83	0.59
2:B:374:TYR:OH	3:D:155:ASP:OD1	2.19	0.59
3:D:7:LEU:HG	3:D:9:VAL:HG23	1.84	0.59
3:D:208:LEU:HD22	3:D:213:PRO:HG3	1.83	0.59
1:E:293:ASN:O	1:E:294:THR:HG22	2.01	0.59
2:F:274:ALA:HB3	2:F:303:THR:HG22	1.84	0.59
3:C:107:ARG:NH2	3:C:163:GLU:OE2	2.35	0.59
1:E:418:THR:HG22	1:E:420:PRO:HD3	1.85	0.59
3:H:30:HIS:NE2	3:H:217:HIS:N	2.50	0.59
3:H:226:LYS:HE3	3:H:232:LEU:HD21	1.84	0.59
1:E:450:GLN:OE1	3:G:82:MET:HB3	2.02	0.59
3:D:99:LEU:HD21	3:D:158:GLN:HG2	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:294:THR:HB	1:E:353:GLN:HG2	1.85	0.58
1:E:492:HIS:HE1	1:E:493:SER:HB3	1.63	0.58
3:C:221:GLN:HE21	3:C:221:GLN:CA	2.15	0.58
1:A:296:GLY:HA3	1:A:324:ALA:HB2	1.86	0.58
1:A:262:TYR:CD1	1:A:294:THR:HG22	2.39	0.57
3:C:117:ARG:HG3	3:C:118:PHE:HD1	1.68	0.57
3:C:221:GLN:HA	3:C:221:GLN:NE2	2.19	0.57
2:F:214:GLN:HG2	2:F:402:ARG:NH2	2.19	0.57
3:D:16:ILE:HG21	3:D:42:THR:HG21	1.87	0.57
2:F:46:HIS:HD1	2:F:49:TRP:CD1	2.23	0.57
2:B:233:LEU:HB2	2:B:259:THR:HG23	1.85	0.57
3:D:11:VAL:HG22	3:D:53:TYR:HA	1.85	0.57
3:G:173:ASP:HB3	3:G:207:ILE:HD12	1.87	0.57
1:E:339:SER:HB3	1:E:368:THR:HG22	1.86	0.57
1:A:296:GLY:CA	1:A:324:ALA:HB2	2.34	0.57
3:C:221:GLN:CA	3:C:221:GLN:NE2	2.67	0.56
3:D:10:SER:O	3:D:54:GLU:HB2	2.04	0.56
3:D:38:SER:O	3:D:222:GLY:HA2	2.04	0.56
1:A:231:LYS:HD2	1:A:232:THR:N	2.19	0.56
3:H:132:LYS:HE2	3:H:153:ARG:CZ	2.34	0.56
1:E:289:PRO:HG3	1:E:294:THR:CA	2.36	0.56
1:E:293:ASN:ND2	1:E:352:HIS:HB2	2.21	0.56
3:H:131:LEU:HB3	3:H:133:MET:HE2	1.88	0.56
3:H:150:GLU:HA	3:H:153:ARG:HH22	1.70	0.56
3:H:131:LEU:O	3:H:132:LYS:HB3	2.05	0.56
1:E:455:GLU:O	1:E:459:ILE:HG12	2.06	0.56
3:D:206:ARG:NH2	3:D:210:TYR:OH	2.37	0.56
3:D:16:ILE:HD13	3:D:42:THR:HG21	1.87	0.55
1:E:165:ILE:O	1:E:209:ILE:HA	2.05	0.55
1:E:474:LEU:HD23	1:E:479:ALA:HA	1.88	0.55
2:F:28:GLN:HA	2:F:31:GLN:CG	2.36	0.55
3:H:22:LEU:HD12	3:H:23:ASP:H	1.71	0.55
3:C:221:GLN:HE21	3:C:221:GLN:N	2.04	0.55
3:G:160:ALA:HA	3:G:191:LEU:HD21	1.88	0.55
3:H:4:ILE:C	3:H:5:LYS:HD2	2.30	0.55
3:H:9:VAL:HG22	3:H:55:VAL:HG22	1.87	0.55
3:C:99:LEU:HD21	3:C:158:GLN:HG2	1.88	0.55
1:E:161:GLU:CD	1:E:164:ILE:HG12	2.32	0.55
2:F:43:THR:OG1	2:F:45:LYS:HG2	2.07	0.55
1:E:427:ASN:O	2:F:366:ARG:HB3	2.06	0.55
3:H:10:SER:O	3:H:54:GLU:HB2	2.06	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:128:ILE:HB	3:H:133:MET:HB2	1.88	0.55
1:A:168:SER:HB3	1:A:171:GLU:HG3	1.87	0.55
2:B:174:HIS:NE2	2:B:176:ASP:OD1	2.40	0.55
3:G:99:LEU:HD21	3:G:158:GLN:HG2	1.89	0.55
3:D:213:PRO:HD2	3:D:230:PHE:HD1	1.72	0.55
3:D:133:MET:HE2	3:D:133:MET:HA	1.88	0.54
3:H:61:GLU:CD	3:H:65:LYS:H	2.14	0.54
1:E:492:HIS:CG	1:E:493:SER:N	2.76	0.54
1:A:447:TYR:OH	3:C:155:ASP:OD1	2.20	0.54
3:D:222:GLY:HA3	3:D:223:ARG:NH1	2.23	0.54
3:H:16:ILE:CD1	3:H:42:THR:HG21	2.35	0.54
3:D:213:PRO:HD2	3:D:230:PHE:CD1	2.42	0.54
1:E:363:HIS:NE2	1:E:370:SER:HB2	2.23	0.54
1:A:35:ALA:HB1	1:A:36:LYS:HA	1.90	0.54
2:F:28:GLN:HA	2:F:31:GLN:HG3	1.89	0.54
3:H:25:HIS:N	3:H:28:GLU:OE2	2.32	0.54
3:H:61:GLU:OE1	3:H:65:LYS:O	2.26	0.54
3:H:150:GLU:HA	3:H:153:ARG:NH2	2.23	0.54
1:A:433:HIS:NE2	2:B:360:HIS:HE1	2.06	0.54
1:E:356:ASP:OD2	1:E:387:ARG:NH1	2.40	0.54
3:D:179:ASP:OD2	3:D:182:LYS:HE3	2.08	0.54
3:H:1:MET:CG	3:H:25:HIS:HA	2.38	0.54
3:H:2:LEU:HB3	3:H:24:VAL:HB	1.89	0.53
2:F:339:LYS:HE3	2:F:340:LEU:HG	1.89	0.53
3:G:152:LYS:HD3	3:G:172:SER:O	2.08	0.53
3:H:99:LEU:HD21	3:H:158:GLN:HG2	1.89	0.53
1:A:294:THR:HB	1:A:296:GLY:CA	2.39	0.53
2:B:278:LYS:H	2:B:307:ASP:HB2	1.74	0.53
2:F:17:LEU:HD11	2:F:64:SER:CB	2.39	0.53
1:E:461:MET:HG3	3:G:97:PHE:HE2	1.74	0.53
3:H:205:GLN:CD	3:H:205:GLN:H	2.16	0.53
2:F:336:LEU:HD11	2:F:343:VAL:HG12	1.90	0.53
3:D:19:GLY:C	3:D:223:ARG:HH21	2.17	0.53
3:D:11:VAL:HG13	3:D:52:ASP:O	2.08	0.53
3:D:18:ARG:N	3:D:223:ARG:NH1	2.57	0.52
2:F:112:ASP:OD1	2:F:114:ARG:NE	2.39	0.52
3:H:109:TYR:O	3:H:110:ARG:HB2	2.08	0.52
2:B:41:LEU:HD23	2:B:125:VAL:HG21	1.91	0.52
3:C:61:GLU:OE2	3:C:64:GLY:N	2.38	0.52
3:H:16:ILE:HG21	3:H:42:THR:CB	2.39	0.52
3:D:12:GLU:HB2	3:D:14:LYS:N	2.24	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:G:12:GLU:O	3:G:12:GLU:HG3	2.09	0.52
3:G:32:ILE:HG23	3:G:219:LEU:HD13	1.91	0.52
3:H:14:LYS:HG2	3:H:15:ALA:N	2.23	0.52
3:C:5:LYS:NZ	3:C:59:THR:HB	2.24	0.52
3:D:179:ASP:O	3:D:183:VAL:HG23	2.09	0.52
1:A:295:GLY:N	1:A:296:GLY:HA3	2.24	0.52
2:F:370:GLU:HG3	3:H:88:VAL:HG11	1.92	0.52
3:D:231:THR:O	3:D:232:LEU:HD12	2.09	0.51
1:A:293:ASN:ND2	1:A:294:THR:OG1	2.43	0.51
1:A:423:GLU:OE1	2:B:50:LYS:NZ	2.44	0.51
3:G:133:MET:HA	3:G:133:MET:HE2	1.92	0.51
1:A:73:PRO:HB2	1:A:327:TRP:HH2	1.75	0.51
1:E:307:CYS:HB3	1:E:312:SER:HB2	1.91	0.51
2:F:46:HIS:ND1	2:F:49:TRP:HD1	2.06	0.51
1:A:301:VAL:HG11	1:A:303:LYS:HE3	1.93	0.51
1:A:375:LYS:HB3	1:A:466:PHE:CE2	2.45	0.51
1:E:308:GLU:H	1:E:309:GLY:HA3	1.76	0.51
2:B:336:LEU:HD11	2:B:343:VAL:HG12	1.92	0.51
1:E:188:VAL:O	1:E:237:ARG:NH2	2.43	0.51
1:E:174:HIS:HA	1:E:177:PRO:HG3	1.93	0.51
1:A:165:ILE:O	1:A:209:ILE:HA	2.11	0.50
3:H:148:GLY:O	3:H:152:LYS:HG2	2.11	0.50
3:D:178:ILE:HD12	3:D:206:ARG:NH1	2.26	0.50
1:A:269:VAL:HB	1:A:303:LYS:HG2	1.93	0.50
3:C:160:ALA:HA	3:C:191:LEU:HD21	1.92	0.50
3:D:164:PRO:HG2	3:D:167:CYS:SG	2.50	0.50
3:H:223:ARG:HB2	3:H:223:ARG:CZ	2.42	0.50
1:E:456:GLU:HG2	1:E:457:ASP:N	2.26	0.50
2:F:214:GLN:NE2	2:F:244:HIS:CD2	2.79	0.50
2:F:278:LYS:H	2:F:307:ASP:HB2	1.77	0.50
1:A:70:MET:HE1	1:A:191:ASN:HA	1.93	0.50
3:D:116:ASP:HB3	3:D:119:ASP:OD2	2.11	0.50
1:E:258:VAL:O	1:E:289:PRO:HA	2.12	0.50
3:D:178:ILE:HG23	3:D:206:ARG:HH12	1.77	0.50
1:A:259:ARG:O	1:A:293:ASN:ND2	2.45	0.49
2:B:161:VAL:HG13	2:B:167:ASN:HB2	1.93	0.49
3:H:127:LYS:HD2	3:H:160:ALA:HB1	1.94	0.49
3:H:132:LYS:HB3	3:H:153:ARG:HE	1.76	0.49
1:A:439:ARG:NH1	2:B:354:ASP:OD2	2.45	0.49
3:C:117:ARG:HG3	3:C:118:PHE:CD1	2.46	0.49
3:D:11:VAL:HG12	3:D:12:GLU:H	1.76	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:346:VAL:HG23	1:E:470:VAL:HG11	1.94	0.49
2:B:337:MET:SD	2:B:390:ILE:HD11	2.51	0.49
1:E:238:THR:HB	1:E:269:VAL:HG22	1.94	0.49
3:H:4:ILE:HG21	3:H:20:LEU:HD22	1.95	0.49
3:H:218:VAL:HG23	3:H:226:LYS:NZ	2.28	0.49
1:E:61:LEU:O	1:E:65:ARG:HG3	2.12	0.49
1:E:391:LYS:HD3	1:E:393:MET:HE2	1.95	0.49
1:A:42:VAL:O	1:A:46:ILE:HG13	2.13	0.49
2:B:325:LYS:HE3	2:B:355:ASP:OD1	2.12	0.49
2:F:175:LEU:HD22	2:F:185:VAL:HG21	1.93	0.49
3:H:8:HIS:HB2	3:H:57:GLY:O	2.13	0.49
2:B:205:ILE:HG21	2:B:213:LEU:HD22	1.95	0.49
3:C:103:LEU:HD21	3:C:115:LEU:HD12	1.95	0.49
3:D:8:HIS:ND1	3:D:18:ARG:HA	2.28	0.49
3:H:30:HIS:CD2	3:H:30:HIS:C	2.90	0.49
1:E:450:GLN:OE1	3:G:82:MET:N	2.46	0.48
1:E:450:GLN:O	3:G:76:ALA:HB2	2.14	0.48
1:E:492:HIS:ND1	1:E:493:SER:HB3	2.25	0.48
2:F:233:LEU:HB2	2:F:259:THR:HG23	1.95	0.48
1:E:493:SER:OG	1:E:494:VAL:N	2.45	0.48
1:A:201:ALA:O	1:A:202:VAL:HB	2.13	0.48
1:A:308:GLU:N	1:A:309:GLY:HA3	2.28	0.48
2:B:395:ALA:O	2:B:399:GLU:HB2	2.12	0.48
2:F:145:GLY:HA2	2:F:180:GLY:HA3	1.96	0.48
2:B:65:ILE:HD12	2:B:161:VAL:HG11	1.95	0.48
1:E:351:GLY:O	1:E:382:SER:N	2.47	0.48
2:F:329:GLN:HA	2:F:359:SER:O	2.14	0.48
3:G:239:GLN:HB2	3:G:241:TYR:CE2	2.49	0.48
1:A:55:TRP:CD2	1:A:181:ARG:HG3	2.49	0.48
3:H:100:GLN:HG2	3:H:120:PHE:CZ	2.49	0.48
1:A:291:ASP:CG	1:A:292:ASN:N	2.65	0.48
3:D:11:VAL:N	3:D:16:ILE:HD11	2.28	0.48
3:D:234:LYS:HG2	3:D:235:GLN:HG2	1.96	0.48
2:B:242:PHE:HD1	2:B:269:ARG:HB3	1.79	0.47
1:E:36:LYS:HG3	1:E:37:GLY:N	2.28	0.47
2:F:214:GLN:NE2	2:F:402:ARG:HH12	2.12	0.47
3:H:207:ILE:HG23	3:H:208:LEU:HG	1.96	0.47
3:C:229:ASP:OD2	3:C:231:THR:OG1	2.24	0.47
3:D:5:LYS:HZ1	3:D:61:GLU:HG2	1.79	0.47
1:E:294:THR:HG21	1:E:324:ALA:CA	2.44	0.47
1:E:173:ILE:O	1:E:177:PRO:HA	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:335:ARG:HA	1:E:364:ILE:HB	1.96	0.47
1:E:461:MET:HG3	3:G:97:PHE:CE2	2.50	0.47
3:H:12:GLU:OE1	3:H:12:GLU:HA	2.15	0.47
3:D:117:ARG:HE	3:D:121:GLN:NE2	2.01	0.47
1:A:422:VAL:HB	2:B:345:THR:HG23	1.95	0.47
2:B:296:ASN:HA	2:B:327:ASP:O	2.14	0.47
3:D:17:LEU:HA	3:D:223:ARG:NH1	2.25	0.47
1:E:294:THR:OG1	1:E:324:ALA:N	2.47	0.47
1:E:299:ASN:C	1:E:300:PHE:HD1	2.23	0.47
1:E:334:LEU:HB3	1:E:339:SER:HB3	1.97	0.47
3:G:12:GLU:O	3:G:13:ASP:HB3	2.14	0.47
3:G:124:MET:HG3	3:G:138:LEU:HD11	1.96	0.47
3:H:124:MET:O	3:H:128:ILE:HG23	2.14	0.47
3:H:218:VAL:CG1	3:H:219:LEU:N	2.77	0.47
1:A:301:VAL:HG12	1:A:303:LYS:HG3	1.95	0.47
3:C:191:LEU:O	3:C:196:ARG:HD2	2.15	0.47
3:C:173:ASP:HB3	3:C:207:ILE:HD12	1.96	0.47
3:D:20:LEU:HB2	3:D:223:ARG:NH2	2.29	0.47
1:E:50:ARG:O	1:E:52:GLU:HG3	2.15	0.46
2:B:418:LEU:HB3	2:B:419:PRO:HD2	1.98	0.46
3:D:167:CYS:HB2	3:D:198:PHE:CD1	2.50	0.46
2:F:15:HIS:O	2:F:19:GLU:HG2	2.15	0.46
2:F:18:PHE:O	2:F:25:ARG:HD2	2.15	0.46
1:A:444:GLN:HA	3:C:88:VAL:HG11	1.98	0.46
2:B:21:GLU:H	2:B:21:GLU:HG3	1.46	0.46
3:H:16:ILE:HG21	3:H:42:THR:HG21	1.96	0.46
3:H:61:GLU:CD	3:H:61:GLU:C	2.83	0.46
2:F:254:ARG:HA	2:F:283:ASP:HB3	1.98	0.46
3:G:116:ASP:OD1	3:G:117:ARG:N	2.48	0.46
2:B:278:LYS:O	2:B:279:ASN:HB2	2.16	0.46
2:B:308:LYS:HB3	2:B:308:LYS:HE3	1.50	0.46
2:F:285:ARG:HA	2:F:314:ASN:O	2.15	0.46
3:H:16:ILE:HD12	3:H:42:THR:CG2	2.40	0.46
2:B:18:PHE:O	2:B:25:ARG:NE	2.46	0.46
1:E:161:GLU:HB3	1:E:164:ILE:H	1.80	0.46
3:H:230:PHE:O	3:H:233:VAL:HG23	2.16	0.46
1:E:445:LEU:O	1:E:449:LEU:HG	2.16	0.46
3:H:110:ARG:NH2	3:H:163:GLU:O	2.49	0.46
3:H:193:ASP:OD2	3:H:196:ARG:NH1	2.49	0.46
2:B:329:GLN:HA	2:B:359:SER:O	2.17	0.45
3:D:12:GLU:O	3:D:13:ASP:HB2	2.15	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:346:VAL:HG23	1:A:470:VAL:HG11	1.98	0.45
3:D:148:GLY:O	3:D:152:LYS:HG2	2.16	0.45
3:H:153:ARG:CZ	3:H:153:ARG:HB2	2.45	0.45
1:A:475:PRO:HB2	1:A:478:PHE:HD1	1.82	0.45
3:D:12:GLU:HB2	3:D:14:LYS:H	1.81	0.45
3:D:228:GLY:HA3	3:D:232:LEU:HD11	1.97	0.45
1:A:308:GLU:H	1:A:309:GLY:HA3	1.82	0.45
1:A:445:LEU:O	1:A:449:LEU:HG	2.16	0.45
1:A:461:MET:HG3	3:C:97:PHE:HE2	1.81	0.45
2:F:68:GLU:HG2	2:F:92:ARG:HH12	1.81	0.45
2:B:15:HIS:NE2	2:B:19:GLU:OE2	2.50	0.45
1:E:308:GLU:N	1:E:309:GLY:HA3	2.32	0.45
3:H:156:ILE:HG13	3:H:184:VAL:HG13	1.98	0.45
3:C:152:LYS:O	3:C:156:ILE:HD12	2.16	0.45
3:D:14:LYS:HD3	3:D:16:ILE:CG1	2.38	0.45
3:H:216:VAL:HB	3:H:232:LEU:HD23	1.98	0.45
1:A:162:GLN:O	1:A:164:ILE:HG13	2.17	0.45
3:C:124:MET:CG	3:C:138:LEU:HD21	2.47	0.45
3:D:128:ILE:HG23	3:D:133:MET:HB2	1.99	0.45
2:F:102:GLU:OE1	2:F:102:GLU:N	2.49	0.45
2:F:278:LYS:HB2	2:F:278:LYS:HE2	1.70	0.45
3:H:191:LEU:O	3:H:196:ARG:HD2	2.17	0.45
1:A:266:ALA:HA	1:A:300:PHE:O	2.16	0.45
1:A:318:GLN:NE2	1:A:328:LYS:NZ	2.64	0.45
1:A:360:LYS:HG2	1:A:389:LEU:HB3	1.99	0.45
2:B:220:PHE:O	2:B:413:ARG:NH2	2.49	0.45
3:D:8:HIS:O	3:D:56:THR:N	2.49	0.45
2:F:17:LEU:HD11	2:F:64:SER:HB2	1.98	0.45
3:H:13:ASP:N	3:H:13:ASP:OD1	2.49	0.45
3:D:3:SER:O	3:D:5:LYS:NZ	2.50	0.45
3:C:62:PHE:CE2	3:C:63:LYS:HE2	2.52	0.45
3:C:178:ILE:HG23	3:C:210:TYR:OH	2.17	0.45
1:E:450:GLN:HE21	1:E:450:GLN:CA	2.28	0.45
2:F:34:GLN:O	2:F:38:ARG:HG2	2.16	0.45
1:E:161:GLU:HB3	1:E:162:GLN:C	2.42	0.44
2:F:18:PHE:O	2:F:25:ARG:NH1	2.51	0.44
1:E:290:GLY:HA2	1:E:291:ASP:OD1	2.17	0.44
3:H:65:LYS:O	3:H:66:ASP:C	2.60	0.44
2:F:18:PHE:CZ	2:F:25:ARG:HD3	2.53	0.44
2:F:242:PHE:CD2	2:F:269:ARG:HB3	2.52	0.44
3:H:7:LEU:HD12	3:H:7:LEU:HA	1.73	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:417:HIS:HE1	2:F:352:TYR:CZ	2.36	0.44
1:A:484:LYS:HD3	1:A:484:LYS:HA	1.83	0.44
3:D:4:ILE:O	3:D:21:SER:HA	2.17	0.44
3:D:115:LEU:HD13	3:D:120:PHE:HA	2.00	0.44
3:H:61:GLU:CD	3:H:62:PHE:N	2.76	0.44
2:B:220:PHE:CE2	2:B:413:ARG:HG2	2.52	0.44
1:E:435:ALA:CB	2:F:360:HIS:CD2	2.96	0.44
3:G:120:PHE:CE2	3:G:124:MET:HE3	2.52	0.44
1:A:260:ASP:HA	1:A:293:ASN:ND2	2.29	0.44
3:D:5:LYS:NZ	3:D:61:GLU:HG2	2.32	0.44
1:E:39:ASN:OD1	1:E:42:VAL:HG23	2.18	0.44
1:E:439:ARG:NH1	2:F:354:ASP:OD2	2.51	0.44
3:G:68:LEU:HA	3:G:75:ARG:NH2	2.33	0.44
3:H:106:VAL:O	3:H:110:ARG:HD2	2.18	0.44
3:H:226:LYS:HE3	3:H:232:LEU:CD2	2.47	0.44
2:F:319:VAL:HG11	2:F:356:VAL:HG11	1.99	0.43
3:H:7:LEU:HG	3:H:9:VAL:HG23	1.99	0.43
1:A:173:ILE:HD13	1:A:180:VAL:HG11	2.00	0.43
1:E:304:ARG:HD2	1:E:333:ILE:HD11	2.00	0.43
3:C:127:LYS:HA	3:C:127:LYS:HD3	1.65	0.43
3:C:221:GLN:HE21	3:C:221:GLN:H	1.66	0.43
1:E:227:ILE:HD13	1:E:229:ALA:O	2.18	0.43
1:E:293:ASN:C	1:E:294:THR:HG22	2.43	0.43
1:E:422:VAL:HB	2:F:345:THR:HG23	1.99	0.43
2:F:185:VAL:HG11	2:F:203:PHE:HE2	1.83	0.43
2:F:376:ARG:HA	2:F:380:ILE:O	2.19	0.43
2:B:187:GLU:OE2	2:B:215:HIS:NE2	2.41	0.43
3:C:1:MET:HE2	3:C:3:SER:HB2	2.00	0.43
3:C:138:LEU:HD23	3:C:138:LEU:HA	1.75	0.43
3:D:11:VAL:O	3:D:13:ASP:N	2.51	0.43
1:E:171:GLU:O	1:E:175:ASP:HB2	2.18	0.43
3:H:16:ILE:HG21	3:H:42:THR:CG2	2.48	0.43
3:D:177:ASP:O	3:D:181:LEU:HB2	2.18	0.43
3:H:132:LYS:HE2	3:H:153:ARG:NH1	2.33	0.43
3:H:169:LEU:HB3	3:H:172:SER:OG	2.18	0.43
1:E:243:ASP:O	1:E:246:SER:OG	2.34	0.43
2:F:161:VAL:HG13	2:F:167:ASN:HB2	2.00	0.43
2:B:285:ARG:HA	2:B:314:ASN:O	2.18	0.43
3:D:42:THR:HG23	3:D:53:TYR:HD1	1.84	0.43
3:G:61:GLU:OE2	3:G:65:LYS:N	2.52	0.43
1:A:157:GLU:HB3	1:A:219:MET:SD	2.59	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:C:120:PHE:CZ	3:C:124:MET:HE3	2.54	0.43
3:D:149:GLY:HA2	3:D:176:LEU:CD2	2.46	0.43
3:D:179:ASP:CG	3:D:182:LYS:HE3	2.44	0.43
3:H:225:VAL:HG12	3:H:226:LYS:HG2	1.99	0.43
2:B:242:PHE:CD1	2:B:269:ARG:HB3	2.54	0.43
3:C:13:ASP:OD1	3:C:14:LYS:HG2	2.19	0.43
2:F:46:HIS:CD2	2:F:47:GLU:H	2.37	0.43
3:G:81:PHE:HE1	3:G:162:LEU:HD12	1.83	0.43
1:A:297:ILE:HG23	1:A:323:SER:HA	2.01	0.42
3:C:63:LYS:HD3	3:C:165:GLU:OE1	2.19	0.42
3:D:18:ARG:O	3:D:223:ARG:NE	2.52	0.42
3:D:96:GLN:HE22	3:D:121:GLN:NE2	2.17	0.42
1:E:235:PHE:CD1	1:E:266:ALA:HB3	2.54	0.42
1:A:379:ALA:O	1:A:382:SER:OG	2.36	0.42
1:E:353:GLN:O	1:E:382:SER:HB2	2.19	0.42
3:H:127:LYS:HA	3:H:127:LYS:HD3	1.82	0.42
3:D:212:LYS:HA	3:D:213:PRO:HD3	1.75	0.42
3:G:233:VAL:O	3:G:236:LEU:HB2	2.19	0.42
3:H:234:LYS:N	3:H:234:LYS:HD2	2.34	0.42
1:E:294:THR:HG21	1:E:324:ALA:CB	2.49	0.42
3:H:120:PHE:CZ	3:H:124:MET:HE3	2.54	0.42
1:A:212:PRO:HG2	1:A:215:VAL:HG21	2.02	0.42
1:A:427:ASN:HB3	2:B:338:GLY:O	2.19	0.42
2:B:275:MET:SD	2:B:414:ILE:HG23	2.59	0.42
2:B:245:SER:O	2:B:272:SER:HA	2.20	0.42
3:D:181:LEU:HA	3:D:184:VAL:HG12	2.01	0.42
1:E:294:THR:HG23	1:E:296:GLY:N	2.24	0.42
1:A:67:TRP:CE2	1:A:198:LEU:HD13	2.55	0.42
1:A:358:GLY:HA3	1:A:387:ARG:O	2.20	0.42
1:E:211:VAL:HA	1:E:212:PRO:HD3	1.80	0.42
1:E:450:GLN:OE1	3:G:82:MET:CB	2.66	0.42
3:G:236:LEU:HD23	3:G:236:LEU:HA	1.72	0.42
3:H:132:LYS:HB3	3:H:153:ARG:NE	2.35	0.42
2:F:390:ILE:HG21	2:F:418:LEU:HD21	2.01	0.41
3:H:24:VAL:HA	3:H:28:GLU:OE2	2.20	0.41
2:B:302:LYS:HB2	2:B:397:LEU:HD11	2.02	0.41
1:E:490:LEU:O	1:E:494:VAL:HG12	2.20	0.41
3:G:124:MET:HE1	3:G:161:VAL:HG21	2.01	0.41
1:E:329:TYR:OH	1:E:356:ASP:OD1	2.32	0.41
2:F:17:LEU:HD11	2:F:64:SER:HB3	2.02	0.41
3:G:17:LEU:HD23	3:G:17:LEU:HA	1.67	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:267:ALA:HB3	1:A:301:VAL:HG13	2.02	0.41
1:E:76:LEU:HD11	1:E:325:ILE:HG23	2.02	0.41
1:E:444:GLN:HG2	3:G:88:VAL:HG11	2.02	0.41
3:H:16:ILE:CG1	3:H:42:THR:HG21	2.51	0.41
3:H:179:ASP:N	3:H:179:ASP:OD1	2.53	0.41
2:B:179:GLU:HG3	2:B:209:ALA:HB3	2.03	0.41
1:E:298:LEU:HD23	1:E:324:ALA:HB3	2.02	0.41
3:H:15:ALA:HB1	3:H:18:ARG:HG3	2.03	0.41
1:A:468:LYS:O	1:A:472:SER:OG	2.37	0.41
3:D:6:ASP:O	3:D:58:GLY:HA3	2.20	0.41
1:E:446:PHE:CZ	3:G:50:ARG:HG3	2.56	0.41
3:C:242:GLY:HA2	3:C:243:TRP:C	2.45	0.41
3:D:222:GLY:C	3:D:223:ARG:NH1	2.78	0.41
2:F:242:PHE:HD2	2:F:269:ARG:HB3	1.85	0.41
3:H:4:ILE:O	3:H:21:SER:HA	2.20	0.41
1:A:427:ASN:O	2:B:366:ARG:HB3	2.20	0.41
3:C:81:PHE:HB2	3:C:164:PRO:HB3	2.03	0.41
3:C:96:GLN:O	3:C:100:GLN:HB2	2.21	0.41
1:E:446:PHE:CE2	3:G:50:ARG:HG3	2.55	0.41
3:G:149:GLY:O	3:G:153:ARG:HG3	2.20	0.41
1:A:421:TYR:CD2	2:B:346:LYS:HD2	2.56	0.41
1:E:66:ALA:O	1:E:70:MET:HG3	2.21	0.41
3:G:121:GLN:O	3:G:124:MET:HB2	2.20	0.41
3:H:8:HIS:CD2	3:H:18:ARG:HG2	2.56	0.41
2:F:57:LEU:HD13	2:F:226:HIS:CG	2.57	0.40
2:F:225:SER:O	2:F:251:ALA:N	2.44	0.40
3:H:61:GLU:CD	3:H:65:LYS:N	2.78	0.40
3:H:152:LYS:O	3:H:155:ASP:HB2	2.21	0.40
1:A:39:ASN:OD1	1:A:42:VAL:HG23	2.21	0.40
3:C:5:LYS:CE	3:C:59:THR:HB	2.51	0.40
3:C:8:HIS:HB2	3:C:56:THR:O	2.21	0.40
3:C:117:ARG:NE	3:C:118:PHE:HE1	2.19	0.40
3:C:164:PRO:HG2	3:C:167:CYS:SG	2.62	0.40
3:D:18:ARG:H	3:D:223:ARG:CZ	2.34	0.40
3:D:120:PHE:CZ	3:D:124:MET:HE3	2.57	0.40
3:D:180:ALA:O	3:D:184:VAL:HG12	2.21	0.40
3:D:181:LEU:HA	3:D:184:VAL:CG1	2.51	0.40
3:D:212:LYS:HB2	3:D:212:LYS:HE2	1.89	0.40
2:B:143:LYS:HE2	2:B:143:LYS:HB3	1.88	0.40
3:C:42:THR:HG23	3:C:53:TYR:HD1	1.85	0.40
3:C:242:GLY:HA2	3:C:243:TRP:HA	1.82	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:42:THR:HG23	3:D:53:TYR:CD1	2.56	0.40
1:E:450:GLN:HG2	1:E:451:ARG:NH1	2.37	0.40
3:G:16:ILE:HG21	3:G:42:THR:OG1	2.21	0.40
3:G:120:PHE:CZ	3:G:124:MET:HE3	2.56	0.40
3:G:128:ILE:HG23	3:G:133:MET:HB2	2.03	0.40
3:D:40:LYS:O	3:D:43:LEU:HB3	2.22	0.40
1:E:36:LYS:CG	1:E:37:GLY:N	2.85	0.40
2:F:308:LYS:HG3	2:F:340:LEU:HD13	2.02	0.40
3:G:1:MET:HE2	3:G:25:HIS:CD2	2.55	0.40
1:A:439:ARG:HD2	2:B:355:ASP:HA	2.03	0.40
3:D:20:LEU:HD12	3:D:222:GLY:O	2.21	0.40
2:F:140:ILE:HG21	2:F:152:LEU:HD22	2.03	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	381/495 (77%)	364 (96%)	15 (4%)	2 (0%)	24	49
1	E	377/495 (76%)	367 (97%)	10 (3%)	0	100	100
2	B	412/423 (97%)	408 (99%)	4 (1%)	0	100	100
2	F	412/423 (97%)	402 (98%)	9 (2%)	1 (0%)	43	66
3	C	241/248 (97%)	235 (98%)	6 (2%)	0	100	100
3	D	233/248 (94%)	223 (96%)	10 (4%)	0	100	100
3	G	241/248 (97%)	232 (96%)	8 (3%)	1 (0%)	30	53
3	H	234/248 (94%)	226 (97%)	8 (3%)	0	100	100
All	All	2531/2828 (90%)	2457 (97%)	70 (3%)	4 (0%)	43	66

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	202	VAL
1	A	289	PRO
2	F	60	SER
3	G	12	GLU

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	323/413 (78%)	310 (96%)	13 (4%)	28	53
1	E	320/413 (78%)	303 (95%)	17 (5%)	20	45
2	B	344/350 (98%)	337 (98%)	7 (2%)	48	71
2	F	344/350 (98%)	334 (97%)	10 (3%)	37	61
3	C	207/212 (98%)	200 (97%)	7 (3%)	32	58
3	D	201/212 (95%)	189 (94%)	12 (6%)	17	40
3	G	207/212 (98%)	197 (95%)	10 (5%)	23	48
3	H	202/212 (95%)	189 (94%)	13 (6%)	16	38
All	All	2148/2374 (90%)	2059 (96%)	89 (4%)	27	53

All (89) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	36	LYS
1	A	76	LEU
1	A	184	LEU
1	A	231	LYS
1	A	258	VAL
1	A	273	ILE
1	A	294	THR
1	A	297	ILE
1	A	318	GLN
1	A	357	THR
1	A	397	THR
1	A	407	SER

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Mol	Chain	Res	Type
1	A	456	GLU
2	B	12	GLN
2	B	45	LYS
2	B	61	GLN
2	B	92	ARG
2	B	143	LYS
2	B	248	LEU
2	B	308	LYS
3	C	5	LYS
3	C	7	LEU
3	C	59	THR
3	C	61	GLU
3	C	156	ILE
3	C	182	LYS
3	C	221	GLN
3	D	4	ILE
3	D	5	LYS
3	D	11	VAL
3	D	41	SER
3	D	54	GLU
3	D	68	LEU
3	D	131	LEU
3	D	179	ASP
3	D	181	LEU
3	D	184	VAL
3	D	206	ARG
3	D	212	LYS
1	E	46	ILE
1	E	49	LYS
1	E	54	GLU
1	E	76	LEU
1	E	164	ILE
1	E	178	GLU
1	E	205	ASP
1	E	213	LYS
1	E	223	THR
1	E	230	GLU
1	E	393	MET
1	E	397	THR
1	E	414	CYS
1	E	425	ARG
1	E	434	GLU

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Mol	Chain	Res	Type
1	E	450	GLN
1	E	492	HIS
2	F	19	GLU
2	F	21	GLU
2	F	31	GLN
2	F	35	GLN
2	F	61	GLN
2	F	248	LEU
2	F	307	ASP
2	F	360	HIS
2	F	383	GLN
2	F	404	GLU
3	G	7	LEU
3	G	9	VAL
3	G	14	LYS
3	G	55	VAL
3	G	67	LEU
3	G	131	LEU
3	G	138	LEU
3	G	165	GLU
3	G	221	GLN
3	G	223	ARG
3	H	16	ILE
3	H	40	LYS
3	H	54	GLU
3	H	63	LYS
3	H	88	VAL
3	H	113	GLU
3	H	116	ASP
3	H	127	LYS
3	H	195	LYS
3	H	212	LYS
3	H	217	HIS
3	H	223	ARG
3	H	226	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (25) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	234	GLN
1	A	263	GLN
1	A	318	GLN

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Mol	Chain	Res	Type
1	A	367	ASN
1	A	404	GLN
2	B	188	HIS
2	B	360	HIS
2	B	387	GLN
3	C	8	HIS
3	C	25	HIS
3	C	221	GLN
3	C	239	GLN
3	D	121	GLN
1	E	285	GLN
1	E	318	GLN
2	F	59	ASN
2	F	122	GLN
2	F	210	ASN
2	F	214	GLN
2	F	244	HIS
2	F	265	ASN
2	F	333	ASN
3	G	36	ASN
3	H	8	HIS
3	H	25	HIS

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 oligosaccharides 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 [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, 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	385/495 (77%)	0.17	26 (6%)	23	20	29, 63, 127, 184	0
1	E	381/495 (76%)	0.41	24 (6%)	26	22	43, 81, 140, 198	0
2	B	414/423 (97%)	-0.12	5 (1%)	76	71	28, 61, 100, 154	0
2	F	414/423 (97%)	0.26	16 (3%)	43	35	44, 78, 123, 176	0
3	C	243/248 (97%)	0.34	15 (6%)	26	22	43, 80, 140, 174	0
3	D	235/248 (94%)	0.47	14 (5%)	27	23	44, 90, 153, 194	0
3	G	243/248 (97%)	0.33	9 (3%)	45	37	46, 80, 128, 163	0
3	H	236/248 (95%)	0.78	28 (11%)	9	8	47, 114, 176, 266	0
All	All	2551/2828 (90%)	0.29	137 (5%)	31	26	28, 78, 143, 266	0

All (137) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	D	222	GLY	7.3
1	A	296	GLY	5.9
1	A	35	ALA	5.0
1	A	295	GLY	4.7
2	F	296	ASN	4.6
3	C	13	ASP	4.0
1	E	160	ALA	4.0
3	C	241	TYR	4.0
3	D	38	SER	3.9
3	C	236	LEU	3.9
1	A	233	GLY	3.9
1	E	174	HIS	3.9
3	H	30	HIS	3.7
3	D	39	GLY	3.6
3	D	233	VAL	3.6
3	G	37	GLY	3.6

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Mol	Chain	Res	Type	RSRZ
3	H	226	LYS	3.5
2	F	23	THR	3.4
3	C	115	LEU	3.3
3	D	16	ILE	3.3
1	E	294	THR	3.3
1	E	293	ASN	3.3
3	D	15	ALA	3.3
3	H	220	TYR	3.2
3	G	11	VAL	3.1
1	E	159	LEU	3.1
3	D	37	GLY	3.0
1	A	48	ALA	3.0
2	F	60	SER	3.0
2	F	17	LEU	3.0
3	C	6	ASP	3.0
1	E	78	ALA	3.0
3	C	239	GLN	2.9
3	C	5	LYS	2.9
1	E	49	LYS	2.9
1	E	357	THR	2.9
2	F	39	THR	2.9
3	G	64	GLY	2.8
2	F	10	ALA	2.8
1	A	158	LYS	2.8
1	E	36	LYS	2.8
2	B	307	ASP	2.8
1	E	233	GLY	2.8
3	G	194	GLY	2.8
3	D	114	THR	2.8
1	A	160	ALA	2.8
1	A	76	LEU	2.7
2	F	419	PRO	2.7
3	H	116	ASP	2.7
3	D	41	SER	2.7
3	H	41	SER	2.7
2	B	102	GLU	2.7
2	B	8	SER	2.7
2	F	340	LEU	2.7
1	A	494	VAL	2.6
3	C	243	TRP	2.6
1	A	159	LEU	2.6
1	A	78	ALA	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	255	SER	2.6
1	E	495	GLY	2.6
1	E	339	SER	2.5
3	G	234	LYS	2.5
3	H	219	LEU	2.5
1	E	308	GLU	2.5
3	H	1	MET	2.5
1	A	74	HIS	2.5
1	A	34	LEU	2.5
2	B	421	GLY	2.4
3	C	221	GLN	2.4
1	A	71	GLU	2.4
3	G	38	SER	2.4
2	B	96	ALA	2.4
1	A	297	ILE	2.4
1	A	289	PRO	2.4
3	D	40	LYS	2.4
1	A	488	ILE	2.4
3	H	16	ILE	2.4
1	E	312	SER	2.3
3	C	59	THR	2.3
1	E	225	PHE	2.3
3	D	235	GLN	2.3
3	H	235	GLN	2.3
1	A	49	LYS	2.3
3	H	234	LYS	2.3
3	D	52	ASP	2.3
1	A	79	HIS	2.3
1	A	294	THR	2.3
3	C	60	VAL	2.3
3	H	222	GLY	2.3
1	A	225	PHE	2.3
3	G	10	SER	2.3
3	C	242	GLY	2.3
3	H	39	GLY	2.3
3	D	113	GLU	2.2
3	D	230	PHE	2.2
2	F	339	LYS	2.2
1	A	73	PRO	2.2
3	C	57	GLY	2.2
3	H	178	ILE	2.2
3	H	66	ASP	2.2

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Mol	Chain	Res	Type	RSRZ
3	H	204	TYR	2.2
1	A	265	HIS	2.2
3	G	242	GLY	2.2
1	E	318	GLN	2.1
3	H	23	ASP	2.1
1	E	48	ALA	2.1
1	E	229	ALA	2.1
3	H	15	ALA	2.1
1	E	494	VAL	2.1
3	H	218	VAL	2.1
3	G	14	LYS	2.1
2	F	249	GLY	2.1
2	F	26	SER	2.1
3	C	235	GLN	2.1
3	H	35	PRO	2.1
3	H	62	PHE	2.1
3	H	202	THR	2.1
2	F	164	GLU	2.1
3	H	211	ILE	2.1
1	E	74	HIS	2.1
3	H	104	ASN	2.1
3	H	20	LEU	2.1
2	F	420	GLY	2.1
3	H	224	ILE	2.1
1	E	161	GLU	2.1
1	E	310	GLU	2.1
3	C	3	SER	2.0
3	H	175	GLY	2.0
1	E	232	THR	2.0
1	A	54	GLU	2.0
3	H	24	VAL	2.0
3	H	17	LEU	2.0
2	F	315	GLY	2.0
2	F	338	GLY	2.0
1	A	232	THR	2.0
1	E	203	ALA	2.0
2	F	100	ALA	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides 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.