Full wwPDB X-ray Structure Validation Report (i)

May 22, 2020 – 03:06 am BST

PDB ID	:	2FSF
Title	:	Escherichia coli SecA, the preprotein translocase dimeric ATPase
Authors	:	Papanikolau, Y.; Petratos, K.; Economou, A.
Deposited on	:	2006-01-23
Resolution	:	2.00 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 (i) symbol.

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

|		
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
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)	:	2.11

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	Percentile Ranks	Value
Rfree		0.292
Clashscore		11
Ramachandran outliers		3.1%
Sidechain outliers		9.9%

Worse ← → *Better*

■ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution
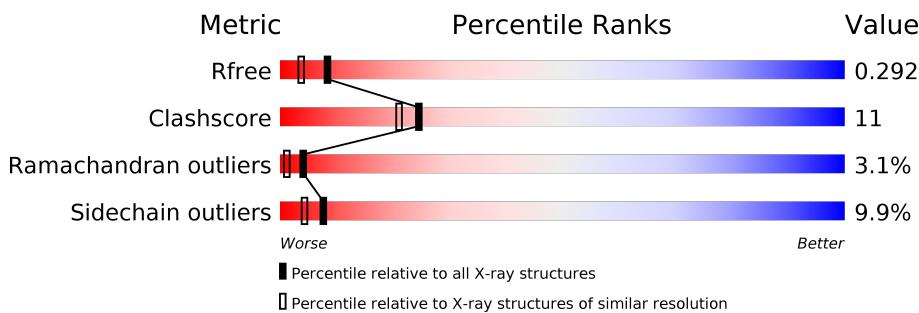
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)

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 >=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 <=5%

Mol	Chain	Length	Quality of chain
1	A	853	61% / 15% / · · / 20%
1	B	853	55% / 21% / 7% · / 15%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 11637 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 Preprotein translocase secA subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	686	Total	C	N	O	S	0	0	0
			5462	3426	966	1044	26			
1	B	723	Total	C	N	O	S	0	0	0
			5741	3600	1009	1104	28			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	177	Total	O	0	0
			177	177		
2	B	257	Total	O	0	0
			257	257		

3 Residue-property plots ⓘ

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

• Molecule 1: Preprotein translocase secA subunit

Chain A:

• Molecule 1: Preprotein translocase secA subunit

Chain B:
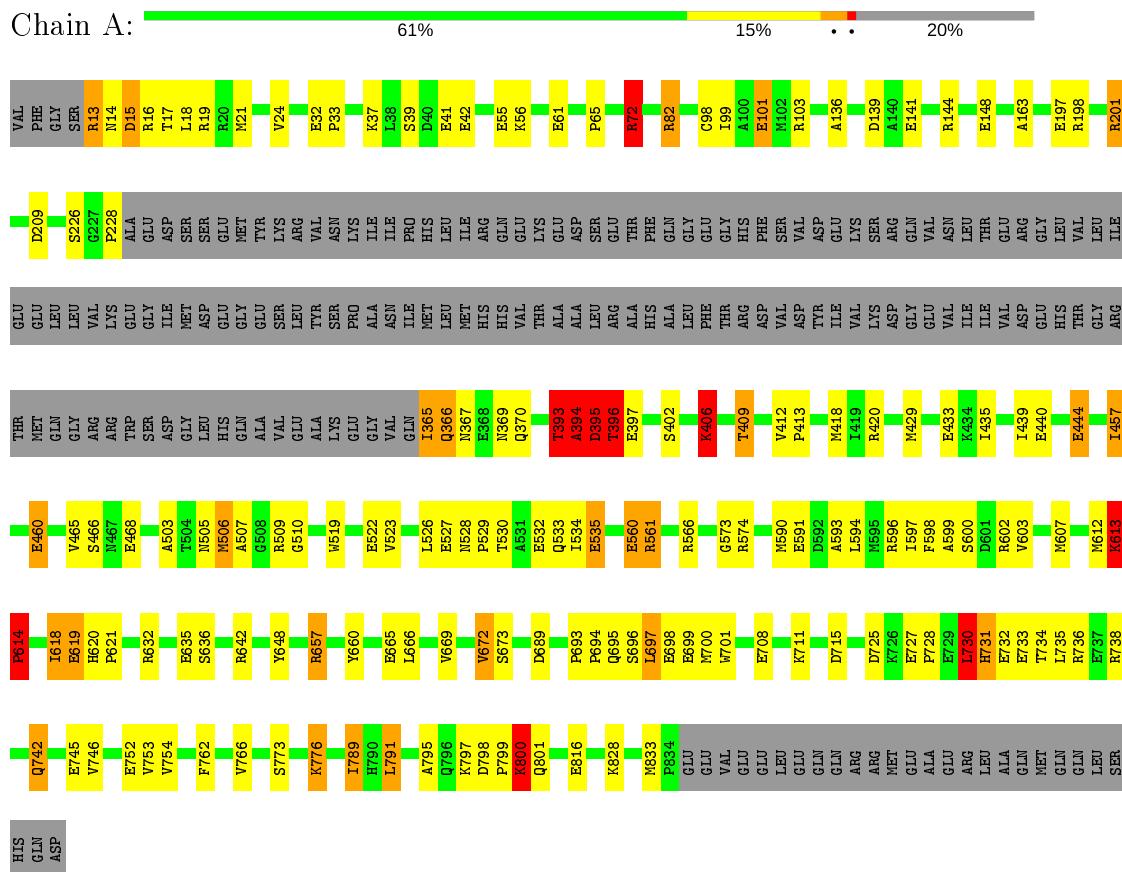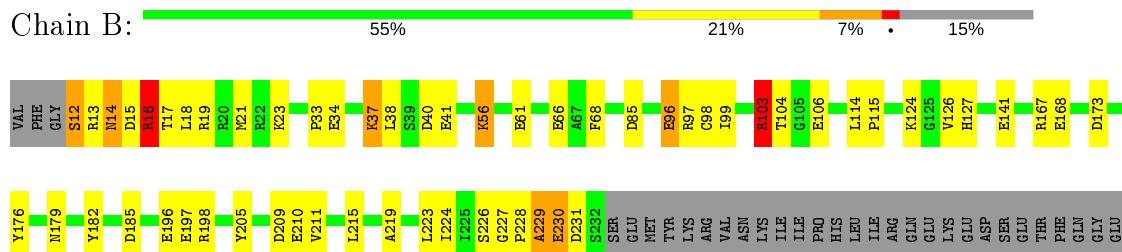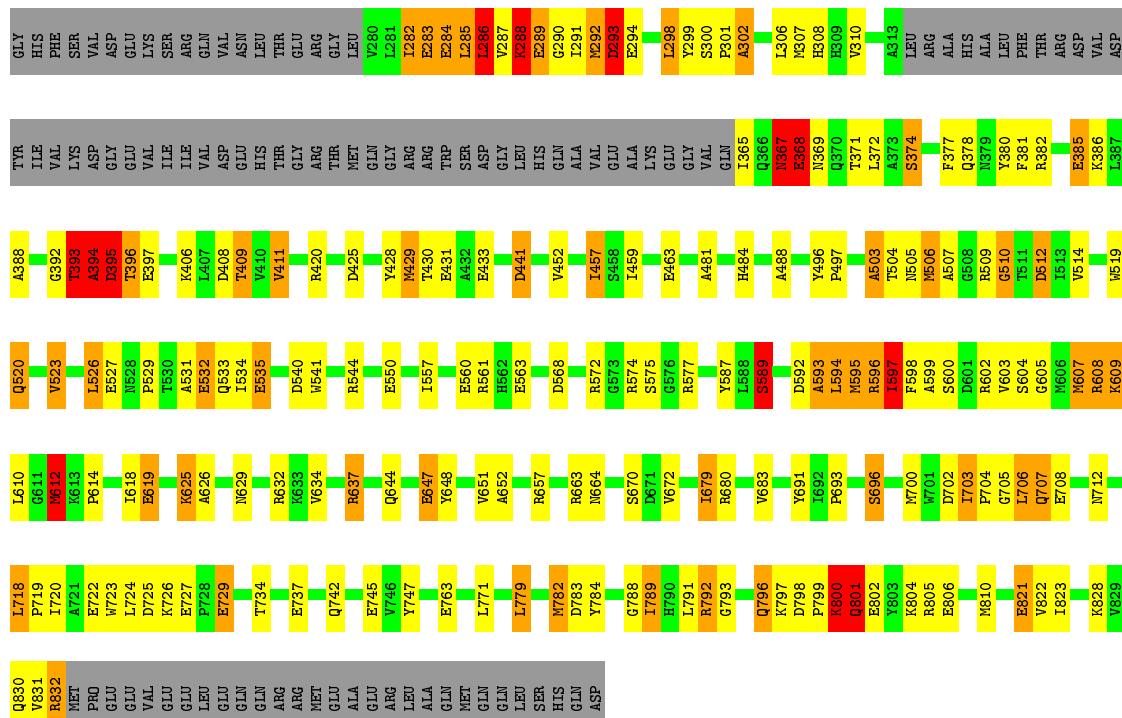
4   Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	75.03Å 90.17Å 163.05Å 90.00° 100.48° 90.00°	Depositor
Resolution (Å)	19.98 – 2.00 19.98 – 2.00	Depositor EDS
% Data completeness (in resolution range)	97.1 (19.98-2.00) 97.1 (19.98-2.00)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	1.82 (at 2.01Å)	Xtriage
Refinement program	REFMAC 5.2.0005	Depositor
R, R_{free}	0.213 , 0.261 0.260 , 0.292	Depositor DCC
R_{free} test set	7010 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	35.8	Xtriage
Anisotropy	0.109	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 64.3	EDS
L-test for twinning[2]	$<|L|> = 0.50, <L^2> = 0.33$	Xtriage
Estimated twinning fraction	0.015 for h,-k,-h-l	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	11637	wwPDB-VP
Average B, all atoms (Å^2)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.93% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.

[2]Theoretical values of $<|L|>$, $<L^2>$ 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	1.34	35/5552 (0.6%)	1.10	19/7491 (0.3%)
1	B	1.49	61/5833 (1.0%)	1.20	36/7870 (0.5%)
All	All	1.42	96/11385 (0.8%)	1.15	55/15361 (0.4%)

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	4
1	B	0	9
All	All	0	13

All (96) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	98	CYS	CB-SG	-13.49	1.59	1.82
1	A	698	GLU	CD-OE2	13.10	1.40	1.25
1	A	698	GLU	CD-OE1	10.85	1.37	1.25
1	A	560	GLU	CG-CD	9.58	1.66	1.51
1	A	697	LEU	C-N	9.56	1.56	1.34
1	B	284	GLU	CD-OE2	9.48	1.36	1.25
1	A	695	GLN	C-O	8.68	1.39	1.23
1	A	698	GLU	C-O	8.58	1.39	1.23
1	B	393	THR	N-CA	8.55	1.63	1.46
1	B	103	ARG	CG-CD	8.49	1.73	1.51
1	B	395	ASP	N-CA	8.31	1.62	1.46
1	B	652	ALA	CA-CB	8.26	1.69	1.52
1	B	385	GLU	CG-CD	8.09	1.64	1.51
1	B	98	CYS	CB-SG	-8.04	1.68	1.82
1	B	393	THR	C-O	7.89	1.38	1.23
1	B	210	GLU	CG-CD	7.84	1.63	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	465	VAL	CB-CG1	-7.25	1.37	1.52
1	B	61	GLU	CD-OE1	7.23	1.33	1.25
1	A	752	GLU	CG-CD	7.22	1.62	1.51
1	B	802	GLU	CD-OE1	7.20	1.33	1.25
1	B	66	GLU	CD-OE2	7.10	1.33	1.25
1	B	41	GLU	CG-CD	7.06	1.62	1.51
1	B	168	GLU	CB-CG	-7.04	1.38	1.52
1	A	197	GLU	CG-CD	6.81	1.62	1.51
1	A	460	GLU	CG-CD	6.64	1.61	1.51
1	B	512	ASP	CB-CG	6.63	1.65	1.51
1	B	625	LYS	CD-CE	6.50	1.67	1.51
1	B	97	ARG	CG-CD	6.49	1.68	1.51
1	B	385	GLU	CD-OE1	6.40	1.32	1.25
1	B	806	GLU	CG-CD	6.37	1.61	1.51
1	B	801	GLN	N-CA	6.35	1.59	1.46
1	A	136	ALA	CA-CB	6.35	1.65	1.52
1	A	660	TYR	CE1-CZ	6.33	1.46	1.38
1	B	197	GLU	CD-OE2	6.25	1.32	1.25
1	A	745	GLU	CG-CD	6.22	1.61	1.51
1	B	66	GLU	CG-CD	6.20	1.61	1.51
1	B	428	TYR	CE1-CZ	-6.12	1.30	1.38
1	A	163	ALA	CA-CB	-6.10	1.39	1.52
1	B	381	PHE	CE1-CZ	6.10	1.49	1.37
1	A	61	GLU	CD-OE1	6.10	1.32	1.25
1	B	23	LYS	CE-NZ	6.09	1.64	1.49
1	B	589	SER	CB-OG	-6.07	1.34	1.42
1	A	141	GLU	CD-OE1	6.06	1.32	1.25
1	A	406	LYS	CD-CE	6.05	1.66	1.51
1	B	96	GLU	CD-OE1	6.04	1.32	1.25
1	B	394	ALA	CA-CB	6.01	1.65	1.52
1	B	182	TYR	CD1-CE1	6.00	1.48	1.39
1	B	61	GLU	CD-OE2	5.95	1.32	1.25
1	B	393	THR	CA-CB	5.90	1.68	1.53
1	B	708	GLU	CB-CG	5.87	1.63	1.52
1	B	821	GLU	CG-CD	-5.82	1.43	1.51
1	B	385	GLU	CD-OE2	5.80	1.32	1.25
1	B	66	GLU	CB-CG	-5.78	1.41	1.52
1	B	822	VAL	CB-CG2	5.77	1.65	1.52
1	A	197	GLU	CD-OE1	5.77	1.31	1.25
1	A	698	GLU	C-N	5.74	1.47	1.34
1	A	460	GLU	CB-CG	5.74	1.63	1.52
1	A	61	GLU	CB-CG	5.68	1.62	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	752	GLU	CD-OE1	5.65	1.31	1.25
1	B	452	VAL	CB-CG2	-5.55	1.41	1.52
1	A	673	SER	CB-OG	-5.54	1.35	1.42
1	A	466	SER	C-O	5.51	1.33	1.23
1	A	394	ALA	CA-CB	5.51	1.64	1.52
1	B	173	ASP	CB-CG	5.50	1.63	1.51
1	B	560	GLU	CG-CD	5.49	1.60	1.51
1	B	380	TYR	CE2-CZ	-5.47	1.31	1.38
1	A	56	LYS	CD-CE	5.46	1.64	1.51
1	B	196	GLU	CD-OE1	-5.45	1.19	1.25
1	A	665	GLU	CG-CD	5.36	1.59	1.51
1	B	126	VAL	CB-CG2	5.36	1.64	1.52
1	A	396	THR	N-CA	5.33	1.57	1.46
1	A	776	LYS	CD-CE	5.33	1.64	1.51
1	B	625	LYS	CE-NZ	5.32	1.62	1.49
1	B	411	VAL	CB-CG1	5.30	1.64	1.52
1	B	124	LYS	CD-CE	5.29	1.64	1.51
1	B	647	GLU	CD-OE2	5.27	1.31	1.25
1	B	197	GLU	CG-CD	5.22	1.59	1.51
1	B	182	TYR	CD2-CE2	5.22	1.47	1.39
1	A	560	GLU	CD-OE1	5.20	1.31	1.25
1	B	106	GLU	CG-CD	5.19	1.59	1.51
1	B	141	GLU	CG-CD	5.18	1.59	1.51
1	B	127	HIS	C-O	-5.16	1.13	1.23
1	B	176	TYR	CB-CG	5.16	1.59	1.51
1	B	395	ASP	CA-C	5.15	1.66	1.52
1	B	388	ALA	CA-CB	5.14	1.63	1.52
1	B	386	LYS	CD-CE	5.14	1.64	1.51
1	B	196	GLU	CB-CG	-5.12	1.42	1.52
1	B	503	ALA	CA-CB	-5.08	1.41	1.52
1	B	626	ALA	CA-CB	-5.06	1.41	1.52
1	A	197	GLU	CD-OE2	5.05	1.31	1.25
1	A	406	LYS	CE-NZ	5.04	1.61	1.49
1	B	406	LYS	CD-CE	5.04	1.63	1.51
1	B	68	PHE	CD1-CE1	5.03	1.49	1.39
1	A	201	ARG	CB-CG	-5.03	1.39	1.52
1	B	56	LYS	CE-NZ	5.03	1.61	1.49
1	A	101	GLU	CG-CD	5.01	1.59	1.51

All (55) bond angle outliers are listed below:

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	167	ARG	NE-CZ-NH1	9.57	125.09	120.30
1	B	425	ASP	CB-CG-OD2	-9.12	110.09	118.30
1	B	425	ASP	CB-CG-OD1	9.05	126.45	118.30
1	A	72	ARG	NE-CZ-NH2	8.68	124.64	120.30
1	B	561	ARG	NE-CZ-NH1	8.38	124.49	120.30
1	B	782	MET	CG-SD-CE	7.75	112.59	100.20
1	B	408	ASP	CB-CG-OD2	-7.63	111.43	118.30
1	A	72	ARG	NE-CZ-NH1	-7.63	116.49	120.30
1	A	574	ARG	NE-CZ-NH1	-7.44	116.58	120.30
1	A	800	LYS	N-CA-C	-7.32	91.25	111.00
1	B	167	ARG	NE-CZ-NH2	-7.27	116.67	120.30
1	A	209	ASP	CB-CG-OD2	-7.23	111.79	118.30
1	A	657	ARG	NE-CZ-NH2	7.23	123.92	120.30
1	A	574	ARG	NE-CZ-NH2	7.12	123.86	120.30
1	B	801	GLN	N-CA-CB	7.04	123.27	110.60
1	A	420	ARG	NE-CZ-NH1	6.84	123.72	120.30
1	B	85	ASP	CB-CG-OD2	-6.81	112.17	118.30
1	B	625	LYS	CD-CE-NZ	6.55	126.76	111.70
1	B	779	LEU	CA-CB-CG	6.52	130.30	115.30
1	B	429	MET	CG-SD-CE	-6.51	89.78	100.20
1	B	185	ASP	CB-CG-OD2	-6.44	112.51	118.30
1	A	561	ARG	NE-CZ-NH2	-6.40	117.10	120.30
1	B	40	ASP	CB-CG-OD1	6.25	123.93	118.30
1	A	566	ARG	NE-CZ-NH1	-6.21	117.19	120.30
1	B	209	ASP	CB-CG-OD2	-6.14	112.77	118.30
1	B	544	ARG	NE-CZ-NH2	-6.00	117.30	120.30
1	B	441	ASP	CB-CG-OD2	5.93	123.64	118.30
1	A	82	ARG	NE-CZ-NH2	-5.93	117.33	120.30
1	A	82	ARG	NE-CZ-NH1	5.88	123.24	120.30
1	B	832	ARG	NE-CZ-NH2	5.80	123.20	120.30
1	B	374	SER	CA-CB-OG	-5.75	95.69	111.20
1	B	663	ARG	NE-CZ-NH2	-5.70	117.45	120.30
1	B	34	GLU	CB-CA-C	-5.70	99.01	110.40
1	B	568	ASP	CB-CG-OD1	5.68	123.41	118.30
1	B	205	TYR	CD1-CE1-CZ	-5.64	114.72	119.80
1	B	420	ARG	NE-CZ-NH1	5.63	123.11	120.30
1	A	198	ARG	NE-CZ-NH1	5.62	123.11	120.30
1	A	418	MET	CG-SD-CE	5.61	109.17	100.20
1	B	103	ARG	CG-CD-NE	5.59	123.54	111.80
1	B	16	ARG	NE-CZ-NH1	5.50	123.05	120.30
1	B	589	SER	CB-CA-C	-5.49	99.66	110.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	572	ARG	CG-CD-NE	-5.49	100.27	111.80
1	B	385	GLU	OE1-CD-OE2	5.43	129.82	123.30
1	B	540	ASP	CB-CG-OD1	-5.41	113.43	118.30
1	B	408	ASP	CB-CG-OD1	5.39	123.15	118.30
1	A	698	GLU	O-C-N	5.38	131.31	122.70
1	A	139	ASP	CB-CG-OD1	5.32	123.09	118.30
1	A	697	LEU	C-N-CA	-5.32	108.41	121.70
1	B	608	ARG	N-CA-CB	5.29	120.13	110.60
1	A	198	ARG	NE-CZ-NH2	-5.28	117.66	120.30
1	B	800	LYS	C-N-CA	-5.26	108.55	121.70
1	B	40	ASP	CB-CG-OD2	-5.24	113.58	118.30
1	B	286	LEU	CA-CB-CG	5.16	127.18	115.30
1	B	800	LYS	O-C-N	-5.16	114.44	122.70
1	A	689	ASP	CB-CG-OD1	5.14	122.93	118.30

There are no chirality outliers.

All (13) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	13	ARG	Peptide
1	A	393	THR	Peptide
1	A	395	ASP	Peptide
1	A	697	LEU	Mainchain
1	B	229	ALA	Peptide
1	B	300	SER	Peptide
1	B	365	ILE	Peptide
1	B	393	THR	Peptide
1	B	394	ALA	Peptide
1	B	597	ILE	Peptide
1	B	607	MET	Peptide
1	B	610	LEU	Peptide
1	B	793	GLY	Peptide

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	5462	0	5460	90	0
1	B	5741	0	5731	155	1
2	A	177	0	0	12	0
2	B	257	0	0	30	0
All	All	11637	0	11191	245	1

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 11.

All (245) 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:B:96:GLU:HG3	2:B:1033:HOH:O	1.46	1.13
1:A:799:PRO:HA	2:A:1026:HOH:O	1.50	1.08
1:B:800:LYS:O	1:B:801:GLN:HB2	1.61	1.01
1:B:103:ARG:HH11	1:B:103:ARG:HG3	1.26	0.97
1:A:799:PRO:C	1:A:800:LYS:O	1.95	0.93
1:A:394:ALA:HA	2:A:980:HOH:O	1.68	0.92
1:A:15:ASP:HA	1:A:18:LEU:HB2	1.53	0.91
1:B:457:ILE:O	1:B:505:ASN:ND2	2.10	0.85
1:A:732:GLU:OE2	1:A:736:ARG:NH1	2.11	0.84
1:A:736:ARG:CZ	2:A:1005:HOH:O	2.25	0.84
1:A:799:PRO:CA	2:A:1026:HOH:O	2.18	0.82
1:A:731:HIS:HB3	2:A:1016:HOH:O	1.80	0.81
1:A:736:ARG:NE	2:A:1005:HOH:O	2.14	0.80
1:B:693:PRO:O	1:B:696:SER:HB2	1.80	0.80
1:A:598:PHE:O	1:A:600:SER:N	2.15	0.80
1:B:103:ARG:HD2	1:B:104:THR:N	1.99	0.78
1:A:535:GLU:HA	1:A:535:GLU:OE1	1.82	0.78
1:B:230:GLU:OE2	1:B:369:ASN:HA	1.85	0.77
1:B:395:ASP:CB	2:B:964:HOH:O	2.32	0.76
1:B:395:ASP:CA	2:B:964:HOH:O	2.34	0.76
1:A:731:HIS:NE2	1:A:733:GLU:HB3	2.01	0.75
1:B:800:LYS:O	1:B:801:GLN:CB	2.23	0.75
1:B:33:PRO:O	1:B:37:LYS:HD3	1.86	0.74
1:A:103:ARG:NH1	1:A:573:GLY:O	2.21	0.74
1:B:103:ARG:HH11	1:B:103:ARG:CG	2.01	0.74
1:B:598:PHE:O	1:B:600:SER:N	2.21	0.73
1:B:788:GLY:O	1:B:792:ARG:N	2.21	0.72
1:B:16:ARG:NE	1:B:19:ARG:HH21	1.88	0.71
1:B:395:ASP:HB2	2:B:964:HOH:O	1.88	0.71
1:B:395:ASP:HA	2:B:964:HOH:O	1.89	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:608:ARG:HG3	2:B:1078:HOH:O	1.92	0.70
1:B:392:GLY:O	1:B:394:ALA:CA	2.40	0.70
1:B:228:PRO:O	1:B:230:GLU:N	2.23	0.69
1:A:657:ARG:HD3	2:A:1006:HOH:O	1.92	0.68
1:B:629:ASN:HD22	1:B:632:ARG:NH2	1.90	0.68
1:B:103:ARG:HD3	2:B:888:HOH:O	1.93	0.68
1:A:101:GLU:OE2	1:A:393:THR:HA	1.93	0.68
1:B:103:ARG:NH1	1:B:103:ARG:HG3	2.05	0.67
1:A:72:ARG:HD2	1:A:82:ARG:HG2	1.75	0.67
1:A:530:THR:H	1:A:533:GLN:HE21	1.44	0.65
1:B:805:ARG:NE	2:B:1115:HOH:O	2.17	0.65
1:B:481:ALA:O	1:B:484:HIS:NE2	2.29	0.65
1:A:800:LYS:N	2:A:1026:HOH:O	2.30	0.65
1:B:520:GLN:HE21	1:B:520:GLN:H	1.44	0.65
1:B:718:LEU:O	1:B:720:ILE:N	2.30	0.65
1:B:14:ASN:ND2	2:B:1083:HOH:O	2.28	0.64
1:B:14:ASN:HB3	2:B:1083:HOH:O	1.97	0.63
1:A:742:GLN:N	1:A:742:GLN:HE21	1.97	0.62
1:B:227:GLY:HA3	1:B:372:LEU:HD11	1.80	0.62
1:B:282:ILE:HD12	1:B:286:LEU:CD1	2.30	0.62
1:B:703:ILE:HA	1:B:706:LEU:HB3	1.82	0.62
1:B:179:ASN:CG	2:B:1017:HOH:O	2.37	0.61
1:B:718:LEU:O	1:B:720:ILE:HG13	1.99	0.61
1:B:459:ILE:O	1:B:463:GLU:HG3	2.00	0.61
1:B:104:THR:OG1	1:B:509:ARG:NE	2.33	0.61
1:B:529:PRO:HA	1:B:533:GLN:NE2	2.16	0.61
1:B:609:LYS:HB3	2:B:1050:HOH:O	1.99	0.60
1:A:594:LEU:C	1:A:596:ARG:H	2.05	0.60
1:B:385:GLU:OE2	2:B:1026:HOH:O	2.16	0.60
1:B:597:ILE:HD12	1:B:634:VAL:HG21	1.84	0.59
1:A:429:MET:HB2	1:A:433:GLU:OE2	2.03	0.59
1:B:563:GLU:HG3	1:B:597:ILE:HD13	1.84	0.59
1:B:503:ALA:HB1	1:B:506:MET:HG3	1.84	0.59
1:B:504:THR:O	1:B:505:ASN:C	2.41	0.58
1:B:789:ILE:O	1:B:789:ILE:HG22	2.03	0.58
1:B:293:ASP:OD2	1:B:293:ASP:N	2.36	0.58
1:B:618:ILE:HG22	1:B:619:GLU:N	2.19	0.58
1:A:731:HIS:NE2	1:A:733:GLU:CB	2.66	0.58
1:A:614:PRO:HA	2:A:1024:HOH:O	2.04	0.58
1:B:496:TYR:CD2	1:B:497:PRO:HD2	2.40	0.57
1:A:530:THR:H	1:A:533:GLN:NE2	2.02	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:736:ARG:NH2	2:A:1005:HOH:O	2.36	0.57
1:B:392:GLY:O	1:B:394:ALA:N	2.37	0.57
1:B:103:ARG:HD2	1:B:104:THR:H	1.70	0.56
1:A:395:ASP:CG	1:A:396:THR:N	2.58	0.56
1:A:732:GLU:OE2	1:A:736:ARG:CZ	2.52	0.56
1:A:753:VAL:HG21	1:A:833:MET:HE2	1.87	0.56
1:B:179:ASN:OD1	2:B:1017:HOH:O	2.17	0.56
1:B:223:LEU:HD21	1:B:377:PHE:CZ	2.41	0.56
1:B:378:GLN:O	1:B:382:ARG:HG3	2.04	0.56
1:B:594:LEU:C	1:B:596:ARG:H	2.08	0.56
1:B:104:THR:HG21	1:B:577:ARG:CZ	2.36	0.56
1:A:534:ILE:HG22	1:A:534:ILE:O	2.06	0.56
1:B:771:LEU:HD23	1:B:771:LEU:C	2.26	0.56
1:B:629:ASN:ND2	1:B:632:ARG:NH2	2.54	0.55
1:B:608:ARG:CG	2:B:1078:HOH:O	2.53	0.55
1:B:429:MET:HB3	1:B:433:GLU:OE2	2.06	0.55
1:B:290:GLY:HA2	1:B:293:ASP:HB3	1.89	0.55
1:B:282:ILE:HD11	1:B:298:LEU:HB3	1.88	0.55
1:B:703:ILE:O	1:B:705:GLY:N	2.40	0.54
1:A:738:ARG:O	1:A:742:GLN:NE2	2.40	0.54
1:B:619:GLU:N	2:B:1103:HOH:O	2.20	0.54
1:B:603:VAL:HG12	1:B:603:VAL:O	2.07	0.54
1:A:435:ILE:HG21	1:A:468:GLU:HG3	1.89	0.53
1:A:789:ILE:HG23	1:A:789:ILE:O	2.08	0.53
1:B:395:ASP:C	2:B:921:HOH:O	2.46	0.53
1:B:488:ALA:O	2:B:1101:HOH:O	2.19	0.53
1:B:301:PRO:O	1:B:302:ALA:CB	2.56	0.53
1:B:526:LEU:HD22	1:B:533:GLN:HE22	1.74	0.53
1:A:618:ILE:O	1:A:619:GLU:HB2	2.08	0.53
1:B:703:ILE:HG22	1:B:707:GLN:HG2	1.92	0.52
1:A:440:GLU:O	1:A:444:GLU:CG	2.58	0.52
1:A:530:THR:HG1	1:A:533:GLN:H	1.56	0.52
1:A:429:MET:HG2	1:A:612:MET:SD	2.49	0.52
1:A:798:ASP:OD1	1:A:799:PRO:O	2.28	0.52
1:B:607:MET:HB3	1:B:612:MET:CE	2.40	0.52
1:B:288:LYS:HG3	1:B:289:GLU:HG2	1.90	0.52
1:B:531:ALA:O	1:B:535:GLU:OE1	2.28	0.52
1:B:647:GLU:OE2	1:B:800:LYS:CE	2.59	0.51
1:B:706:LEU:C	1:B:706:LEU:HD12	2.30	0.51
1:A:519:TRP:HA	1:A:522:GLU:OE1	2.11	0.51
1:A:730:LEU:O	1:A:731:HIS:ND1	2.42	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:696:SER:HB2	1:A:700:MET:HG3	1.92	0.51
1:B:679:ILE:O	1:B:683:VAL:HG23	2.11	0.51
1:B:647:GLU:OE2	1:B:800:LYS:HE2	2.11	0.51
1:B:282:ILE:O	1:B:286:LEU:HB2	2.11	0.50
1:B:691:TYR:HB3	1:B:702:ASP:O	2.12	0.50
1:A:457:ILE:HG23	1:A:560:GLU:HB2	1.93	0.50
1:B:506:MET:HG2	2:B:983:HOH:O	2.12	0.50
1:A:594:LEU:O	1:A:597:ILE:HG12	2.11	0.50
1:B:18:LEU:HD23	1:B:21:MET:HE3	1.94	0.50
1:B:282:ILE:HD12	1:B:286:LEU:HD13	1.93	0.50
1:B:589:SER:HB2	1:B:592:ASP:OD2	2.11	0.50
1:A:395:ASP:O	1:A:397:GLU:OE2	2.29	0.50
1:B:16:ARG:NE	1:B:19:ARG:NH2	2.57	0.50
1:B:507:ALA:N	2:B:983:HOH:O	2.30	0.50
1:B:114:LEU:HB2	1:B:115:PRO:CD	2.41	0.50
1:B:56:LYS:NZ	2:B:1089:HOH:O	2.45	0.50
1:B:395:ASP:HB2	2:B:892:HOH:O	2.11	0.49
1:B:520:GLN:NE2	1:B:520:GLN:H	2.09	0.49
1:A:799:PRO:C	2:A:1026:HOH:O	2.46	0.49
1:A:799:PRO:O	1:A:800:LYS:O	2.30	0.49
1:A:32:GLU:HB3	1:A:33:PRO:HD3	1.94	0.49
1:A:39:SER:OG	1:A:42:GLU:HG3	2.12	0.49
1:A:144:ARG:CG	1:A:148:GLU:OE1	2.61	0.48
1:A:457:ILE:HA	1:A:505:ASN:OD1	2.12	0.48
1:A:394:ALA:O	1:A:396:THR:N	2.45	0.48
1:B:532:GLU:HA	1:B:535:GLU:HB2	1.95	0.48
1:A:144:ARG:HG2	1:A:148:GLU:OE1	2.13	0.48
1:A:590:MET:SD	1:A:607:MET:HB2	2.53	0.48
1:B:16:ARG:HE	1:B:19:ARG:NH2	2.12	0.48
1:B:679:ILE:CG1	1:B:823:ILE:HD11	2.44	0.48
1:B:395:ASP:HA	2:B:1077:HOH:O	2.14	0.48
1:A:402:SER:O	1:A:406:LYS:HD3	2.14	0.47
1:A:800:LYS:NZ	1:A:800:LYS:HB3	2.28	0.47
1:A:99:ILE:HB	1:A:409:THR:HB	1.96	0.47
1:B:519:TRP:HB3	1:B:541:TRP:CG	2.49	0.47
1:B:301:PRO:O	1:B:302:ALA:HB2	2.13	0.47
1:A:435:ILE:O	1:A:439:ILE:HG12	2.13	0.47
1:A:440:GLU:O	1:A:444:GLU:HG3	2.14	0.47
1:B:228:PRO:O	1:B:230:GLU:OE2	2.31	0.47
1:B:529:PRO:HA	1:B:533:GLN:HE21	1.79	0.47
1:A:742:GLN:O	1:A:746:VAL:HG23	2.13	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:17:THR:HG22	1:B:21:MET:CE	2.45	0.47
1:B:430:THR:OG1	2:B:1099:HOH:O	2.18	0.47
1:B:12:SER:HB2	1:B:15:ASP:OD1	2.15	0.47
1:B:801:GLN:HA	1:B:801:GLN:OE1	2.15	0.47
1:B:651:VAL:CG2	1:B:804:LYS:HG2	2.45	0.47
1:B:282:ILE:HD12	1:B:286:LEU:HD12	1.97	0.46
1:B:308:HIS:CE1	1:B:784:TYR:CE1	3.04	0.46
1:B:805:ARG:CD	2:B:1115:HOH:O	2.61	0.46
1:B:712:ASN:C	1:B:828:LYS:HZ1	2.17	0.46
1:B:651:VAL:HG21	1:B:804:LYS:HG2	1.97	0.46
1:B:292:MET:O	1:B:294:GLU:N	2.48	0.46
1:A:17:THR:O	1:A:21:MET:HG3	2.16	0.46
1:A:519:TRP:O	1:A:522:GLU:HB2	2.15	0.46
1:B:637:ARG:NH1	2:B:1032:HOH:O	2.49	0.46
1:B:392:GLY:O	1:B:394:ALA:HB3	2.16	0.45
1:A:561:ARG:HB2	1:A:594:LEU:HD13	1.97	0.45
1:B:607:MET:HB3	1:B:612:MET:HE1	1.98	0.45
1:B:592:ASP:O	1:B:595:MET:N	2.45	0.45
1:B:734:THR:HA	1:B:737:GLU:OE2	2.16	0.45
1:B:506:MET:SD	1:B:574:ARG:NE	2.90	0.45
1:B:593:ALA:O	1:B:596:ARG:HB3	2.17	0.45
1:A:32:GLU:OE2	1:A:82:ARG:HD2	2.17	0.45
1:A:593:ALA:O	1:A:596:ARG:HB2	2.17	0.45
1:B:520:GLN:HA	1:B:523:VAL:HG13	1.99	0.45
1:B:17:THR:O	1:B:21:MET:HE2	2.17	0.45
1:B:224:ILE:HG23	1:B:371:THR:HG23	1.98	0.45
1:B:648:TYR:CZ	1:B:800:LYS:HB2	2.51	0.44
1:A:715:ASP:HB2	1:A:828:LYS:HG2	1.99	0.44
1:B:550:GLU:HG3	1:B:550:GLU:O	2.17	0.44
1:B:99:ILE:HD12	1:B:211:VAL:HG21	2.00	0.44
1:B:798:ASP:HA	1:B:799:PRO:HD2	1.75	0.44
1:A:503:ALA:CB	1:A:506:MET:HG2	2.47	0.44
1:A:503:ALA:HB1	1:A:506:MET:HG2	1.99	0.44
1:A:370:GLN:OE1	1:A:776:LYS:HD3	2.17	0.44
1:B:223:LEU:HD11	1:B:377:PHE:CE1	2.53	0.44
1:B:99:ILE:HB	1:B:409:THR:HB	1.99	0.44
1:A:594:LEU:HD21	1:A:597:ILE:HD11	2.00	0.44
1:B:230:GLU:OE2	1:B:368:GLU:O	2.34	0.44
1:A:228:PRO:HB3	1:A:367:ASN:HD21	1.82	0.43
1:A:613:LYS:HA	1:A:614:PRO:HD2	1.88	0.43
1:B:644:GLN:HE22	1:B:800:LYS:NZ	2.15	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:789:ILE:O	1:B:789:ILE:CG2	2.65	0.43
1:B:563:GLU:HG2	1:B:634:VAL:HG11	2.00	0.43
1:B:747:TYR:OH	1:B:763:GLU:OE2	2.32	0.43
1:A:32:GLU:OE1	1:A:82:ARG:NH1	2.51	0.43
1:B:228:PRO:HB3	1:B:367:ASN:OD1	2.18	0.43
1:A:648:TYR:OH	1:A:800:LYS:N	2.51	0.43
1:B:679:ILE:HG13	1:B:823:ILE:HD11	2.01	0.43
1:B:14:ASN:HD21	1:B:411:VAL:H	1.67	0.43
1:A:701:TRP:N	1:A:701:TRP:CD1	2.85	0.43
1:B:283:GLU:O	1:B:287:VAL:HG12	2.19	0.42
1:B:395:ASP:C	1:B:397:GLU:H	2.21	0.42
1:B:514:VAL:O	2:B:957:HOH:O	2.21	0.42
1:B:703:ILE:O	1:B:706:LEU:N	2.49	0.42
1:A:440:GLU:O	1:A:444:GLU:HG2	2.19	0.42
1:A:620:HIS:HA	1:A:621:PRO:HD2	1.81	0.42
1:B:13:ARG:HD2	1:B:13:ARG:HA	1.84	0.42
1:B:103:ARG:CD	1:B:104:THR:H	2.32	0.42
1:A:773:SER:O	1:A:776:LYS:HG2	2.19	0.42
1:B:496:TYR:CG	1:B:497:PRO:HD2	2.54	0.42
1:B:782:MET:CE	1:B:810:MET:HE2	2.49	0.42
1:A:666:LEU:HD22	1:A:672:VAL:HG21	2.00	0.42
1:B:16:ARG:HD3	1:B:16:ARG:HA	1.90	0.42
1:B:618:ILE:CA	2:B:1103:HOH:O	2.67	0.42
1:A:526:LEU:HD13	1:A:529:PRO:HA	2.01	0.42
1:B:285:LEU:HD23	1:B:310:VAL:HG21	2.02	0.42
1:B:605:GLY:O	1:B:608:ARG:HG2	2.19	0.42
1:B:723:TRP:HB2	1:B:724:LEU:HD23	2.02	0.42
1:B:223:LEU:O	1:B:374:SER:HA	2.20	0.41
1:A:594:LEU:C	1:A:596:ARG:N	2.71	0.41
1:B:103:ARG:NH2	1:B:575:SER:O	2.53	0.41
1:B:198:ARG:HH21	1:B:664:ASN:HD22	1.67	0.41
1:A:365:ILE:HG22	1:A:366:GLN:O	2.20	0.41
1:A:412:VAL:HA	1:A:413:PRO:HD2	1.81	0.41
1:B:392:GLY:O	1:B:394:ALA:CB	2.69	0.41
1:A:693:PRO:HA	1:A:694:PRO:HD3	1.92	0.41
1:A:727:GLU:HA	1:A:728:PRO:HD2	1.91	0.41
1:A:532:GLU:OE1	1:A:535:GLU:HB2	2.20	0.41
1:A:24:VAL:HG13	1:A:65:PRO:HG3	2.02	0.41
1:A:762:PHE:O	1:A:766:VAL:HG23	2.21	0.41
1:B:742:GLN:O	1:B:745:GLU:HG2	2.21	0.41
1:A:460:GLU:H	1:A:460:GLU:CD	2.24	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:526:LEU:HD12	1:A:529:PRO:HB3	2.03	0.41
1:B:782:MET:CE	1:B:810:MET:CE	2.99	0.41
1:B:396:THR:N	2:B:892:HOH:O	2.54	0.41
1:A:394:ALA:CA	2:A:980:HOH:O	2.44	0.40
1:A:528:ASN:O	1:A:529:PRO:C	2.59	0.40
1:B:557:ILE:HG23	1:B:587:TYR:CD2	2.57	0.40
1:B:510:GLY:HA3	1:B:574:ARG:HH12	1.87	0.40
1:B:441:ASP:HA	2:B:984:HOH:O	2.20	0.40
1:B:696:SER:HB3	1:B:700:MET:HB2	2.03	0.40
1:B:215:LEU:O	1:B:219:ALA:HB2	2.22	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:600:SER:OG	1:B:830:GLN:O[1_655]	1.97	0.23

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	682/853 (80%)	635 (93%)	31 (4%)	16 (2%)	6	2
1	B	717/853 (84%)	650 (91%)	39 (5%)	28 (4%)	3	1
All	All	1399/1706 (82%)	1285 (92%)	70 (5%)	44 (3%)	4	1

All (44) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	394	ALA
1	A	396	THR
1	A	507	ALA

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Mol	Chain	Res	Type
1	A	599	ALA
1	A	614	PRO
1	A	730	LEU
1	B	229	ALA
1	B	293	ASP
1	B	302	ALA
1	B	394	ALA
1	B	395	ASP
1	B	599	ALA
1	B	612	MET
1	B	614	PRO
1	B	719	PRO
1	B	729	GLU
1	B	801	GLN
1	A	395	ASP
1	A	510	GLY
1	A	795	ALA
1	B	288	LYS
1	B	292	MET
1	B	393	THR
1	B	396	THR
1	B	510	GLY
1	B	597	ILE
1	B	619	GLU
1	B	704	PRO
1	A	603	VAL
1	A	619	GLU
1	B	289	GLU
1	B	368	GLU
1	B	796	GLN
1	B	797	LYS
1	A	800	LYS
1	A	801	GLN
1	A	791	LEU
1	B	298	LEU
1	B	367	ASN
1	B	593	ALA
1	A	613	LYS
1	A	789	ILE
1	B	534	ILE
1	B	789	ILE

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	582/728 (80%)	532 (91%)	50 (9%)	10	6
1	B	613/728 (84%)	545 (89%)	68 (11%)	6	3
All	All	1195/1456 (82%)	1077 (90%)	118 (10%)	8	4

All (118) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	ARG
1	A	14	ASN
1	A	15	ASP
1	A	16	ARG
1	A	19	ARG
1	A	37	LYS
1	A	41	GLU
1	A	55	GLU
1	A	72	ARG
1	A	201	ARG
1	A	226	SER
1	A	365	ILE
1	A	366	GLN
1	A	369	ASN
1	A	393	THR
1	A	395	ASP
1	A	406	LYS
1	A	409	THR
1	A	444	GLU
1	A	457	ILE
1	A	506	MET
1	A	509	ARG
1	A	523	VAL
1	A	527	GLU
1	A	535	GLU
1	A	591	GLU
1	A	602	ARG

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Mol	Chain	Res	Type
1	A	613	LYS
1	A	614	PRO
1	A	618	ILE
1	A	632	ARG
1	A	635	GLU
1	A	636	SER
1	A	642	ARG
1	A	669	VAL
1	A	672	VAL
1	A	699	GLU
1	A	708	GLU
1	A	711	LYS
1	A	725	ASP
1	A	730	LEU
1	A	731	HIS
1	A	734	THR
1	A	735	LEU
1	A	742	GLN
1	A	754	VAL
1	A	791	LEU
1	A	797	LYS
1	A	800	LYS
1	A	816	GLU
1	B	12	SER
1	B	14	ASN
1	B	16	ARG
1	B	37	LYS
1	B	38	LEU
1	B	103	ARG
1	B	226	SER
1	B	230	GLU
1	B	231	ASP
1	B	282	ILE
1	B	283	GLU
1	B	284	GLU
1	B	285	LEU
1	B	286	LEU
1	B	288	LYS
1	B	291	ILE
1	B	293	ASP
1	B	299	TYR
1	B	306	LEU

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Mol	Chain	Res	Type
1	B	307	MET
1	B	367	ASN
1	B	368	GLU
1	B	393	THR
1	B	409	THR
1	B	431	GLU
1	B	457	ILE
1	B	506	MET
1	B	512	ASP
1	B	520	GLN
1	B	523	VAL
1	B	526	LEU
1	B	527	GLU
1	B	532	GLU
1	B	535	GLU
1	B	589	SER
1	B	594	LEU
1	B	595	MET
1	B	596	ARG
1	B	602	ARG
1	B	604	SER
1	B	609	LYS
1	B	612	MET
1	B	625	LYS
1	B	637	ARG
1	B	657	ARG
1	B	670	SER
1	B	672	VAL
1	B	679	ILE
1	B	680	ARG
1	B	696	SER
1	B	703	ILE
1	B	706	LEU
1	B	707	GLN
1	B	718	LEU
1	B	722	GLU
1	B	725	ASP
1	B	726	LYS
1	B	727	GLU
1	B	729	GLU
1	B	779	LEU
1	B	783	ASP

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Mol	Chain	Res	Type
1	B	791	LEU
1	B	792	ARG
1	B	796	GLN
1	B	800	LYS
1	B	821	GLU
1	B	831	VAL
1	B	832	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	486	ASN
1	A	533	GLN
1	A	638	ASN
1	A	662	GLN
1	A	742	GLN
1	A	748	GLN
1	B	14	ASN
1	B	520	GLN
1	B	528	ASN
1	B	533	GLN
1	B	545	HIS
1	B	629	ASN
1	B	638	ASN
1	B	644	GLN
1	B	664	ASN
1	B	707	GLN
1	B	742	GLN
1	B	761	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 carbohydrates 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 (i)

6.1 Protein, DNA and RNA chains (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers (i)

Unable to reproduce the depositors R factor - this section is therefore empty.