



# Full wwPDB X-ray Structure Validation Report ⓘ

May 3, 2025 – 10:38 AM EDT

PDB ID : 2FSF / pdb\_00002fsf  
Title : Escherichia coli SecA, the preprotein translocase dimeric ATPase  
Authors : Papanikolaou, 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](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0rc1  
Xtrriage (Phenix) : 2.0rc1  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.006 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.43.1

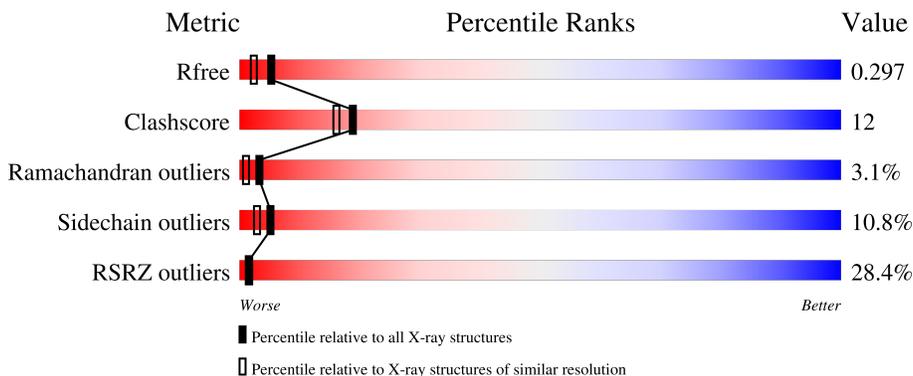
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	9409 (2.00-2.00)
Clashscore	180529	10737 (2.00-2.00)
Ramachandran outliers	177936	10628 (2.00-2.00)
Sidechain outliers	177891	10627 (2.00-2.00)
RSRZ outliers	164620	9409 (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 of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . 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	853	
1	B	853	

## 2 Entry composition

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
			Total	C	N	O	S			
1	A	686	5462	3426	966	1044	26	0	0	0
1	B	723	5741	3600	1009	1104	28	0	0	0

- Molecule 2 is water.

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





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	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) 97.0 (19.98-2.00)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.82 (at 2.01Å)	Xtrriage
Refinement program	REFMAC 5.2.0005	Depositor
R, $R_{free}$	0.213 , 0.261 0.260 , 0.297	Depositor DCC
$R_{free}$ test set	7010 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	35.8	Xtrriage
Anisotropy	0.109	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 53.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.015 for h,-k,-h-l	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	11637	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	57.0	wwPDB-VP

Xtrriage'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.*

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

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 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	1.61	44/5552 (0.8%)	1.34	29/7491 (0.4%)
1	B	1.84	95/5833 (1.6%)	1.48	63/7870 (0.8%)
All	All	1.73	139/11385 (1.2%)	1.41	92/15361 (0.6%)

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 (139) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	697	LEU	C-N	14.88	1.56	1.33
1	B	393	THR	N-CA	13.38	1.63	1.46
1	B	395	ASP	N-CA	13.01	1.62	1.46
1	B	64	ILE	CA-CB	12.69	1.61	1.54
1	A	698	GLU	C-O	11.84	1.39	1.24
1	B	393	THR	C-O	11.39	1.38	1.24
1	A	163	ALA	CA-CB	-10.85	1.39	1.53
1	B	114	LEU	C-O	-10.68	1.15	1.24
1	B	652	ALA	CA-CB	10.61	1.69	1.53
1	B	395	ASP	CA-C	10.13	1.66	1.52
1	B	801	GLN	N-CA	9.97	1.59	1.46
1	A	698	GLU	C-N	9.86	1.47	1.33
1	B	394	ALA	CA-C	9.79	1.65	1.52
1	B	393	THR	CA-CB	9.01	1.68	1.53
1	B	32	GLU	C-O	-9.00	1.16	1.24
1	B	127	HIS	C-O	-8.92	1.13	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	695	GLN	C-O	8.40	1.39	1.24
1	A	396	THR	N-CA	8.38	1.57	1.46
1	B	126	VAL	C-O	-8.23	1.15	1.24
1	B	405	TYR	CA-C	-8.11	1.41	1.52
1	A	466	SER	C-O	8.06	1.33	1.24
1	A	136	ALA	CA-CB	8.02	1.65	1.53
1	B	13	ARG	CA-C	7.96	1.57	1.52
1	B	831	VAL	CA-CB	7.88	1.64	1.54
1	B	194	SER	C-O	-7.82	1.16	1.24
1	A	801	GLN	N-CA	7.78	1.56	1.46
1	A	698	GLU	CD-OE2	7.74	1.40	1.25
1	A	395	ASP	CA-C	7.67	1.63	1.52
1	B	109	THR	N-CA	-7.55	1.37	1.46
1	B	131	VAL	CA-C	-7.42	1.42	1.52
1	B	651	VAL	CA-CB	-7.38	1.45	1.54
1	B	626	ALA	CA-CB	-7.36	1.41	1.53
1	B	393	THR	CA-C	7.11	1.62	1.52
1	B	789	ILE	CA-CB	7.08	1.64	1.54
1	B	103	ARG	CG-CD	6.91	1.73	1.52
1	B	394	ALA	CA-CB	6.86	1.65	1.53
1	B	85	ASP	N-CA	-6.81	1.38	1.46
1	B	503	ALA	CA-CB	-6.80	1.41	1.53
1	B	474	ILE	C-O	6.75	1.31	1.24
1	B	101	GLU	C-N	-6.69	1.25	1.33
1	B	24	VAL	CA-CB	-6.68	1.45	1.54
1	B	100	ALA	CA-CB	6.68	1.61	1.53
1	A	98	CYS	CB-SG	-6.65	1.59	1.81
1	B	134	TYR	CA-C	6.59	1.61	1.52
1	B	163	ALA	CA-CB	6.57	1.62	1.53
1	A	697	LEU	CA-C	6.55	1.62	1.53
1	A	427	VAL	CA-CB	6.50	1.62	1.54
1	A	698	GLU	CD-OE1	6.44	1.37	1.25
1	B	801	GLN	CA-C	-6.44	1.44	1.52
1	A	697	LEU	C-O	6.41	1.32	1.23
1	B	468	GLU	C-O	-6.37	1.16	1.24
1	A	394	ALA	CA-CB	6.25	1.64	1.53
1	A	438	ILE	CA-CB	-6.24	1.47	1.54
1	B	49	GLU	CA-C	6.23	1.60	1.52
1	A	454	VAL	CA-CB	-6.23	1.46	1.54
1	B	392	GLY	N-CA	6.16	1.52	1.45
1	B	435	ILE	C-O	-6.12	1.17	1.24
1	A	64	ILE	C-O	-6.06	1.19	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	672	VAL	CA-CB	6.05	1.62	1.54
1	B	156	ILE	C-O	-6.05	1.17	1.24
1	B	427	VAL	CA-C	-6.03	1.45	1.52
1	B	669	VAL	CA-C	6.02	1.59	1.52
1	B	179	ASN	C-O	5.98	1.30	1.24
1	A	670	SER	N-CA	5.97	1.54	1.46
1	A	612	MET	CA-C	5.91	1.60	1.52
1	B	390	MET	SD-CE	-5.91	1.64	1.79
1	A	394	ALA	C-O	5.91	1.31	1.24
1	B	86	VAL	N-CA	5.90	1.54	1.46
1	B	209	ASP	C-O	5.86	1.31	1.24
1	A	177	GLY	C-O	-5.86	1.17	1.24
1	B	199	VAL	N-CA	5.86	1.52	1.45
1	B	311	THR	CA-CB	5.84	1.62	1.53
1	B	87	GLN	N-CA	-5.80	1.39	1.46
1	B	808	PHE	C-O	-5.79	1.16	1.24
1	B	410	VAL	C-O	-5.75	1.17	1.24
1	B	116	ALA	N-CA	-5.74	1.39	1.46
1	B	658	ALA	CA-CB	-5.74	1.44	1.53
1	A	659	ILE	CA-CB	5.73	1.61	1.54
1	A	163	ALA	C-O	-5.73	1.19	1.24
1	B	310	VAL	CA-CB	5.71	1.62	1.54
1	B	395	ASP	C-O	5.71	1.31	1.24
1	A	560	GLU	CG-CD	5.71	1.66	1.52
1	B	470	THR	CA-C	-5.71	1.45	1.52
1	B	388	ALA	CA-CB	5.70	1.63	1.53
1	B	648	TYR	CA-C	-5.70	1.45	1.52
1	B	586	PHE	CA-C	-5.65	1.45	1.52
1	B	284	GLU	CD-OE2	5.64	1.36	1.25
1	A	559	THR	CA-CB	5.60	1.62	1.53
1	B	413	PRO	C-O	5.60	1.30	1.23
1	A	557	ILE	CA-CB	-5.59	1.47	1.54
1	B	197	GLU	C-O	-5.58	1.16	1.24
1	A	476	HIS	N-CA	-5.56	1.39	1.46
1	A	474	ILE	CA-CB	5.53	1.60	1.53
1	A	211	VAL	CA-CB	-5.53	1.46	1.54
1	A	792	ARG	N-CA	5.50	1.53	1.46
1	B	662	GLN	N-CA	-5.49	1.39	1.46
1	B	478	VAL	C-O	-5.49	1.16	1.24
1	B	390	MET	CA-C	-5.48	1.46	1.52
1	B	178	THR	CA-CB	5.47	1.62	1.53
1	B	664	ASN	C-O	5.47	1.30	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	512	ASP	CB-CG	5.45	1.65	1.52
1	B	412	VAL	CA-C	5.44	1.57	1.53
1	B	101	GLU	CA-C	5.43	1.59	1.52
1	B	619	GLU	N-CA	5.43	1.53	1.46
1	B	204	HIS	C-O	-5.41	1.17	1.23
1	A	172	ALA	CA-CB	-5.41	1.45	1.53
1	B	433	GLU	C-O	-5.41	1.17	1.24
1	B	618	ILE	CA-C	5.39	1.59	1.52
1	A	418	MET	SD-CE	5.37	1.93	1.79
1	A	389	GLY	C-O	-5.35	1.18	1.23
1	B	809	SER	N-CA	-5.32	1.39	1.46
1	B	670	SER	N-CA	5.31	1.53	1.46
1	B	402	SER	CA-C	5.26	1.59	1.52
1	B	557	ILE	CA-CB	-5.25	1.48	1.54
1	B	97	ARG	CG-CD	5.24	1.68	1.52
1	B	802	GLU	C-O	-5.24	1.17	1.24
1	A	791	LEU	CA-C	5.24	1.59	1.52
1	B	115	PRO	N-CA	5.23	1.54	1.47
1	B	395	ASP	CA-CB	5.22	1.62	1.53
1	B	802	GLU	C-N	5.21	1.40	1.33
1	A	481	ALA	CA-CB	5.19	1.62	1.53
1	B	17	THR	CA-CB	5.18	1.61	1.53
1	B	133	ASP	N-CA	-5.17	1.39	1.46
1	B	672	VAL	CA-CB	5.16	1.61	1.54
1	B	189	ASP	C-O	-5.15	1.17	1.24
1	B	488	ALA	CA-CB	-5.15	1.44	1.53
1	A	581	ALA	CA-C	5.13	1.59	1.52
1	A	134	TYR	CA-C	5.09	1.59	1.52
1	B	41	GLU	CA-C	5.09	1.59	1.52
1	B	143	ASN	CA-C	-5.08	1.45	1.52
1	B	649	ASP	CA-C	5.07	1.59	1.52
1	B	810	MET	C-O	-5.06	1.18	1.24
1	B	588	LEU	CA-C	-5.06	1.46	1.52
1	B	475	LYS	CA-C	-5.05	1.46	1.52
1	B	512	ASP	CA-C	5.04	1.59	1.52
1	A	393	THR	CA-CB	5.03	1.61	1.53
1	A	808	PHE	C-O	-5.03	1.18	1.24
1	B	625	LYS	CD-CE	5.02	1.67	1.52
1	A	683	VAL	CA-CB	5.01	1.60	1.54

All (92) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	613	LYS	CA-C-N	10.33	132.76	119.84
1	A	613	LYS	C-N-CA	10.33	132.76	119.84
1	A	800	LYS	N-CA-C	-9.18	91.25	110.80
1	B	608	ARG	N-CA-C	-8.89	101.53	111.14
1	B	435	ILE	N-CA-C	-8.75	102.33	110.82
1	B	790	HIS	N-CA-C	-7.79	103.62	113.43
1	B	374	SER	CA-CB-OG	-7.71	95.69	111.10
1	B	801	GLN	N-CA-CB	7.56	123.27	110.49
1	B	34	GLU	CB-CA-C	-7.56	99.01	110.88
1	A	697	LEU	CA-C-N	-7.27	108.41	121.14
1	A	697	LEU	C-N-CA	-7.27	108.41	121.14
1	B	613	LYS	CA-C-N	7.26	128.91	119.84
1	B	613	LYS	C-N-CA	7.26	128.91	119.84
1	A	600	SER	N-CA-C	7.24	120.19	108.32
1	B	800	LYS	O-C-N	-7.13	114.44	122.86
1	B	210	GLU	CB-CA-C	-7.12	101.11	111.23
1	B	608	ARG	N-CA-CB	6.94	120.13	110.07
1	B	392	GLY	N-CA-C	6.92	119.95	112.33
1	A	674	GLU	N-CA-C	-6.87	103.72	111.07
1	B	800	LYS	CA-C-N	-6.80	108.55	121.54
1	B	800	LYS	C-N-CA	-6.80	108.55	121.54
1	B	445	ARG	N-CA-C	6.67	118.64	111.36
1	A	618	ILE	CB-CA-C	6.59	116.92	111.05
1	A	581	ALA	N-CA-C	-6.54	101.45	110.35
1	A	636	SER	N-CA-C	6.51	118.04	111.07
1	A	697	LEU	N-CA-C	-6.48	102.15	110.19
1	B	730	LEU	N-CA-C	6.47	119.15	111.71
1	A	698	GLU	O-C-N	6.41	131.31	122.46
1	A	715	ASP	N-CA-C	-6.40	104.77	112.58
1	B	13	ARG	N-CA-C	6.32	118.91	108.48
1	A	681	GLU	N-CA-C	-6.32	103.92	111.69
1	B	639	PHE	N-CA-C	6.31	118.96	111.71
1	A	753	VAL	N-CA-C	6.28	117.06	110.72
1	B	794	TYR	N-CA-C	6.23	124.06	110.80
1	B	563	GLU	N-CA-C	-6.22	104.50	111.28
1	B	108	LYS	N-CA-C	6.19	118.82	111.33
1	B	446	THR	N-CA-C	-6.12	104.69	111.36
1	B	228	PRO	N-CA-C	-6.09	105.06	113.53
1	A	72	ARG	NE-CZ-NH2	6.04	124.64	119.20
1	B	517	GLY	N-CA-C	-6.00	105.07	112.33
1	B	579	GLY	N-CA-C	5.99	123.32	115.47
1	B	723	TRP	N-CA-C	-5.96	104.47	110.97
1	B	819	LYS	N-CA-C	5.96	118.29	111.02

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	732	GLU	N-CA-C	5.92	117.73	111.28
1	A	673	SER	N-CA-C	5.92	123.40	110.80
1	B	437	ALA	N-CA-C	-5.91	104.42	111.69
1	B	394	ALA	N-CA-C	5.87	123.31	110.80
1	B	103	ARG	N-CA-C	5.86	118.51	110.24
1	B	474	ILE	N-CA-C	5.85	116.22	107.51
1	B	366	GLN	N-CA-C	5.80	120.51	112.45
1	A	712	ASN	N-CA-C	5.79	117.26	111.07
1	A	614	PRO	N-CA-C	5.78	124.38	112.47
1	A	412	VAL	CA-C-N	5.70	125.70	119.89
1	A	412	VAL	C-N-CA	5.70	125.70	119.89
1	B	681	GLU	N-CA-C	-5.70	104.99	111.14
1	B	517	GLY	CA-C-O	-5.67	118.04	122.52
1	A	568	ASP	N-CA-C	-5.65	105.20	111.36
1	B	412	VAL	CA-C-N	-5.60	114.48	120.03
1	B	412	VAL	C-N-CA	-5.60	114.48	120.03
1	B	806	GLU	N-CA-C	-5.50	105.29	112.23
1	B	411	VAL	CB-CA-C	-5.50	104.26	111.25
1	B	673	SER	CB-CA-C	-5.49	102.02	110.81
1	B	139	ASP	N-CA-C	5.46	116.91	111.07
1	B	395	ASP	N-CA-C	5.41	122.32	110.80
1	B	135	LEU	N-CA-C	5.39	117.15	111.28
1	B	672	VAL	N-CA-CB	-5.37	104.25	112.15
1	B	293	ASP	N-CA-C	5.37	122.23	110.80
1	A	698	GLU	N-CA-C	-5.37	106.24	112.89
1	B	669	VAL	CB-CA-C	5.37	118.97	110.81
1	B	572	ARG	CG-CD-NE	-5.33	100.27	112.00
1	A	210	GLU	CB-CA-C	-5.32	103.68	111.23
1	B	311	THR	N-CA-CB	5.32	118.41	110.22
1	B	782	MET	CG-SD-CE	5.32	112.59	100.90
1	B	392	GLY	CA-C-N	5.29	131.64	121.54
1	B	392	GLY	C-N-CA	5.29	131.64	121.54
1	B	393	THR	CA-C-O	5.28	128.06	120.51
1	B	103	ARG	CG-CD-NE	5.25	123.54	112.00
1	A	657	ARG	NE-CZ-NH2	5.24	123.92	119.20
1	B	616	GLU	N-CA-C	5.22	116.66	110.19
1	B	367	ASN	N-CA-C	5.22	121.91	110.80
1	B	409	THR	N-CA-CB	5.19	118.72	110.57
1	A	574	ARG	NE-CZ-NH2	5.18	123.86	119.20
1	B	642	ARG	N-CA-C	5.17	116.92	111.28
1	A	128	VAL	N-CA-C	-5.16	101.16	108.58
1	A	369	ASN	N-CA-C	5.14	117.00	109.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	19	ARG	N-CA-C	5.11	116.54	111.07
1	B	282	ILE	CB-CA-C	-5.08	105.38	112.04
1	B	106	GLU	N-CA-C	5.06	119.43	113.16
1	B	429	MET	CG-SD-CE	-5.05	89.78	100.90
1	B	798	ASP	CA-C-N	5.05	124.50	119.24
1	B	798	ASP	C-N-CA	5.05	124.50	119.24
1	A	72	ARG	NE-CZ-NH1	-5.01	116.49	121.50

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	95	0
1	B	5741	0	5731	167	1
2	A	177	0	0	12	0
2	B	257	0	0	29	0
All	All	11637	0	11191	262	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 12.

All (262) 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:A:799:PRO:C	1:A:800:LYS:O	1.95	0.97
1:B:103:ARG:HG3	1:B:103:ARG:HH11	1.26	0.97
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:OE1	1:A:535:GLU:HA	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:102:MET:HE3	1:A:108:LYS:HG2	1.67	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:17:THR:HG22	1:B:21:MET:HE2	1.69	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
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

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:101:GLU:OE2	1:A:393:THR:HA	1.93	0.68
1:A:833:MET:HE2	1:A:833:MET:HA	1.76	0.68
1:B:103:ARG:HG3	1:B:103:ARG:NH1	2.05	0.67
1:A:72:ARG:HD2	1:A:82:ARG:HG2	1.75	0.67
1:B:179:ASN:CG	2:B:1017:HOH:O	2.37	0.66
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:A:594:LEU:C	1:A:596:ARG:H	2.05	0.65
1:B:520:GLN:H	1:B:520:GLN:HE21	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:B:504:THR:O	1:B:505:ASN:C	2.41	0.63
1:A:742:GLN:HE21	1:A:742:GLN:N	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: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:A:395:ASP:CG	1:A:396:THR:N	2.58	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:B:594:LEU:C	1:B:596:ARG:H	2.08	0.60
1:B:771:LEU:C	1:B:771:LEU:HD23	2.26	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:789:ILE:HG22	1:B:789:ILE:O	2.03	0.58
1:B:395:ASP:C	2:B:921:HOH:O	2.46	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:293:ASP:N	1:B:293:ASP:OD2	2.36	0.57
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
1:A:736:ARG:NH2	2:A:1005:HOH:O	2.36	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:392:GLY:O	1:B:394:ALA:N	2.37	0.57
1:B:430:THR:OG1	2:B:1099:HOH:O	2.18	0.57
1:B:103:ARG:HD2	1:B:104:THR:H	1.70	0.56
1:A:732:GLU:OE2	1:A:736:ARG:CZ	2.52	0.56
1:B:179:ASN:OD1	2:B:1017:HOH:O	2.17	0.56
1:B:706:LEU:C	1:B:706:LEU:HD12	2.30	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: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: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:282:ILE:HD11	1:B:298:LEU:HB3	1.88	0.55
1:B:290:GLY:HA2	1:B:293:ASP:HB3	1.89	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:B:81:MET:HE2	1:B:110:LEU:HD22	1.90	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: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:A:799:PRO:C	2:A:1026:HOH:O	2.46	0.53
1:B:526:LEU:HD22	1:B:533:GLN:HE22	1.74	0.53
1:B:747:TYR:OH	1:B:759:MET:HE2	2.09	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:530:THR:HG1	1:A:533:GLN:H	1.56	0.52
1:B:782:MET:HE3	1:B:810:MET:HE2	1.91	0.52
1:A:440:GLU:O	1:A:444:GLU:CG	2.58	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: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
1:A:696:SER:HB2	1:A:700:MET:HG3	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:647:GLU:OE2	1:B:800:LYS:HE2	2.11	0.51
1:B:679:ILE:O	1:B:683:VAL:HG23	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: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:712:ASN:C	1:B:828:LYS:HZ1	2.18	0.50
1:B:114:LEU:HB2	1:B:115:PRO:CD	2.41	0.50
1:B:395:ASP:HB2	2:B:892:HOH:O	2.11	0.49
1:B:520:GLN:H	1:B:520:GLN:NE2	2.09	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:395:ASP:C	1:B:397:GLU:H	2.21	0.48
1:B:16:ARG:HE	1:B:19:ARG:NH2	2.12	0.48
1:B:102:MET:HE3	1:B:108:LYS:HG2	1.96	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:A:675:THR:HG21	1:A:767:MET:HE1	1.95	0.47
1:B:519:TRP:HB3	1:B:541:TRP:CG	2.49	0.47
1:A:594:LEU:C	1:A:596:ARG:N	2.71	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:12:SER:HB2	1:B:15:ASP:OD1	2.15	0.47
1:B:607:MET:HB3	1:B:612:MET:HE1	1.97	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:747:TYR:CZ	1:B:759:MET:HE2	2.51	0.46
1:B:805:ARG:CD	2:B:1115:HOH:O	2.61	0.46
1:B:651:VAL:HG21	1:B:804:LYS:HG2	1.97	0.46
1:B:801:GLN:OE1	1:B:801:GLN:HA	2.15	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:A:460:GLU:CD	1:A:460:GLU:H	2.24	0.45
1:A:528:ASN:O	1:A:529:PRO:C	2.59	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:723:TRP:CG	1:A:738:ARG:HH21	2.35	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: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:99:ILE:HD12	1:B:211:VAL:HG21	2.00	0.44
1:B:550:GLU:O	1:B:550:GLU:HG3	2.17	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:370:GLN:OE1	1:A:776:LYS:HD3	2.17	0.44
1:A:503:ALA:HB1	1:A:506:MET:HG2	1.99	0.44
1:B:99:ILE:HB	1:B:409:THR:HB	1.99	0.44
1:B:223:LEU:HD11	1:B:377:PHE:CE1	2.53	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:504:THR:O	1:A:505:ASN:C	2.60	0.43
1:A:613:LYS:HA	1:A:614:PRO:HD2	1.88	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:644:GLN:HE22	1:B:800:LYS:NZ	2.15	0.43
1:B:718:LEU:O	1:B:719:PRO:C	2.60	0.43
1:B:789:ILE:O	1:B:789:ILE:CG2	2.65	0.43
1:B:782:MET:CE	1:B:810:MET:HE2	2.48	0.43
1:B:563:GLU:HG2	1:B:634:VAL:HG11	2.00	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:CD1	1:A:701:TRP:N	2.85	0.43
1:A:82:ARG:O	1:A:83:HIS:C	2.62	0.43
1:B:594:LEU:C	1:B:596:ARG:N	2.76	0.43
1:B:283:GLU:O	1:B:287:VAL:HG12	2.19	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:B:392:GLY:C	1:B:394:ALA:N	2.78	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: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:A:799:PRO:O	1:A:800:LYS:O	2.30	0.42
1:B:285:LEU:HD23	1:B:310:VAL:HG21	2.02	0.42
1:B:542:GLN:HE21	1:B:546:ASP:CG	2.28	0.42
1:B:605:GLY:O	1:B:608:ARG:HG2	2.19	0.42
1:B:671:ASP:OD1	1:B:673:SER:OG	2.28	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:B:21:MET:HB2	1:B:21:MET:HE3	1.87	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:B:788:GLY:C	1:B:792:ARG:HG3	2.44	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:17:THR:HG22	1:B:21:MET:CE	2.45	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
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:620:HIS:O	1:B:621:PRO:C	2.63	0.41
1:B:742:GLN:O	1:B:745:GLU:HG2	2.21	0.41
1:A:526:LEU:HD12	1:A:529:PRO:HB3	2.03	0.41
1:B:305:MET:HE1	1:B:784:TYR:HE2	1.86	0.41
1:B:706:LEU:C	1:B:706:LEU:CD1	2.93	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: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%)	<b>5</b> <b>2</b>

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	717/853 (84%)	650 (91%)	39 (5%)	28 (4%)	2 1
All	All	1399/1706 (82%)	1285 (92%)	70 (5%)	44 (3%)	3 1

All (44) Ramachandran outliers are listed below:

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

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Mol	Chain	Res	Type
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%)	525 (90%)	57 (10%)	6 4
1	B	613/728 (84%)	541 (88%)	72 (12%)	4 2
All	All	1195/1456 (82%)	1066 (89%)	129 (11%)	5 3

All (129) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	ARG
1	A	15	ASP
1	A	37	LYS
1	A	38	LEU
1	A	41	GLU
1	A	72	ARG
1	A	76	LYS
1	A	156	ILE
1	A	201	ARG
1	A	225	ILE
1	A	226	SER
1	A	365	ILE
1	A	366	GLN
1	A	369	ASN
1	A	393	THR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	395	ASP
1	A	406	LYS
1	A	409	THR
1	A	443	LYS
1	A	444	GLU
1	A	457	ILE
1	A	506	MET
1	A	509	ARG
1	A	518	SER
1	A	523	VAL
1	A	527	GLU
1	A	535	GLU
1	A	538	LYS
1	A	591	GLU
1	A	602	ARG
1	A	612	MET
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	738	ARG
1	A	742	GLN
1	A	754	VAL
1	A	789	ILE
1	A	791	LEU
1	A	792	ARG
1	A	797	LYS
1	A	800	LYS
1	A	816	GLU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	12	SER
1	B	16	ARG
1	B	37	LYS
1	B	38	LEU
1	B	103	ARG
1	B	156	ILE
1	B	196	GLU
1	B	226	SER
1	B	230	GLU
1	B	231	ASP
1	B	282	ILE
1	B	283	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
1	B	310	VAL
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	459	ILE
1	B	461	LYS
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

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	609	LYS
1	B	610	LEU
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	696	SER
1	B	703	ILE
1	B	706	LEU
1	B	707	GLN
1	B	718	LEU
1	B	722	GLU
1	B	724	LEU
1	B	725	ASP
1	B	726	LYS
1	B	727	GLU
1	B	734	THR
1	B	742	GLN
1	B	779	LEU
1	B	783	ASP
1	B	791	LEU
1	B	796	GLN
1	B	800	LYS
1	B	801	GLN
1	B	821	GLU
1	B	831	VAL
1	B	832	ARG

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

<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	A	367	ASN
1	A	486	ASN
1	A	520	GLN
1	A	533	GLN
1	A	562	HIS
1	A	570	GLN
1	A	638	ASN
1	A	662	GLN

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Mol	Chain	Res	Type
1	A	742	GLN
1	A	748	GLN
1	A	790	HIS
1	B	14	ASN
1	B	467	ASN
1	B	520	GLN
1	B	528	ASN
1	B	533	GLN
1	B	542	GLN
1	B	545	HIS
1	B	620	HIS
1	B	629	ASN
1	B	638	ASN
1	B	644	GLN
1	B	664	ASN
1	B	707	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 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

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	686/853 (80%)	1.41	153 (22%) <b>3</b> <b>2</b>	40, 53, 84, 102	0
1	B	723/853 (84%)	1.86	247 (34%) <b>1</b> <b>1</b>	38, 54, 87, 102	0
All	All	1409/1706 (82%)	1.64	400 (28%) <b>1</b> <b>1</b>	38, 53, 86, 102	0

All (400) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	728	PRO	10.5
1	A	597	ILE	10.3
1	B	789	ILE	8.7
1	B	598	PHE	8.4
1	B	291	ILE	8.1
1	B	283	GLU	8.0
1	B	603	VAL	7.9
1	B	615	GLY	7.9
1	B	597	ILE	7.7
1	B	365	ILE	7.5
1	A	603	VAL	6.7
1	A	791	LEU	6.7
1	B	299	TYR	6.6
1	B	697	LEU	6.6
1	B	700	MET	6.6
1	A	394	ALA	6.4
1	B	721	ALA	6.4
1	B	724	LEU	6.3
1	B	696	SER	6.2
1	B	614	PRO	6.1
1	B	723	TRP	6.0
1	B	12	SER	6.0
1	B	282	ILE	5.8
1	B	718	LEU	5.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	393	THR	5.8
1	B	703	ILE	5.8
1	A	794	TYR	5.8
1	B	610	LEU	5.8
1	B	735	LEU	5.7
1	A	616	GLU	5.7
1	B	791	LEU	5.6
1	B	507	ALA	5.5
1	B	594	LEU	5.5
1	B	730	LEU	5.5
1	A	507	ALA	5.5
1	A	723	TRP	5.5
1	B	795	ALA	5.5
1	B	292	MET	5.3
1	A	604	SER	5.3
1	B	684	PHE	5.3
1	B	731	HIS	5.3
1	B	394	ALA	5.2
1	B	796	GLN	5.2
1	A	614	PRO	5.2
1	A	365	ILE	5.1
1	B	691	TYR	5.1
1	B	287	VAL	5.1
1	B	704	PRO	5.1
1	B	695	GLN	5.1
1	B	706	LEU	5.0
1	B	794	TYR	5.0
1	B	607	MET	5.0
1	B	229	ALA	5.0
1	A	724	LEU	4.9
1	B	280	VAL	4.9
1	B	734	THR	4.9
1	A	594	LEU	4.9
1	A	720	ILE	4.9
1	A	728	PRO	4.8
1	B	725	ASP	4.8
1	A	395	ASP	4.8
1	B	483	PHE	4.8
1	B	616	GLU	4.7
1	A	602	ARG	4.7
1	A	610	LEU	4.7
1	B	705	GLY	4.7

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	609	LYS	4.7
1	B	702	ASP	4.7
1	A	612	MET	4.6
1	A	796	GLN	4.6
1	B	509	ARG	4.6
1	B	602	ARG	4.6
1	A	617	ALA	4.6
1	B	521	ALA	4.6
1	A	534	ILE	4.6
1	A	799	PRO	4.6
1	A	725	ASP	4.5
1	A	792	ARG	4.5
1	B	790	HIS	4.5
1	A	797	LYS	4.5
1	A	598	PHE	4.4
1	B	719	PRO	4.4
1	B	285	LEU	4.4
1	A	721	ALA	4.4
1	B	281	LEU	4.4
1	B	290	GLY	4.3
1	B	793	GLY	4.3
1	A	15	ASP	4.3
1	B	618	ILE	4.3
1	A	615	GLY	4.3
1	A	727	GLU	4.3
1	A	531	ALA	4.3
1	B	729	GLU	4.3
1	A	717	ASP	4.2
1	A	705	GLY	4.2
1	A	793	GLY	4.2
1	B	688	ILE	4.2
1	B	738	ARG	4.2
1	B	230	GLU	4.2
1	B	720	ILE	4.2
1	B	831	VAL	4.2
1	A	716	LEU	4.2
1	B	699	GLU	4.2
1	B	727	GLU	4.2
1	B	617	ALA	4.2
1	A	789	ILE	4.2
1	A	16	ARG	4.2
1	B	103	ARG	4.2

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	301	PRO	4.2
1	B	611	GLY	4.2
1	B	832	ARG	4.1
1	A	593	ALA	4.1
1	B	797	LYS	4.1
1	A	731	HIS	4.1
1	B	599	ALA	4.1
1	A	600	SER	4.1
1	B	284	GLU	4.1
1	A	715	ASP	4.1
1	B	694	PRO	4.0
1	B	593	ALA	3.9
1	B	670	SER	3.9
1	B	792	ARG	3.9
1	B	367	ASN	3.9
1	A	722	GLU	3.9
1	B	709	ARG	3.9
1	B	595	MET	3.9
1	B	286	LEU	3.9
1	B	606	MET	3.8
1	A	523	VAL	3.8
1	A	14	ASN	3.8
1	A	834	PRO	3.8
1	B	519	TRP	3.8
1	B	513	ILE	3.8
1	B	692	ILE	3.8
1	B	740	LEU	3.7
1	A	718	LEU	3.7
1	A	368	GLU	3.7
1	A	367	ASN	3.7
1	B	689	ASP	3.7
1	A	709	ARG	3.7
1	A	719	PRO	3.6
1	A	618	ILE	3.6
1	B	605	GLY	3.6
1	B	524	ALA	3.6
1	B	506	MET	3.6
1	B	395	ASP	3.6
1	A	700	MET	3.6
1	B	701	TRP	3.6
1	B	739	ILE	3.6
1	B	508	GLY	3.5

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	313	ALA	3.5
1	A	790	HIS	3.5
1	A	17	THR	3.5
1	A	396	THR	3.5
1	A	599	ALA	3.5
1	B	596	ARG	3.5
1	B	604	SER	3.5
1	A	798	ASP	3.5
1	B	612	MET	3.5
1	A	613	LYS	3.5
1	B	532	GLU	3.5
1	B	136	ALA	3.5
1	A	784	TYR	3.5
1	B	608	ARG	3.5
1	B	708	GLU	3.5
1	B	722	GLU	3.5
1	B	600	SER	3.4
1	A	526	LEU	3.4
1	B	714	PHE	3.4
1	A	393	THR	3.4
1	B	228	PRO	3.4
1	A	607	MET	3.4
1	B	429	MET	3.4
1	B	15	ASP	3.4
1	B	733	GLU	3.4
1	A	609	LYS	3.3
1	B	754	VAL	3.3
1	B	366	GLN	3.3
1	A	697	LEU	3.3
1	A	398	ALA	3.3
1	A	745	GLU	3.3
1	B	669	VAL	3.3
1	A	833	MET	3.3
1	A	601	ASP	3.2
1	B	296	GLU	3.2
1	A	795	ALA	3.2
1	B	295	GLY	3.2
1	B	613	LYS	3.2
1	B	687	THR	3.2
1	A	704	PRO	3.2
1	B	510	GLY	3.2
1	B	526	LEU	3.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	A	726	LYS	3.1
1	A	595	MET	3.1
1	A	691	TYR	3.1
1	B	820	TYR	3.1
1	B	302	ALA	3.1
1	B	534	ILE	3.1
1	B	293	ASP	3.1
1	B	716	LEU	3.0
1	A	832	ARG	3.0
1	A	806	GLU	3.0
1	A	831	VAL	3.0
1	B	693	PRO	3.0
1	B	753	VAL	3.0
1	B	232	SER	3.0
1	B	717	ASP	3.0
1	B	479	LEU	3.0
1	A	708	GLU	3.0
1	B	711	LYS	3.0
1	B	752	GLU	3.0
1	B	303	ASN	2.9
1	B	472	ALA	2.9
1	B	530	THR	2.9
1	B	742	GLN	2.9
1	A	698	GLU	2.9
1	B	523	VAL	2.9
1	B	746	VAL	2.9
1	A	508	GLY	2.9
1	B	743	SER	2.9
1	A	687	THR	2.9
1	B	368	GLU	2.8
1	B	713	ASP	2.8
1	B	294	GLU	2.8
1	A	519	TRP	2.8
1	A	730	LEU	2.8
1	B	710	LEU	2.8
1	B	126	VAL	2.8
1	B	531	ALA	2.8
1	B	732	GLU	2.8
1	A	216	ILE	2.8
1	B	799	PRO	2.8
1	A	710	LEU	2.8
1	A	672	VAL	2.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	511	THR	2.7
1	A	735	LEU	2.7
1	A	606	MET	2.7
1	B	122	THR	2.7
1	B	641	ILE	2.7
1	A	742	GLN	2.7
1	B	288	LYS	2.7
1	B	297	SER	2.7
1	B	156	ILE	2.7
1	A	757	GLU	2.7
1	B	747	TYR	2.7
1	A	209	ASP	2.7
1	A	30	ALA	2.6
1	A	366	GLN	2.6
1	B	686	ALA	2.6
1	B	707	GLN	2.6
1	A	611	GLY	2.6
1	B	308	HIS	2.6
1	B	749	ARG	2.6
1	B	690	ALA	2.6
1	A	193	PHE	2.6
1	A	530	THR	2.6
1	A	19	ARG	2.6
1	B	488	ALA	2.6
1	B	129	VAL	2.6
1	B	310	VAL	2.6
1	B	829	VAL	2.6
1	A	512	ASP	2.6
1	A	596	ARG	2.6
1	B	745	GLU	2.6
1	B	170	TYR	2.5
1	A	103	ARG	2.5
1	A	560	GLU	2.5
1	B	788	GLY	2.5
1	A	481	ALA	2.5
1	A	13	ARG	2.5
1	B	16	ARG	2.5
1	A	228	PRO	2.5
1	B	737	GLU	2.5
1	B	94	LEU	2.5
1	A	539	ALA	2.5
1	B	214	ILE	2.4

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	203	LEU	2.4
1	B	312	ALA	2.4
1	A	369	ASN	2.4
1	A	744	ILE	2.4
1	B	27	ILE	2.4
1	B	512	ASP	2.4
1	B	407	LEU	2.4
1	A	488	ALA	2.4
1	A	511	THR	2.4
1	B	396	THR	2.4
1	B	409	THR	2.4
1	B	159	PRO	2.4
1	A	608	ARG	2.4
1	A	639	PHE	2.4
1	B	13	ARG	2.4
1	B	736	ARG	2.4
1	A	712	ASN	2.4
1	B	528	ASN	2.4
1	B	712	ASN	2.4
1	A	711	LYS	2.4
1	B	726	LYS	2.4
1	B	93	VAL	2.4
1	B	154	VAL	2.4
1	A	509	ARG	2.4
1	B	632	ARG	2.4
1	A	537	ILE	2.4
1	B	174	ILE	2.4
1	B	698	GLU	2.3
1	B	158	LEU	2.3
1	B	202	LYS	2.3
1	B	481	ALA	2.3
1	A	810	MET	2.3
1	B	125	GLY	2.3
1	B	715	ASP	2.3
1	A	684	PHE	2.3
1	B	482	LYS	2.3
1	B	486	ASN	2.3
1	A	690	ALA	2.3
1	B	206	ALA	2.3
1	A	669	VAL	2.3
1	A	754	VAL	2.3
1	B	491	VAL	2.3

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	822	VAL	2.3
1	A	702	ASP	2.3
1	A	433	GLU	2.3
1	A	399	PHE	2.3
1	B	304	ILE	2.3
1	A	506	MET	2.3
1	B	489	ALA	2.3
1	B	211	VAL	2.3
1	B	806	GLU	2.3
1	B	744	ILE	2.3
1	B	298	LEU	2.3
1	B	487	GLU	2.2
1	B	71	VAL	2.2
1	A	714	PHE	2.2
1	B	520	GLN	2.2
1	A	409	THR	2.2
1	B	311	THR	2.2
1	A	522	GLU	2.2
1	A	635	GLU	2.2
1	B	231	ASP	2.2
1	A	800	LYS	2.2
1	A	637	ARG	2.2
1	A	567	ILE	2.2
1	A	429	MET	2.2
1	A	483	PHE	2.2
1	A	688	ILE	2.2
1	A	135	LEU	2.2
1	B	176	TYR	2.2
1	B	492	ALA	2.2
1	A	406	LYS	2.2
1	B	798	ASP	2.2
1	A	749	ARG	2.2
1	B	123	GLY	2.2
1	B	514	VAL	2.2
1	A	533	GLN	2.2
1	A	641	ILE	2.1
1	B	567	ILE	2.1
1	A	682	ASP	2.1
1	B	186	TYR	2.1
1	A	787	GLN	2.1
1	B	59	VAL	2.1
1	B	128	VAL	2.1

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	410	VAL	2.1
1	B	60	LEU	2.1
1	B	571	LEU	2.1
1	B	402	SER	2.1
1	A	418	MET	2.1
1	B	307	MET	2.1
1	A	527	GLU	2.1
1	B	786	ARG	2.1
1	B	399	PHE	2.1
1	A	734	THR	2.1
1	A	620	HIS	2.1
1	A	732	GLU	2.1
1	B	289	GLU	2.1
1	B	150	LEU	2.1
1	B	207	LEU	2.1
1	B	636	SER	2.1
1	B	678	SER	2.1
1	B	99	ILE	2.1
1	B	419	ILE	2.1
1	A	686	ALA	2.0
1	B	116	ALA	2.0
1	B	172	ALA	2.0
1	B	652	ALA	2.0
1	B	755	GLY	2.0
1	B	182	TYR	2.0
1	B	205	TYR	2.0
1	A	20	ARG	2.0
1	A	56	LYS	2.0
1	B	637	ARG	2.0
1	B	104	THR	2.0
1	A	563	GLU	2.0
1	B	107	GLY	2.0
1	A	621	PRO	2.0
1	A	741	ALA	2.0
1	B	529	PRO	2.0
1	A	642	ARG	2.0
1	B	37	LYS	2.0
1	B	543	VAL	2.0
1	B	309	HIS	2.0
1	B	408	ASP	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.