



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 01:45 PM UTC

PDB ID : 4P6I / pdb_00004p6i
Title : Crystal structure of the Cas1-Cas2 complex from Escherichia coli
Authors : Nunez, J.K.; Kranzusch, P.J.; Noeske, J.; Doudna, J.A.
Deposited on : 2014-03-24
Resolution : 2.30 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

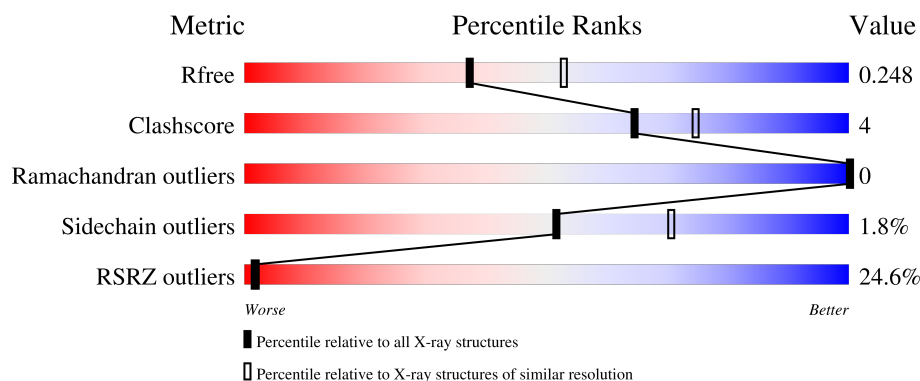
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	103	
1	B	103	
2	C	305	
2	D	305	
2	E	305	

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Mol	Chain	Length	Quality of chain
2	F	305	21% 82% 9% 10%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 10450 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 CRISPR-associated endoribonuclease Cas2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	101	Total	C	N	O	S	0	0	0
			792	507	136	145	4			
1	B	97	Total	C	N	O	S	0	0	0
			755	483	131	137	4			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	95	GLY	-	expression tag	UNP P45956
A	96	SER	-	expression tag	UNP P45956
A	97	SER	-	expression tag	UNP P45956
A	98	GLU	-	expression tag	UNP P45956
A	99	ASN	-	expression tag	UNP P45956
A	100	LEU	-	expression tag	UNP P45956
A	101	TYR	-	expression tag	UNP P45956
A	102	PHE	-	expression tag	UNP P45956
A	103	GLN	-	expression tag	UNP P45956
B	95	GLY	-	expression tag	UNP P45956
B	96	SER	-	expression tag	UNP P45956
B	97	SER	-	expression tag	UNP P45956
B	98	GLU	-	expression tag	UNP P45956
B	99	ASN	-	expression tag	UNP P45956
B	100	LEU	-	expression tag	UNP P45956
B	101	TYR	-	expression tag	UNP P45956
B	102	PHE	-	expression tag	UNP P45956
B	103	GLN	-	expression tag	UNP P45956

- Molecule 2 is a protein called CRISPR-associated endonuclease Cas1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	270	Total	C	N	O	S	0	0	0
			2080	1327	371	375	7			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	288	Total	C	N	O	S	0	0	0
			2200	1409	388	396	7			
2	E	259	Total	C	N	O	S	0	0	0
			1979	1262	353	357	7			
2	F	276	Total	C	N	O	S	0	0	0
			2119	1356	376	380	7			

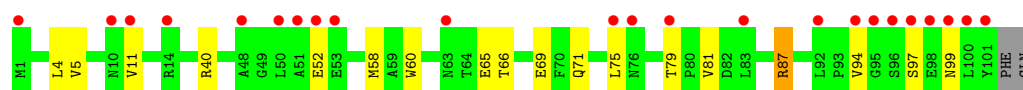
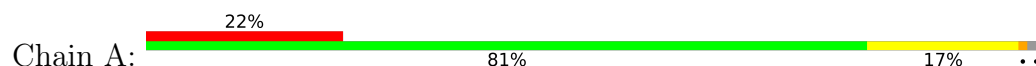
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	66	Total	O	0	0
			66	66		
3	B	55	Total	O	0	0
			55	55		
3	C	86	Total	O	0	0
			86	86		
3	D	136	Total	O	0	0
			136	136		
3	E	66	Total	O	0	0
			66	66		
3	F	116	Total	O	0	0
			116	116		

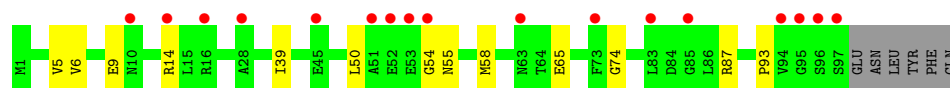
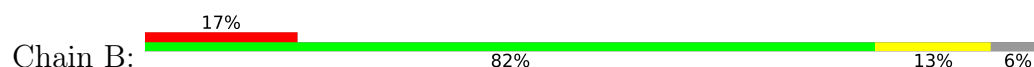
3 Residue-property plots [i](#)

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

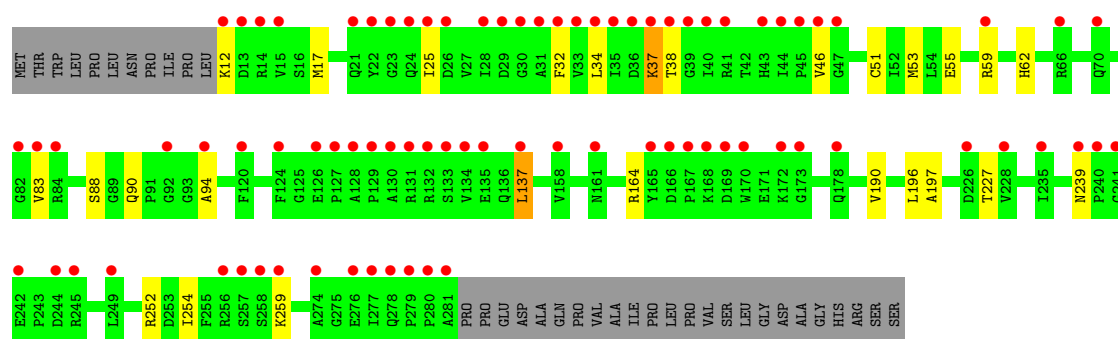
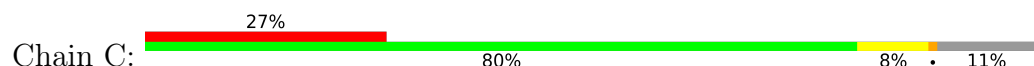
- Molecule 1: CRISPR-associated endoribonuclease Cas2



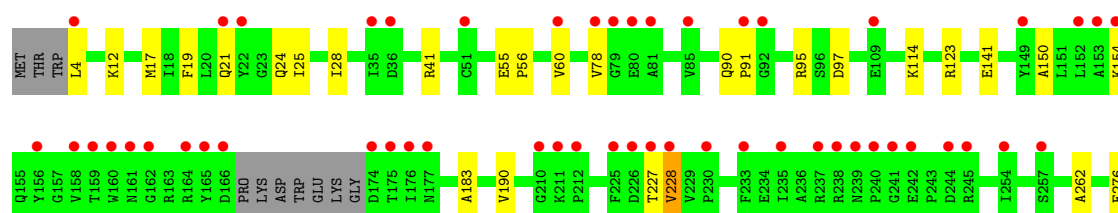
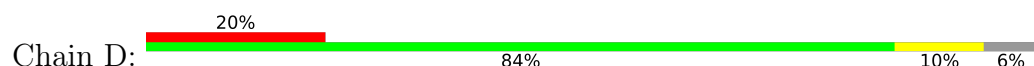
- Molecule 1: CRISPR-associated endoribonuclease Cas2

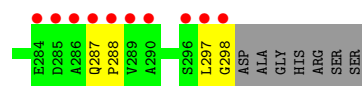


- Molecule 2: CRISPR-associated endonuclease Cas1

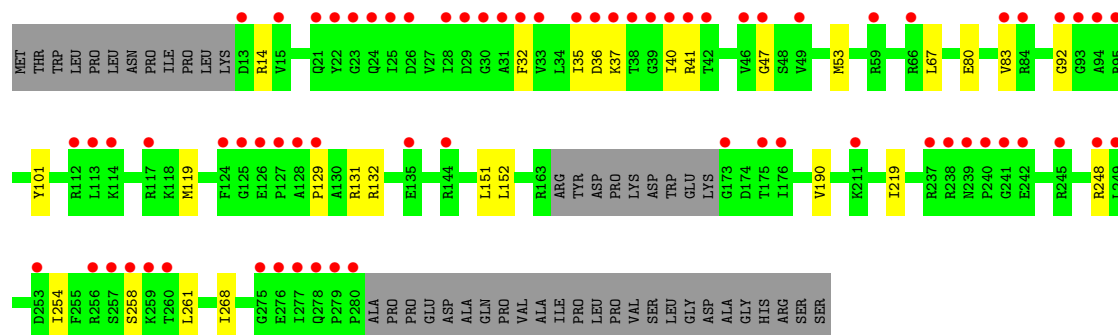
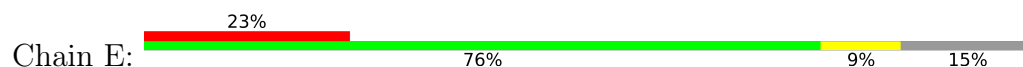


- Molecule 2: CRISPR-associated endonuclease Cas1

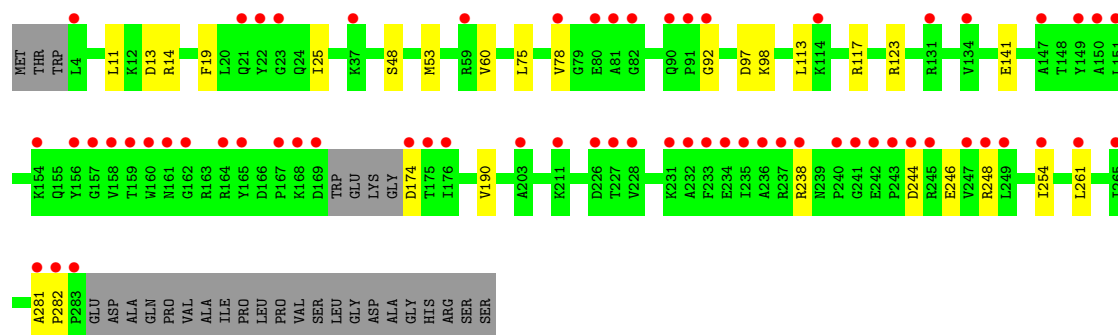
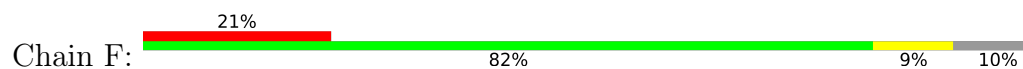




● Molecule 2: CRISPR-associated endonuclease Cas1



● Molecule 2: CRISPR-associated endonuclease Cas1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	94.88Å 125.70Å 99.31Å 90.00° 102.74° 90.00°	Depositor
Resolution (Å)	62.85 – 2.30 62.85 – 2.30	Depositor EDS
% Data completeness (in resolution range)	97.1 (62.85-2.30) 97.2 (62.85-2.30)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.16 (at 2.29Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, R_{free}	0.225 , 0.245 0.228 , 0.248	Depositor DCC
R_{free} test set	2012 reflections (2.05%)	wwPDB-VP
Wilson B-factor (Å ²)	36.8	Xtriage
Anisotropy	0.162	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 34.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.016 for l,k,h	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	10450	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.75% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.30	0/807	0.71	0/1097
1	B	0.27	0/769	0.65	0/1045
2	C	0.31	0/2120	0.73	0/2873
2	D	0.32	0/2244	0.73	3/3051 (0.1%)
2	E	0.32	0/2014	0.73	0/2729
2	F	0.31	0/2161	0.74	0/2934
All	All	0.31	0/10115	0.73	3/13729 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	228	VAL	N-CA-C	5.14	115.81	110.82
2	D	90	GLN	CA-C-N	5.11	126.23	119.84
2	D	90	GLN	C-N-CA	5.11	126.23	119.84

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	792	0	801	13	0
1	B	755	0	769	9	0
2	C	2080	0	2136	14	0
2	D	2200	0	2272	20	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	1979	0	2038	15	0
2	F	2119	0	2188	17	0
3	A	66	0	0	5	0
3	B	55	0	0	1	0
3	C	86	0	0	0	0
3	D	136	0	0	3	0
3	E	66	0	0	2	0
3	F	116	0	0	2	0
All	All	10450	0	10204	79	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (79) 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)
2:F:113:LEU:O	3:F:501:HOH:O	2.00	0.79
2:F:238:ARG:NH1	2:F:246:GLU:OE2	2.17	0.77
1:B:65:GLU:OE2	3:B:242:HOH:O	2.04	0.75
2:F:11:LEU:HA	2:F:14:ARG:HD3	1.79	0.65
2:D:227:THR:OG1	3:D:422:HOH:O	2.13	0.65
2:D:123:ARG:NH1	2:D:141:GLU:OE2	2.31	0.63
2:E:14:ARG:NH1	2:E:47:GLY:O	2.31	0.62
1:A:94:VAL:HG23	1:A:97:SER:HB2	1.82	0.62
1:B:39:ILE:HD11	2:F:13:ASP:HB3	1.84	0.60
2:D:4:LEU:N	3:D:522:HOH:O	2.35	0.59
2:D:21:GLN:HA	2:D:55:GLU:HB2	1.87	0.56
2:F:244:ASP:O	2:F:248:ARG:HG2	2.07	0.53
1:A:99:ASN:ND2	3:A:263:HOH:O	2.41	0.52
2:F:190:VAL:HB	2:F:261:LEU:HD21	1.92	0.52
2:E:53:MET:HE1	2:E:190:VAL:HG12	1.92	0.51
2:E:101:TYR:OH	3:E:461:HOH:O	2.19	0.51
1:A:81:VAL:HB	2:D:298:GLY:HA3	1.92	0.51
2:E:36:ASP:OD1	2:E:37:LYS:N	2.33	0.51
2:F:117:ARG:N	3:F:501:HOH:O	2.09	0.51
2:E:131:ARG:NH2	2:E:132:ARG:HH12	2.10	0.50
2:E:35:ILE:HG13	2:E:41:ARG:HG2	1.93	0.50
2:E:254:ILE:O	2:E:258:SER:OG	2.29	0.50
1:B:87:ARG:HH11	1:B:87:ARG:HA	1.78	0.49
2:C:17:MET:HG2	2:C:51:CYS:HB3	1.94	0.49
2:F:19:PHE:CZ	2:F:248:ARG:HD2	2.47	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:59:ARG:HE	2:D:24:GLN:HE22	1.60	0.48
2:C:37:LYS:HD2	2:C:38:THR:N	2.28	0.48
2:E:219:ILE:HG12	2:E:268:ILE:HG12	1.95	0.48
2:F:174:ASP:N	2:F:174:ASP:OD1	2.47	0.48
1:A:69:GLU:OE2	1:A:87:ARG:NH1	2.47	0.47
2:F:97:ASP:OD1	2:F:98:LYS:N	2.47	0.47
2:E:92:GLY:HA2	2:F:92:GLY:HA2	1.97	0.47
2:E:80:GLU:OE1	2:E:248:ARG:NH1	2.48	0.47
1:A:40:ARG:NH2	3:A:225:HOH:O	2.48	0.46
2:E:36:ASP:OD1	2:E:37:LYS:HG3	2.15	0.46
2:C:25:ILE:HG12	2:C:34:LEU:HD23	1.97	0.46
2:C:227:THR:HG22	2:C:254:ILE:HD13	1.98	0.46
2:C:32:PHE:CG	2:C:46:VAL:HG21	2.51	0.46
2:C:55:GLU:OE1	2:C:252:ARG:NH2	2.44	0.46
2:F:14:ARG:HG2	2:F:48:SER:HA	1.98	0.46
2:C:62:HIS:CG	2:D:56:PRO:HA	2.51	0.46
2:D:150:ALA:O	2:D:154:LYS:HD3	2.16	0.46
2:F:25:ILE:HG12	2:F:60:VAL:HG12	1.98	0.45
2:F:123:ARG:NH1	2:F:141:GLU:OE2	2.48	0.45
2:C:53:MET:HE1	2:C:190:VAL:HG12	1.99	0.45
2:E:83:VAL:O	3:E:409:HOH:O	2.21	0.45
2:C:196:LEU:HD11	2:D:91:PRO:HB3	1.98	0.45
1:B:6:VAL:HG22	1:B:58:MET:HG3	1.99	0.45
2:E:129:PRO:HG2	2:E:132:ARG:HG2	1.99	0.44
2:F:281:ALA:HA	2:F:282:PRO:HD3	1.89	0.44
1:A:66:THR:HG21	1:A:87:ARG:HB3	2.00	0.44
2:C:88:SER:HB3	2:D:91:PRO:HA	1.99	0.44
2:D:183:ALA:HB1	2:D:228:VAL:HG13	1.99	0.44
2:C:90:GLN:HB3	2:C:94:ALA:HB2	2.00	0.43
2:D:25:ILE:HD11	2:D:60:VAL:HG13	2.01	0.43
2:D:114:LYS:HZ1	2:D:276:GLU:CD	2.27	0.43
1:A:40:ARG:HD3	1:A:60:TRP:CD2	2.54	0.42
1:A:52:GLU:OE1	1:A:52:GLU:N	2.51	0.42
1:B:54:GLY:O	1:B:74:GLY:HA3	2.19	0.42
1:B:9:GLU:HB3	1:B:55:ASN:HB3	2.01	0.42
1:B:14:ARG:HD3	1:B:50:LEU:HD22	2.01	0.42
1:A:65:GLU:OE1	3:A:229:HOH:O	2.21	0.42
1:A:79:THR:HG23	3:A:211:HOH:O	2.20	0.41
2:C:137:LEU:HD12	2:C:137:LEU:HA	1.93	0.41
2:D:28:ILE:HG21	2:D:41:ARG:NH1	2.35	0.41
2:D:287:GLN:NE2	3:D:451:HOH:O	2.52	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:254:ILE:HD13	2:F:254:ILE:HA	1.91	0.41
1:A:71:GLN:NE2	3:A:227:HOH:O	2.45	0.41
2:E:119:MET:HE2	2:E:119:MET:HB3	1.80	0.41
1:B:93:PRO:HB3	2:D:41:ARG:CZ	2.50	0.41
2:C:51:CYS:HB2	2:C:197:ALA:HB2	2.02	0.41
2:D:12:LYS:HG3	2:D:262:ALA:HB2	2.03	0.41
1:A:4:LEU:HD11	1:A:58:MET:HG3	2.03	0.40
2:F:19:PHE:CZ	2:F:53:MET:HG3	2.56	0.40
1:A:5:VAL:HG11	1:B:5:VAL:HG11	2.02	0.40
2:D:95:ARG:HB3	2:D:97:ASP:OD1	2.21	0.40
2:D:17:MET:HE2	2:D:19:PHE:CE1	2.57	0.40
2:E:32:PHE:HD2	2:E:67:LEU:HD23	1.87	0.40
2:D:287:GLN:HA	2:D:288:PRO:HD3	1.97	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	99/103 (96%)	96 (97%)	3 (3%)	0	100	100
1	B	95/103 (92%)	92 (97%)	3 (3%)	0	100	100
2	C	268/305 (88%)	262 (98%)	6 (2%)	0	100	100
2	D	284/305 (93%)	278 (98%)	6 (2%)	0	100	100
2	E	255/305 (84%)	248 (97%)	7 (3%)	0	100	100
2	F	272/305 (89%)	268 (98%)	4 (2%)	0	100	100
All	All	1273/1426 (89%)	1244 (98%)	29 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	85/87 (98%)	82 (96%)	3 (4%)	32	48
1	B	81/87 (93%)	81 (100%)	0	100	100
2	C	215/245 (88%)	208 (97%)	7 (3%)	33	50
2	D	231/245 (94%)	228 (99%)	3 (1%)	61	77
2	E	205/245 (84%)	201 (98%)	4 (2%)	48	67
2	F	222/245 (91%)	220 (99%)	2 (1%)	70	84
All	All	1039/1154 (90%)	1020 (98%)	19 (2%)	51	70

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	11	VAL
1	A	75	LEU
1	A	87	ARG
2	C	12	LYS
2	C	37	LYS
2	C	83	VAL
2	C	137	LEU
2	C	164	ARG
2	C	239	ASN
2	C	259	LYS
2	D	78	VAL
2	D	190	VAL
2	D	297	LEU
2	E	40	ILE
2	E	151	LEU
2	E	152	LEU
2	E	261	LEU
2	F	75	LEU
2	F	78	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	99	ASN
2	C	239	ASN
2	E	161	ASN

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	101/103 (98%)	1.30	23 (22%) 2 2	34, 48, 76, 93	0
1	B	97/103 (94%)	1.09	17 (17%) 4 4	36, 46, 68, 89	0
2	C	270/305 (88%)	1.54	82 (30%) 1 1	39, 54, 87, 110	0
2	D	288/305 (94%)	1.35	62 (21%) 2 3	36, 49, 80, 95	0
2	E	259/305 (84%)	1.55	70 (27%) 1 1	38, 55, 84, 94	0
2	F	276/305 (90%)	1.36	64 (23%) 2 2	36, 52, 86, 101	0
All	All	1291/1426 (90%)	1.41	318 (24%) 2 2	34, 51, 84, 110	0

All (318) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	95	GLY	9.6
2	C	129	PRO	9.5
1	B	94	VAL	8.7
2	F	283	PRO	8.5
2	F	92	GLY	7.1
1	A	101	TYR	6.8
2	C	128	ALA	6.6
2	C	22	TYR	6.5
2	F	165	TYR	6.5
2	E	125	GLY	6.3
1	B	96	SER	6.1
2	F	4	LEU	6.1
2	D	297	LEU	6.1
2	E	39	GLY	5.7
2	C	130	ALA	5.7
1	A	96	SER	5.6
1	A	51	ALA	5.6
1	A	75	LEU	5.6
2	D	80	GLU	5.5

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Mol	Chain	Res	Type	RSRZ
2	C	40	ILE	5.4
2	E	40	ILE	5.4
1	A	52	GLU	5.3
2	E	29	ASP	5.2
2	E	22	TYR	5.2
2	E	38	THR	5.1
1	B	97	SER	5.0
2	D	286	ALA	5.0
2	C	281	ALA	5.0
1	B	53	GLU	4.9
2	E	30	GLY	4.9
2	F	161	ASN	4.9
2	C	170	TRP	4.8
2	C	39	GLY	4.8
2	F	227	THR	4.8
2	C	35	ILE	4.6
2	E	37	LYS	4.6
2	E	94	ALA	4.4
2	D	21	GLN	4.4
2	C	12	LYS	4.3
2	E	280	PRO	4.3
2	F	240	PRO	4.2
2	F	22	TYR	4.2
2	D	165	TYR	4.2
2	D	154	LYS	4.2
2	F	81	ALA	4.1
2	E	28	ILE	4.1
2	D	227	THR	4.0
2	C	36	ASP	4.0
2	C	168	LYS	4.0
2	D	298	GLY	4.0
2	D	244	ASP	4.0
2	D	289	VAL	4.0
1	A	100	LEU	4.0
1	A	53	GLU	3.9
2	E	84	ARG	3.9
2	F	237	ARG	3.9
2	D	174	ASP	3.9
2	C	37	LYS	3.9
2	D	81	ALA	3.9
2	E	241	GLY	3.8
2	C	38	THR	3.8

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Mol	Chain	Res	Type	RSRZ
2	F	282	PRO	3.8
2	E	24	GLN	3.8
2	D	285	ASP	3.8
2	E	257	SER	3.8
2	F	151	LEU	3.8
1	B	51	ALA	3.7
2	F	174	ASP	3.7
2	D	240	PRO	3.7
2	C	28	ILE	3.7
1	A	97	SER	3.7
2	E	47	GLY	3.7
2	F	175	THR	3.7
2	C	256	ARG	3.7
2	D	212	PRO	3.7
2	E	92	GLY	3.7
2	D	226	ASP	3.6
2	D	237	ARG	3.6
1	A	99	ASN	3.6
2	E	128	ALA	3.6
2	D	245	ARG	3.6
2	C	167	PRO	3.6
2	E	41	ARG	3.6
2	D	161	ASN	3.6
2	E	276	GLU	3.6
2	D	296	SER	3.5
2	D	241	GLY	3.5
2	C	46	VAL	3.5
2	C	84	ARG	3.5
2	D	239	ASN	3.5
2	F	167	PRO	3.5
1	A	95	GLY	3.5
2	C	29	ASP	3.5
1	A	98	GLU	3.5
2	E	83	VAL	3.5
2	E	31	ALA	3.5
2	E	279	PRO	3.4
2	C	131	ARG	3.4
2	E	46	VAL	3.4
2	C	165	TYR	3.4
2	E	245	ARG	3.4
2	F	238	ARG	3.3
2	E	277	ILE	3.3

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Mol	Chain	Res	Type	RSRZ
2	C	278	GLN	3.3
2	D	162	GLY	3.3
2	E	36	ASP	3.3
2	D	22	TYR	3.3
2	C	21	GLN	3.3
2	E	173	GLY	3.3
2	C	43	HIS	3.2
2	C	41	ARG	3.2
2	E	129	PRO	3.2
2	E	42	THR	3.2
2	D	288	PRO	3.2
2	D	166	ASP	3.2
2	C	32	PHE	3.1
2	C	124	PHE	3.1
2	F	281	ALA	3.1
2	E	21	GLN	3.1
2	F	21	GLN	3.1
2	F	159	THR	3.1
2	F	226	ASP	3.1
2	D	164	ARG	3.1
2	D	175	THR	3.1
1	B	14	ARG	3.1
2	E	256	ARG	3.1
2	F	59	ARG	3.1
2	F	91	PRO	3.1
2	D	156	TYR	3.0
2	E	260	THR	3.0
2	C	70	GLN	3.0
2	E	278	GLN	3.0
2	C	239	ASN	3.0
2	C	44	ILE	3.0
2	C	257	SER	3.0
2	D	176	ILE	3.0
2	E	239	ASN	3.0
2	F	169	ASP	3.0
2	E	240	PRO	3.0
2	D	109	GLU	2.9
2	D	242	GLU	2.9
2	E	13	ASP	2.9
2	F	241	GLY	2.9
2	C	127	PRO	2.9
2	D	233	PHE	2.9

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Mol	Chain	Res	Type	RSRZ
2	F	131	ARG	2.9
2	F	156	TYR	2.9
2	C	137	LEU	2.9
2	C	134	VAL	2.9
2	C	276	GLU	2.9
2	E	242	GLU	2.9
2	F	242	GLU	2.9
1	A	10	ASN	2.9
2	C	13	ASP	2.9
2	E	124	PHE	2.8
2	F	80	GLU	2.8
1	B	10	ASN	2.8
2	C	244	ASP	2.8
2	C	45	PRO	2.8
2	C	94	ALA	2.8
2	F	168	LYS	2.8
1	A	79	THR	2.8
2	E	112	ARG	2.8
1	B	63	ASN	2.8
2	D	91	PRO	2.8
2	D	4	LEU	2.8
2	D	290	ALA	2.8
2	F	164	ARG	2.8
1	A	76	ASN	2.8
2	E	253	ASP	2.8
2	C	24	GLN	2.8
2	E	126	GLU	2.8
2	C	259	LYS	2.8
2	E	35	ILE	2.7
2	D	238	ARG	2.7
2	E	93	GLY	2.7
2	E	275	GLY	2.7
2	C	240	PRO	2.7
2	F	234	GLU	2.7
2	C	59	ARG	2.7
2	F	236	ALA	2.7
2	D	78	VAL	2.7
2	D	79	GLY	2.7
2	E	66	ARG	2.7
2	E	95	ARG	2.7
1	B	52	GLU	2.7
1	B	85	GLY	2.7

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Mol	Chain	Res	Type	RSRZ
2	F	147	ALA	2.6
2	F	244	ASP	2.6
2	E	248	ARG	2.6
2	C	47	GLY	2.6
2	E	175	THR	2.6
2	D	211	LYS	2.6
2	E	238	ARG	2.6
2	C	161	ASN	2.6
1	A	1	MET	2.6
2	C	30	GLY	2.6
2	C	83	VAL	2.6
2	C	280	PRO	2.6
2	D	60	VAL	2.6
2	E	127	PRO	2.6
2	F	254	ILE	2.6
2	E	59	ARG	2.6
2	E	144	ARG	2.6
2	C	228	VAL	2.6
2	D	51	CYS	2.5
2	E	26	ASP	2.5
2	F	243	PRO	2.5
2	D	235	ILE	2.5
1	B	45	GLU	2.5
2	C	26	ASP	2.5
2	C	166	ASP	2.5
2	F	231	LYS	2.5
2	C	241	GLY	2.5
2	D	225	PHE	2.5
1	B	16	ARG	2.5
2	D	228	VAL	2.5
2	C	23	GLY	2.5
2	D	287	GLN	2.5
2	F	162	GLY	2.5
2	C	135	GLU	2.4
2	D	284	GLU	2.4
1	A	94	VAL	2.4
2	C	169	ASP	2.4
2	D	177	ASN	2.4
2	C	14	ARG	2.4
2	C	274	ALA	2.4
2	D	153	ALA	2.4
2	D	230	PRO	2.4

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Mol	Chain	Res	Type	RSRZ
2	C	33	VAL	2.4
2	D	158	VAL	2.4
2	E	33	VAL	2.4
2	F	134	VAL	2.4
2	D	160	TRP	2.4
2	F	160	TRP	2.4
2	E	249	LEU	2.4
1	A	14	ARG	2.4
2	D	257	SER	2.4
1	A	50	LEU	2.4
2	E	211	LYS	2.4
2	E	258	SER	2.4
2	E	15	VAL	2.4
2	E	25	ILE	2.4
2	F	78	VAL	2.4
2	F	233	PHE	2.4
2	D	152	LEU	2.4
2	C	31	ALA	2.3
2	E	259	LYS	2.3
2	F	176	ILE	2.3
2	F	265	ILE	2.3
1	A	83	LEU	2.3
2	C	178	GLN	2.3
2	F	249	LEU	2.3
2	F	211	LYS	2.3
2	E	23	GLY	2.3
2	F	23	GLY	2.3
2	D	159	THR	2.3
2	C	245	ARG	2.3
2	F	245	ARG	2.3
2	C	82	GLY	2.3
2	D	149	TYR	2.3
2	E	237	ARG	2.3
2	D	85	VAL	2.3
2	E	32	PHE	2.3
2	F	154	LYS	2.3
2	D	92	GLY	2.3
2	C	15	VAL	2.3
1	A	63	ASN	2.2
2	C	92	GLY	2.2
2	F	157	GLY	2.2
2	F	149	TYR	2.2

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Mol	Chain	Res	Type	RSRZ
2	F	150	ALA	2.2
1	A	92	LEU	2.2
1	B	83	LEU	2.2
2	C	249	LEU	2.2
2	C	279	PRO	2.2
2	C	126	GLU	2.2
1	B	28	ALA	2.2
2	C	172	LYS	2.2
2	F	203	ALA	2.2
2	F	232	ALA	2.2
2	C	133	SER	2.2
1	A	11	VAL	2.2
2	F	37	LYS	2.2
1	A	48	ALA	2.2
2	C	66	ARG	2.2
2	C	173	GLY	2.2
2	E	176	ILE	2.1
1	B	73	PHE	2.1
2	E	114	LYS	2.1
2	F	82	GLY	2.1
2	E	117	ARG	2.1
2	C	277	ILE	2.1
2	D	35	ILE	2.1
2	D	254	ILE	2.1
2	E	49	VAL	2.1
2	F	158	VAL	2.1
1	B	54	GLY	2.1
2	C	132	ARG	2.1
2	C	258	SER	2.1
2	D	36	ASP	2.1
2	F	90	GLN	2.1
2	F	247	VAL	2.1
2	C	120	PHE	2.1
2	D	210	GLY	2.1
2	C	242	GLU	2.1
2	E	135	GLU	2.1
2	C	34	LEU	2.1
2	F	235	ILE	2.1
2	C	25	ILE	2.0
2	C	235	ILE	2.0
2	C	158	VAL	2.0
2	F	228	VAL	2.0

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Mol	Chain	Res	Type	RSRZ
2	F	114	LYS	2.0
2	C	226	ASP	2.0
2	E	113	LEU	2.0
2	F	261	LEU	2.0
2	F	248	ARG	2.0

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

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

6.3 Carbohydrates [i](#)

There are no 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.