



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 26, 2026 – 05:12 AM EDT

PDB ID : 9FE4 / pdb_00009fe4
Title : Crystallographic structure of AcrB V612F
Authors : Lazarova, M.; Diederichs, K.; Pos, K.M.
Deposited on : 2024-05-17
Resolution : 2.80 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

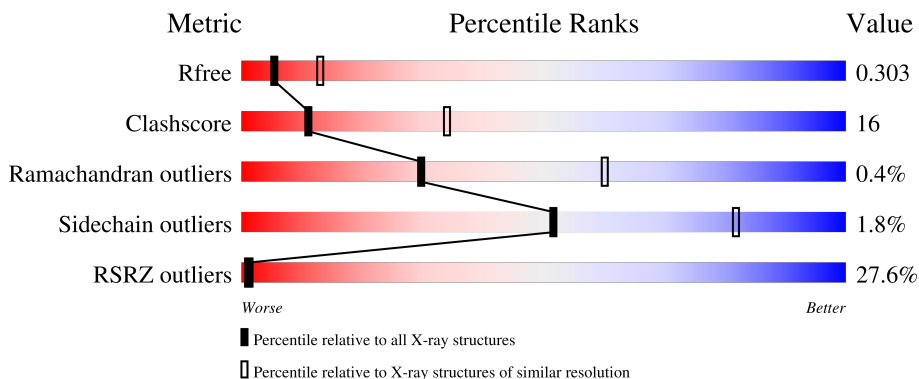
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.80 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	3866 (2.80-2.80)
Clashscore	190562	4276 (2.80-2.80)
Ramachandran outliers	187476	4196 (2.80-2.80)
Sidechain outliers	187428	4198 (2.80-2.80)
RSRZ outliers	180081	3869 (2.80-2.80)

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	B	1057	<div> <div>27%</div> <div>67%</div> <div>29%</div> <div>..</div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 7842 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 Multidrug efflux pump subunit AcrB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	1032	Total	C	N	O	S	0	0	0
			7842	5047	1294	1457	44			

There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	612	PHE	VAL	engineered mutation	UNP P31224
B	1050	LEU	-	expression tag	UNP P31224
B	1051	GLU	-	expression tag	UNP P31224
B	1052	HIS	-	expression tag	UNP P31224
B	1053	HIS	-	expression tag	UNP P31224
B	1054	HIS	-	expression tag	UNP P31224
B	1055	HIS	-	expression tag	UNP P31224
B	1056	HIS	-	expression tag	UNP P31224
B	1057	HIS	-	expression tag	UNP P31224



4 Data and refinement statistics

Property	Value	Source
Space group	P 3 2 1	Depositor
Cell constants a, b, c, α , β , γ	134.41Å 134.41Å 190.97Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	49.70 – 2.80 49.70 – 2.80	Depositor EDS
% Data completeness (in resolution range)	99.8 (49.70-2.80) 99.7 (49.70-2.80)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.76 (at 2.81Å)	Xtriage
Refinement program	PHENIX 1.20.1	Depositor
R, R_{free}	0.259 , 0.300 0.270 , 0.303	Depositor DCC
R_{free} test set	2481 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å ²)	83.0	Xtriage
Anisotropy	0.143	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 73.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.031 for -h,-k,l	Xtriage
F_o, F_c correlation	0.91	EDS
Total number of atoms	7842	wwPDB-VP
Average B, all atoms (Å ²)	110.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.43% 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	B	0.49	0/7992	0.77	4/10853 (0.0%)

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	B	0	3

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	B	85	THR	N-CA-C	-5.88	105.88	113.16
1	B	645	GLU	N-CA-C	-5.73	104.72	110.97
1	B	76	MET	N-CA-C	5.70	117.36	111.03
1	B	644	VAL	N-CA-C	5.00	119.75	109.34

There are no chirality outliers.

All (3) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	1032	ARG	Sidechain
1	B	185	ARG	Sidechain
1	B	239	ARG	Sidechain

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	B	7842	0	7992	259	0
All	All	7842	0	7992	259	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 16.

All (259) 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:57:VAL:CG2	1:B:88:VAL:HG23	1.69	1.22
1:B:535:LEU:CD1	1:B:961:ILE:HD12	1.74	1.18
1:B:57:VAL:HG22	1:B:88:VAL:CG2	1.75	1.15
1:B:535:LEU:HD11	1:B:961:ILE:CD1	1.78	1.13
1:B:953:MET:HE1	1:B:960:LEU:HD23	1.32	1.06
1:B:57:VAL:HG13	1:B:82:SER:HB3	1.36	1.01
1:B:644:VAL:O	1:B:648:THR:HG23	1.60	1.01
1:B:302:THR:O	1:B:306:ILE:HD12	1.63	0.97
1:B:355:MET:SD	1:B:368:PRO:HG2	2.04	0.97
1:B:905:VAL:CG2	1:B:906:PRO:HD3	1.96	0.95
1:B:355:MET:HE1	1:B:368:PRO:CD	1.97	0.94
1:B:57:VAL:HG22	1:B:88:VAL:HG23	1.40	0.92
1:B:57:VAL:HG21	1:B:88:VAL:HG23	1.49	0.92
1:B:57:VAL:CG2	1:B:88:VAL:CG2	2.41	0.89
1:B:535:LEU:HD13	1:B:961:ILE:HG23	1.51	0.89
1:B:909:VAL:O	1:B:913:LEU:HD13	1.74	0.88
1:B:905:VAL:HG23	1:B:906:PRO:HD3	1.56	0.86
1:B:459:PHE:HD2	1:B:467:TYR:CD2	1.94	0.85
1:B:412:VAL:HG22	1:B:435:MET:HE1	1.61	0.83
1:B:324:VAL:HG12	1:B:326:PRO:HD3	1.60	0.82
1:B:355:MET:HE1	1:B:368:PRO:HD2	1.60	0.82
1:B:535:LEU:HD11	1:B:961:ILE:HD12	0.86	0.81
1:B:355:MET:CE	1:B:368:PRO:HG2	2.13	0.79
1:B:429:GLU:HA	1:B:432:ARG:HG3	1.69	0.75
1:B:953:MET:HE1	1:B:960:LEU:CD2	2.12	0.74
1:B:729:ILE:HD11	1:B:786:ILE:HD12	1.68	0.74
1:B:57:VAL:CG1	1:B:82:SER:HB3	2.16	0.73
1:B:953:MET:CE	1:B:960:LEU:HD23	2.14	0.73
1:B:905:VAL:HG22	1:B:906:PRO:HD3	1.69	0.72
1:B:535:LEU:CD1	1:B:961:ILE:HG23	2.20	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:456:MET:HG3	1:B:459:PHE:CE2	2.26	0.71
1:B:243:THR:HG23	1:B:268:ILE:HB	1.72	0.70
1:B:728:LYS:HD3	1:B:808:ARG:CZ	2.22	0.70
1:B:909:VAL:O	1:B:913:LEU:CD1	2.41	0.68
1:B:905:VAL:HG23	1:B:906:PRO:CD	2.24	0.68
1:B:243:THR:CG2	1:B:268:ILE:HB	2.24	0.68
1:B:590:VAL:O	1:B:594:VAL:HG23	1.94	0.68
1:B:815:ARG:NH1	1:B:817:GLU:OE2	2.22	0.68
1:B:298:ASN:ND2	1:B:301:ASP:HB2	2.09	0.67
1:B:530:SER:O	1:B:534:ILE:HG12	1.95	0.67
1:B:57:VAL:HG22	1:B:88:VAL:HG21	1.72	0.67
1:B:535:LEU:HD13	1:B:961:ILE:CG2	2.22	0.66
1:B:166:ILE:HD12	1:B:306:ILE:HG23	1.78	0.66
1:B:243:THR:HG23	1:B:268:ILE:CG2	2.26	0.66
1:B:667:ASN:OD1	1:B:668:LEU:N	2.29	0.66
1:B:340:VAL:O	1:B:344:LEU:HD12	1.96	0.65
1:B:555:LEU:HB3	1:B:913:LEU:HD23	1.77	0.65
1:B:244:GLU:N	1:B:244:GLU:OE2	2.29	0.64
1:B:30:LEU:HD22	1:B:390:ILE:HG13	1.78	0.64
1:B:591:LEU:HD13	1:B:611:ALA:HB1	1.79	0.63
1:B:445:ILE:HG21	1:B:940:LYS:HE2	1.80	0.62
1:B:243:THR:HG23	1:B:268:ILE:CB	2.30	0.62
1:B:909:VAL:HG12	1:B:913:LEU:HD11	1.81	0.62
1:B:281:PHE:CZ	1:B:324:VAL:HG11	2.35	0.62
1:B:729:ILE:HD11	1:B:786:ILE:CD1	2.29	0.62
1:B:375:VAL:HA	1:B:480:LEU:HD23	1.83	0.61
1:B:938:SER:HB3	1:B:1014:ALA:HB1	1.81	0.61
1:B:36:PRO:O	1:B:38:ILE:HD12	2.01	0.60
1:B:342:LYS:O	1:B:346:GLU:HG3	2.01	0.60
1:B:355:MET:SD	1:B:368:PRO:CG	2.84	0.60
1:B:696:THR:OG1	1:B:825:MET:HE1	2.02	0.60
1:B:36:PRO:HD2	1:B:38:ILE:HD11	1.82	0.60
1:B:202:ASP:OD2	1:B:792:ARG:NH2	2.35	0.60
1:B:135:SER:HB2	1:B:673:GLU:HB3	1.83	0.59
1:B:901:VAL:O	1:B:904:VAL:HG12	2.01	0.59
1:B:459:PHE:CD2	1:B:467:TYR:CD2	2.84	0.59
1:B:30:LEU:HD21	1:B:389:SER:HA	1.83	0.59
1:B:729:ILE:CD1	1:B:786:ILE:HD12	2.33	0.59
1:B:777:ALA:O	1:B:781:MET:HG2	2.02	0.59
1:B:20:MET:HE3	1:B:374:VAL:HG22	1.83	0.59
1:B:101:ASP:O	1:B:105:VAL:HG23	2.03	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:35:TYR:CD2	1:B:671:ILE:HD13	2.38	0.58
1:B:555:LEU:HD21	1:B:917:THR:HG21	1.84	0.58
1:B:355:MET:CE	1:B:368:PRO:CG	2.80	0.58
1:B:646:ALA:HA	1:B:649:MET:HE2	1.86	0.58
1:B:337:ILE:O	1:B:341:VAL:HG22	2.04	0.57
1:B:456:MET:CG	1:B:459:PHE:CE2	2.86	0.57
1:B:925:VAL:HA	1:B:928:GLN:OE1	2.04	0.57
1:B:302:THR:OG1	1:B:303:ALA:N	2.38	0.57
1:B:355:MET:CE	1:B:368:PRO:CD	2.79	0.57
1:B:915:ALA:HB2	1:B:1009:GLY:HA3	1.86	0.57
1:B:16:ALA:O	1:B:20:MET:HG3	2.06	0.56
1:B:243:THR:HG23	1:B:268:ILE:HG22	1.88	0.55
1:B:801:PHE:HA	1:B:804:PHE:CZ	2.41	0.55
1:B:412:VAL:HG22	1:B:435:MET:CE	2.35	0.55
1:B:192:GLU:HG2	1:B:264:ASP:O	2.06	0.55
1:B:953:MET:HE2	1:B:960:LEU:HA	1.88	0.55
1:B:351:VAL:O	1:B:355:MET:HG3	2.07	0.54
1:B:862:MET:HG3	1:B:863:SER:N	2.23	0.54
1:B:416:VAL:HG22	1:B:431:THR:HA	1.89	0.54
1:B:251:LEU:HD11	1:B:262:LEU:HA	1.89	0.54
1:B:583:THR:HG22	1:B:585:GLU:H	1.72	0.54
1:B:775:SER:HB2	1:B:789:TRP:CZ2	2.42	0.54
1:B:923:ASN:HA	1:B:927:PHE:CD2	2.43	0.54
1:B:241:THR:HA	1:B:763:ILE:O	2.09	0.53
1:B:580:ALA:HB1	1:B:724:THR:HG22	1.91	0.53
1:B:909:VAL:HG12	1:B:913:LEU:CD1	2.39	0.53
1:B:573:MET:HG2	1:B:668:LEU:HD21	1.90	0.53
1:B:686:ASP:OD1	1:B:690:LEU:HB2	2.09	0.53
1:B:192:GLU:HB3	1:B:265:VAL:HG12	1.91	0.52
1:B:441:ALA:O	1:B:445:ILE:N	2.41	0.52
1:B:762:PHE:CE1	1:B:769:LYS:HB2	2.45	0.52
1:B:459:PHE:HB2	1:B:464:GLY:HA2	1.92	0.52
1:B:909:VAL:HG13	1:B:931:LEU:HD22	1.91	0.52
1:B:298:ASN:O	1:B:302:THR:HG23	2.09	0.52
1:B:699:ARG:HG2	1:B:703:LEU:HD23	1.92	0.51
1:B:396:PHE:HA	1:B:399:VAL:HG12	1.92	0.51
1:B:650:ARG:HG3	1:B:650:ARG:HH11	1.75	0.51
1:B:383:LEU:HD21	1:B:473:THR:HA	1.93	0.51
1:B:54:ALA:O	1:B:57:VAL:HG12	2.11	0.51
1:B:674:LEU:O	1:B:676:THR:N	2.44	0.51
1:B:602:GLU:CD	1:B:647:ILE:HG23	2.36	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:26:ALA:O	1:B:30:LEU:HB2	2.11	0.50
1:B:634:TRP:CD1	1:B:637:ARG:HH22	2.29	0.50
1:B:307:ARG:NH1	1:B:328:ASP:OD2	2.45	0.50
1:B:602:GLU:OE2	1:B:647:ILE:HG23	2.11	0.50
1:B:1017:LEU:HB3	1:B:1021:PHE:CE2	2.46	0.50
1:B:641:GLU:H	1:B:641:GLU:CD	2.19	0.50
1:B:990:VAL:HG22	1:B:1004:GLY:C	2.36	0.50
1:B:732:ASP:HB3	1:B:735:LYS:HB2	1.94	0.50
1:B:535:LEU:O	1:B:538:THR:HG23	2.12	0.50
1:B:277:ILE:HD13	1:B:614:GLY:HA3	1.93	0.50
1:B:357:LEU:HD23	1:B:358:PHE:CE1	2.47	0.50
1:B:591:LEU:O	1:B:595:THR:HG23	2.13	0.49
1:B:705:GLU:HB3	1:B:847:LEU:CD2	2.43	0.49
1:B:27:ILE:HG12	1:B:380:PHE:CD2	2.47	0.49
1:B:211:ASN:ND2	1:B:761:ASP:O	2.45	0.49
1:B:895:TRP:O	1:B:899:PHE:HE1	1.95	0.49
1:B:303:ALA:O	1:B:307:ARG:HG3	2.13	0.49
1:B:905:VAL:CG2	1:B:906:PRO:CD	2.80	0.49
1:B:676:THR:HA	1:B:862:MET:HE3	1.95	0.49
1:B:239:ARG:NH1	1:B:761:ASP:HB2	2.28	0.48
1:B:312:LYS:O	1:B:316:PHE:HE1	1.96	0.48
1:B:572:PHE:CE1	1:B:631:LEU:HD21	2.47	0.48
1:B:702:LEU:HB2	1:B:851:LEU:HD11	1.95	0.48
1:B:38:ILE:HD13	1:B:671:ILE:HD12	1.96	0.48
1:B:570:GLY:HA2	1:B:631:LEU:HD12	1.94	0.48
1:B:572:PHE:HE1	1:B:631:LEU:HD21	1.78	0.48
1:B:899:PHE:H	1:B:899:PHE:HD1	1.62	0.48
1:B:401:ALA:O	1:B:405:LEU:HG	2.14	0.48
1:B:355:MET:HE1	1:B:368:PRO:CG	2.42	0.48
1:B:561:SER:HA	1:B:923:ASN:HB3	1.94	0.48
1:B:68:ASN:O	1:B:110:LYS:HB3	2.14	0.48
1:B:156:ASP:CG	1:B:182:TYR:CD2	2.91	0.48
1:B:302:THR:C	1:B:306:ILE:HD12	2.36	0.48
1:B:456:MET:HG3	1:B:459:PHE:HE2	1.78	0.48
1:B:169:THR:O	1:B:172:VAL:HG12	2.14	0.47
1:B:835:LYS:HE3	1:B:839:GLU:OE2	2.14	0.47
1:B:901:VAL:HG11	1:B:943:ILE:HG13	1.97	0.47
1:B:359:LEU:HD12	1:B:417:GLU:OE2	2.14	0.47
1:B:5:PHE:CD2	1:B:487:ILE:HG23	2.48	0.47
1:B:30:LEU:CD2	1:B:389:SER:HA	2.45	0.47
1:B:693:GLU:O	1:B:696:THR:HB	2.14	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:889:ALA:N	1:B:898:PRO:HG3	2.30	0.47
1:B:306:ILE:O	1:B:309:GLU:N	2.47	0.47
1:B:454:VAL:N	1:B:455:PRO:HD2	2.30	0.47
1:B:655:PHE:HB3	1:B:663:VAL:HB	1.96	0.47
1:B:992:SER:OG	1:B:1000:GLN:OE1	2.31	0.47
1:B:375:VAL:HG11	1:B:481:SER:HA	1.97	0.46
1:B:174:ASP:HB3	1:B:292:LYS:HB2	1.96	0.46
1:B:858:ASP:OD1	1:B:859:TRP:N	2.36	0.46
1:B:603:LYS:O	1:B:632:LYS:NZ	2.48	0.46
1:B:248:LYS:HB2	1:B:248:LYS:HE2	1.70	0.46
1:B:409:ALA:O	1:B:413:VAL:HG22	2.15	0.46
1:B:913:LEU:O	1:B:917:THR:HG22	2.15	0.46
1:B:641:GLU:OE1	1:B:641:GLU:N	2.37	0.46
1:B:927:PHE:CZ	1:B:931:LEU:HD11	2.51	0.46
1:B:564:LEU:HD13	1:B:925:VAL:HG22	1.98	0.46
1:B:375:VAL:HG23	1:B:405:LEU:HD13	1.97	0.45
1:B:1017:LEU:O	1:B:1021:PHE:HD2	1.99	0.45
1:B:99:ASP:HB3	1:B:102:ILE:HB	1.98	0.45
1:B:137:LEU:HD13	1:B:293:LEU:HB2	1.98	0.45
1:B:897:ILE:HD13	1:B:950:LYS:HD2	1.97	0.45
1:B:846:GLN:O	1:B:849:SER:OG	2.31	0.45
1:B:23:GLY:O	1:B:27:ILE:HG13	2.17	0.45
1:B:572:PHE:HZ	1:B:598:TYR:CE1	2.35	0.45
1:B:910:ILE:HG13	1:B:914:LEU:HD13	1.98	0.45
1:B:645:GLU:O	1:B:649:MET:HG3	2.17	0.45
1:B:359:LEU:HA	1:B:359:LEU:HD13	1.75	0.45
1:B:391:ASN:O	1:B:392:THR:C	2.59	0.45
1:B:591:LEU:HD23	1:B:591:LEU:HA	1.79	0.45
1:B:862:MET:HG3	1:B:863:SER:H	1.81	0.45
1:B:255:GLN:NE2	1:B:256:ASP:OD1	2.50	0.44
1:B:684:LEU:HD12	1:B:684:LEU:HA	1.67	0.44
1:B:530:SER:O	1:B:534:ILE:N	2.46	0.44
1:B:470:PHE:CD2	1:B:929:VAL:HG21	2.52	0.44
1:B:40:PRO:HD3	1:B:462:SER:OG	2.18	0.44
1:B:317:PHE:CE2	1:B:323:ILE:HD13	2.52	0.44
1:B:572:PHE:HZ	1:B:598:TYR:HE1	1.65	0.44
1:B:896:SER:HA	1:B:899:PHE:CE1	2.53	0.44
1:B:578:LEU:HD23	1:B:587:THR:HG23	1.98	0.44
1:B:905:VAL:O	1:B:909:VAL:HG23	2.18	0.44
1:B:634:TRP:CD1	1:B:637:ARG:NH2	2.86	0.44
1:B:690:LEU:HD23	1:B:690:LEU:HA	1.93	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:367:ILE:HB	1:B:368:PRO:HD3	1.99	0.44
1:B:595:THR:HG22	1:B:609:VAL:HG11	2.00	0.44
1:B:121:GLU:H	1:B:121:GLU:CD	2.26	0.43
1:B:372:VAL:O	1:B:373:PRO:C	2.58	0.43
1:B:775:SER:HB2	1:B:789:TRP:HZ2	1.83	0.43
1:B:442:LEU:HA	1:B:445:ILE:HD12	1.99	0.43
1:B:945:ILE:HG21	1:B:1022:VAL:HG13	1.99	0.43
1:B:355:MET:CE	1:B:368:PRO:HD2	2.41	0.43
1:B:687:GLN:NE2	1:B:856:GLY:HA3	2.34	0.43
1:B:762:PHE:CE2	1:B:764:ASP:HB2	2.53	0.43
1:B:953:MET:CE	1:B:960:LEU:HA	2.47	0.43
1:B:456:MET:HE2	1:B:456:MET:HB3	1.82	0.43
1:B:904:VAL:HG11	1:B:939:ALA:HA	2.00	0.43
1:B:453:PHE:CE2	1:B:474:ILE:HG21	2.54	0.43
1:B:414:GLU:HG3	1:B:977:MET:HE1	2.00	0.43
1:B:594:VAL:O	1:B:598:TYR:HD2	2.02	0.43
1:B:208:LYS:HA	1:B:760:ASN:ND2	2.34	0.42
1:B:223:PRO:HA	1:B:224:PRO:HD3	1.95	0.42
1:B:552:MET:HG3	1:B:913:LEU:HD22	2.00	0.42
1:B:1025:PHE:HA	1:B:1028:VAL:HG22	2.01	0.42
1:B:115:MET:HB2	1:B:116:PRO:HD3	2.00	0.42
1:B:278:ILE:HG13	1:B:584:GLN:NE2	2.34	0.42
1:B:505:HIS:HB2	1:B:507:GLU:HG3	2.02	0.42
1:B:643:LYS:O	1:B:647:ILE:HG13	2.20	0.42
1:B:183:ALA:O	1:B:185:ARG:HG2	2.19	0.42
1:B:389:SER:OG	1:B:391:ASN:OD1	2.31	0.42
1:B:428:LYS:HD2	1:B:494:ALA:O	2.19	0.42
1:B:888:LEU:HD13	1:B:901:VAL:HB	2.02	0.42
1:B:699:ARG:O	1:B:703:LEU:HD23	2.20	0.42
1:B:702:LEU:HD12	1:B:702:LEU:O	2.20	0.42
1:B:1011:MET:O	1:B:1015:THR:HG22	2.20	0.42
1:B:913:LEU:N	1:B:913:LEU:HD12	2.35	0.42
1:B:175:VAL:HG11	1:B:289:LEU:HD13	2.02	0.42
1:B:80:SER:HB2	1:B:90:ILE:HG12	2.02	0.41
1:B:139:VAL:HB	1:B:327:TYR:HB3	2.01	0.41
1:B:270:LEU:HD23	1:B:270:LEU:HA	1.88	0.41
1:B:631:LEU:HD11	1:B:644:VAL:HG22	2.02	0.41
1:B:184:MET:HB3	1:B:771:VAL:HG22	2.01	0.41
1:B:398:MET:HE2	1:B:398:MET:HB3	1.88	0.41
1:B:923:ASN:HA	1:B:927:PHE:HD2	1.85	0.41
1:B:143:ILE:HG13	1:B:322:LYS:HB3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:280:GLU:HA	1:B:284:GLN:O	2.20	0.41
1:B:907:LEU:HD12	1:B:907:LEU:H	1.86	0.41
1:B:244:GLU:H	1:B:244:GLU:CD	2.29	0.41
1:B:298:ASN:CG	1:B:301:ASP:H	2.28	0.41
1:B:904:VAL:HA	1:B:907:LEU:HD13	2.02	0.41
1:B:323:ILE:HG22	1:B:325:TYR:CE1	2.55	0.41
1:B:546:LEU:O	1:B:550:VAL:HG13	2.21	0.41
1:B:699:ARG:HG2	1:B:699:ARG:O	2.19	0.41
1:B:459:PHE:HD1	1:B:876:LEU:CD1	2.34	0.41
1:B:136:PHE:HD1	1:B:291:ILE:O	2.04	0.41
1:B:144:ASN:HA	1:B:320:GLY:O	2.21	0.41
1:B:459:PHE:CD1	1:B:876:LEU:CD1	3.03	0.41
1:B:684:LEU:HD11	1:B:855:VAL:CG1	2.51	0.41
1:B:456:MET:HG2	1:B:467:TYR:HB3	2.03	0.40
1:B:573:MET:HG2	1:B:668:LEU:CD2	2.50	0.40
1:B:937:LEU:HD13	1:B:1011:MET:CE	2.51	0.40
1:B:651:ALA:O	1:B:652:THR:C	2.63	0.40
1:B:21:LEU:O	1:B:25:LEU:HB3	2.22	0.40
1:B:600:THR:OG1	1:B:601:LYS:N	2.53	0.40
1:B:699:ARG:HG3	1:B:827:ILE:HD11	2.04	0.40
1:B:706:ALA:HB3	1:B:716:VAL:HG11	2.04	0.40
1:B:758:TYR:OH	1:B:761:ASP:OD1	2.36	0.40
1:B:1017:LEU:O	1:B:1021:PHE:CD2	2.75	0.40
1:B:150:THR:O	1:B:154:ILE:HD12	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	B	1030/1057 (97%)	952 (92%)	74 (7%)	4 (0%)	30 60

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	675	GLY
1	B	36	PRO
1	B	676	THR
1	B	677	ALA

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	B	838/863 (97%)	823 (98%)	15 (2%)	51 82

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	18	ILE
1	B	25	LEU
1	B	117	LEU
1	B	230	LEU
1	B	238	THR
1	B	261	LEU
1	B	374	VAL
1	B	610	PHE
1	B	744	ASN
1	B	779	TYR
1	B	784	ASP
1	B	786	ILE
1	B	868	LEU
1	B	945	ILE
1	B	1016	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	58	GLN

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Mol	Chain	Res	Type
1	B	74	ASN
1	B	191	ASN
1	B	255	GLN
1	B	391	ASN
1	B	415	ASN
1	B	469	GLN
1	B	687	GLN
1	B	726	GLN
1	B	744	ASN
1	B	797	GLN

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	B	1032/1057 (97%)	1.47	285 (27%) 1 1	40, 119, 158, 190	0

All (285) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	438	ILE	6.0
1	B	7	ASP	5.8
1	B	944	LEU	5.8
1	B	938	SER	5.7
1	B	960	LEU	5.5
1	B	937	LEU	5.4
1	B	12	ALA	5.4
1	B	945	ILE	5.3
1	B	964	THR	5.3
1	B	399	VAL	5.2
1	B	542	LEU	5.2
1	B	961	ILE	5.2
1	B	13	TRP	5.1
1	B	866	GLU	5.1
1	B	409	ALA	5.0
1	B	941	ASN	4.9
1	B	949	ALA	4.9
1	B	946	VAL	4.8
1	B	435	MET	4.7
1	B	411	VAL	4.7
1	B	357	LEU	4.6
1	B	3	ASN	4.6
1	B	527	TYR	4.5
1	B	1022	VAL	4.4
1	B	408	ASP	4.4
1	B	520	PHE	4.4
1	B	1007	VAL	4.4

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Mol	Chain	Res	Type	RSRZ
1	B	113	LEU	4.3
1	B	664	PHE	4.3
1	B	133	SER	4.2
1	B	962	GLU	4.2
1	B	1019	ILE	4.2
1	B	535	LEU	4.2
1	B	37	THR	4.1
1	B	982	PHE	4.2
1	B	973	ARG	4.1
1	B	972	LEU	4.1
1	B	965	LEU	4.0
1	B	410	ILE	4.0
1	B	934	THR	4.0
1	B	485	ALA	4.0
1	B	1002	ALA	4.0
1	B	907	LEU	4.0
1	B	908	GLY	3.9
1	B	1027	VAL	3.9
1	B	355	MET	3.9
1	B	969	ARG	3.9
1	B	441	ALA	3.9
1	B	886	LEU	3.8
1	B	490	PRO	3.8
1	B	11	PHE	3.8
1	B	939	ALA	3.8
1	B	402	ILE	3.7
1	B	413	VAL	3.7
1	B	661	ALA	3.7
1	B	936	GLY	3.7
1	B	831	ALA	3.6
1	B	406	VAL	3.6
1	B	1005	THR	3.6
1	B	401	ALA	3.6
1	B	983	ILE	3.6
1	B	940	LYS	3.6
1	B	1014	ALA	3.6
1	B	1003	VAL	3.6
1	B	1024	VAL	3.6
1	B	442	LEU	3.5
1	B	349	ILE	3.5
1	B	548	ILE	3.5
1	B	647	ILE	3.5

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Mol	Chain	Res	Type	RSRZ
1	B	549	VAL	3.5
1	B	351	VAL	3.4
1	B	544	LEU	3.4
1	B	353	LEU	3.4
1	B	981	ALA	3.4
1	B	19	ILE	3.4
1	B	985	GLY	3.4
1	B	17	ILE	3.4
1	B	976	LEU	3.4
1	B	9	PRO	3.4
1	B	1011	MET	3.4
1	B	655	PHE	3.4
1	B	405	LEU	3.3
1	B	416	VAL	3.3
1	B	897	ILE	3.3
1	B	489	THR	3.3
1	B	904	VAL	3.3
1	B	18	ILE	3.3
1	B	891	LEU	3.3
1	B	569	GLN	3.3
1	B	437	GLN	3.3
1	B	1016	VAL	3.3
1	B	979	SER	3.3
1	B	974	PRO	3.2
1	B	516	PHE	3.2
1	B	859	TRP	3.2
1	B	890	ALA	3.2
1	B	458	PHE	3.2
1	B	531	VAL	3.2
1	B	112	GLN	3.2
1	B	417	GLU	3.2
1	B	888	LEU	3.2
1	B	374	VAL	3.2
1	B	902	MET	3.2
1	B	977	MET	3.2
1	B	445	ILE	3.2
1	B	488	LEU	3.1
1	B	384	ALA	3.1
1	B	873	ALA	3.1
1	B	230	LEU	3.1
1	B	545	TYR	3.1
1	B	494	ALA	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	948	PHE	3.1
1	B	348	ILE	3.1
1	B	515	TRP	3.1
1	B	449	LEU	3.1
1	B	14	VAL	3.0
1	B	541	TYR	3.0
1	B	486	LEU	3.0
1	B	484	VAL	3.0
1	B	491	ALA	3.0
1	B	359	LEU	3.0
1	B	6	ILE	2.9
1	B	412	VAL	2.9
1	B	918	PHE	2.9
1	B	15	ILE	2.9
1	B	161	ASN	2.9
1	B	354	VAL	2.9
1	B	372	VAL	2.9
1	B	396	PHE	2.9
1	B	1031	ARG	2.9
1	B	564	LEU	2.9
1	B	346	GLU	2.9
1	B	2	PRO	2.8
1	B	478	MET	2.8
1	B	453	PHE	2.8
1	B	921	LEU	2.8
1	B	162	MET	2.8
1	B	345	VAL	2.8
1	B	989	LEU	2.8
1	B	978	THR	2.8
1	B	35	TYR	2.8
1	B	448	VAL	2.8
1	B	16	ALA	2.8
1	B	347	ALA	2.8
1	B	480	LEU	2.8
1	B	519	MET	2.8
1	B	1006	GLY	2.8
1	B	598	TYR	2.8
1	B	995	ALA	2.8
1	B	377	LEU	2.8
1	B	400	LEU	2.8
1	B	601	LYS	2.8
1	B	167	SER	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	916	ALA	2.7
1	B	275	TYR	2.7
1	B	243	THR	2.7
1	B	986	VAL	2.7
1	B	219	LEU	2.7
1	B	376	LEU	2.7
1	B	393	LEU	2.7
1	B	942	ALA	2.7
1	B	629	VAL	2.7
1	B	337	ILE	2.7
1	B	667	ASN	2.7
1	B	253	VAL	2.7
1	B	673	GLU	2.7
1	B	933	THR	2.6
1	B	602	GLU	2.6
1	B	668	LEU	2.6
1	B	975	ILE	2.6
1	B	332	PHE	2.6
1	B	440	GLY	2.6
1	B	444	GLY	2.6
1	B	903	LEU	2.6
1	B	165	ALA	2.6
1	B	495	THR	2.6
1	B	991	ILE	2.6
1	B	223	PRO	2.5
1	B	560	PRO	2.5
1	B	366	LEU	2.5
1	B	597	TYR	2.5
1	B	644	VAL	2.5
1	B	929	VAL	2.5
1	B	987	MET	2.5
1	B	1012	VAL	2.5
1	B	547	ILE	2.5
1	B	837	THR	2.5
1	B	336	SER	2.5
1	B	782	LEU	2.5
1	B	679	GLY	2.5
1	B	994	GLY	2.5
1	B	528	THR	2.5
1	B	666	PHE	2.5
1	B	404	LEU	2.5
1	B	487	ILE	2.5

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Mol	Chain	Res	Type	RSRZ
1	B	5	PHE	2.5
1	B	1026	PHE	2.5
1	B	670	ALA	2.5
1	B	575	MET	2.4
1	B	508	GLY	2.4
1	B	968	VAL	2.4
1	B	1015	THR	2.4
1	B	970	MET	2.4
1	B	1008	MET	2.4
1	B	628	PHE	2.4
1	B	364	ALA	2.4
1	B	368	PRO	2.4
1	B	943	ILE	2.4
1	B	482	VAL	2.4
1	B	352	PHE	2.4
1	B	525	HIS	2.4
1	B	454	VAL	2.4
1	B	971	ARG	2.4
1	B	892	TYR	2.4
1	B	716	VAL	2.3
1	B	513	PHE	2.3
1	B	339	GLU	2.3
1	B	421	ALA	2.3
1	B	988	PRO	2.3
1	B	557	VAL	2.3
1	B	606	VAL	2.3
1	B	173	GLY	2.3
1	B	817	GLU	2.3
1	B	350	LEU	2.3
1	B	555	LEU	2.3
1	B	1030	ARG	2.3
1	B	901	VAL	2.3
1	B	905	VAL	2.3
1	B	387	GLY	2.3
1	B	403	GLY	2.3
1	B	429	GLU	2.2
1	B	338	HIS	2.2
1	B	617	PHE	2.2
1	B	414	GLU	2.2
1	B	83	ASP	2.2
1	B	407	ASP	2.2
1	B	867	ARG	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	340	VAL	2.2
1	B	493	CYS	2.2
1	B	398	MET	2.2
1	B	497	LEU	2.2
1	B	660	ASP	2.2
1	B	634	TRP	2.2
1	B	552	MET	2.2
1	B	380	PHE	2.2
1	B	27	ILE	2.2
1	B	323	ILE	2.2
1	B	563	PHE	2.2
1	B	1020	PHE	2.2
1	B	702	LEU	2.2
1	B	475	VAL	2.1
1	B	78	MET	2.1
1	B	383	LEU	2.1
1	B	1021	PHE	2.1
1	B	371	ALA	2.1
1	B	543	VAL	2.1
1	B	672	VAL	2.1
1	B	174	ASP	2.1
1	B	624	THR	2.1
1	B	638	PRO	2.1
1	B	397	GLY	2.1
1	B	459	PHE	2.1
1	B	917	THR	2.1
1	B	840	ALA	2.1
1	B	963	ALA	2.1
1	B	967	ALA	2.1
1	B	327	TYR	2.1
1	B	467	TYR	2.1
1	B	877	TYR	2.1
1	B	605	ASN	2.1
1	B	369	THR	2.1
1	B	538	THR	2.1
1	B	587	THR	2.1
1	B	286	ALA	2.1
1	B	910	ILE	2.1
1	B	229	GLN	2.0
1	B	375	VAL	2.0
1	B	419	VAL	2.0
1	B	571	VAL	2.0

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Mol	Chain	Res	Type	RSRZ
1	B	483	LEU	2.0
1	B	492	LEU	2.0
1	B	503	GLY	2.0
1	B	678	THR	2.0
1	B	957	GLY	2.0
1	B	567	GLU	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.