Full wwPDB X-ray Structure Validation Report (i)

Aug 7, 2023 – 01:09 PM EDT

PDB ID	:	1OW6
Title	:	Paxillin LD4 motif bound to the Focal Adhesion Targeting (FAT) domain of the Focal Adhesion Kinase
Authors	:	Hoellerer, M.K.; Noble, M.E.M.; Labesse, G.; Campbell, I.D.; Werner, J.M.; Arold, S.T.
Deposited on	:	2003-03-28
Resolution	:	2.35 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

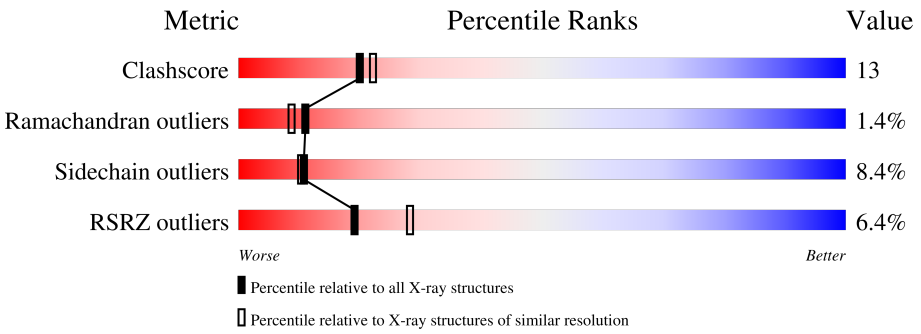
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.35
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.35 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))
Clashscore	141614	1232 (2.36-2.36)
Ramachandran outliers	138981	1211 (2.36-2.36)
Sidechain outliers	138945	1212 (2.36-2.36)
RSRZ outliers	127900	1150 (2.36-2.36)

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 <=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	161	61% 17% • 17%
1	B	161	66% 18% •• 14%
1	C	161	7% 53% 27% 5% • 14%
2	D	13	46% 46% 46% 8%
2	F	13	85% 62% 15% 8% 15%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 3488 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 Focal adhesion kinase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	134	1042	658	176	201	7	0	0	0
1	B	139	1073	680	180	206	7	0	0	0
1	C	139	1073	680	180	206	7	0	0	0

- Molecule 2 is a protein called Paxillin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	D	12	94	56	15	22	1	0	0	0
2	F	11	87	53	14	19	1	0	0	0

- Molecule 3 is water.

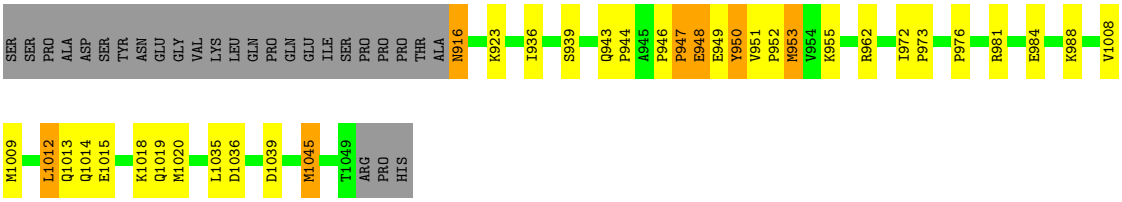
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	36	36	36	0	0
3	B	44	44	44	0	0
3	C	35	35	35	0	0
3	D	3	3	3	0	0
3	F	1	1	1	0	0

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.

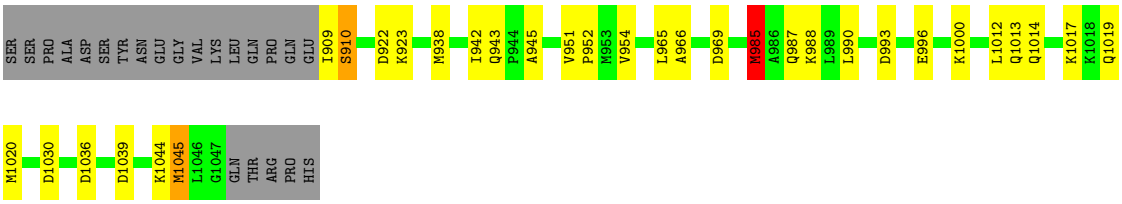
• Molecule 1: Focal adhesion kinase 1

Chain A:



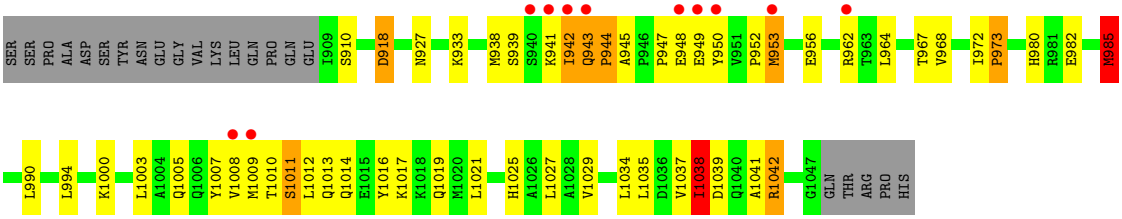
• Molecule 1: Focal adhesion kinase 1

Chain B:



• Molecule 1: Focal adhesion kinase 1

Chain C:

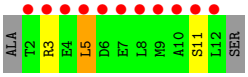


• Molecule 2: Paxillin

Chain D:

• Molecule 2: Paxillin

Chain F:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	88.31Å 223.27Å 96.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.27 – 2.35 36.91 – 2.35	Depositor EDS
% Data completeness (in resolution range)	96.8 (37.27-2.35) 96.8 (36.91-2.35)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	0.08	Depositor
$< I/\sigma(I) >$ [1]	2.23 (at 2.34Å)	Xtriage
Refinement program	REFMAC 5.1.24	Depositor
R, R_{free}	0.242 , 0.274 0.244 , (Not available)	Depositor DCC
R_{free} test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å^2)	44.2	Xtriage
Anisotropy	0.722	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 63.3	EDS
L-test for twinning[2]	$< \|L\| > = 0.50$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	3488	wwPDB-VP
Average B, all atoms (Å^2)	59.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.38% of the height of the origin peak. No significant pseudotranslation is detected.*

[1]Intensities estimated from amplitudes.

[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
1	A	0.49	0/1053	1.14	5/1424 (0.4%)
1	B	0.54	0/1087	1.11	6/1474 (0.4%)
1	C	0.53	1/1087 (0.1%)	1.24	5/1474 (0.3%)
2	D	0.40	0/93	1.14	1/122 (0.8%)
2	F	0.57	0/86	1.21	0/114
All	All	0.52	1/3406 (0.0%)	1.17	17/4608 (0.4%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	C	0	1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	1038	ILE	CA-CB	5.51	1.67	1.54

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	1042	ARG	NE-CZ-NH1	9.09	124.85	120.30
1	A	1039	ASP	CB-CG-OD1	7.85	125.36	118.30
1	B	922	ASP	CB-CG-OD2	7.07	124.66	118.30
1	C	918	ASP	CB-CG-OD2	6.91	124.52	118.30
1	C	985	MET	CG-SD-CE	6.80	111.08	100.20
1	A	1036	ASP	CB-CG-OD1	6.34	124.00	118.30
1	A	962	ARG	NE-CZ-NH1	-6.22	117.19	120.30
1	B	1036	ASP	CB-CG-OD1	6.01	123.71	118.30
1	B	985	MET	CG-SD-CE	5.76	109.42	100.20
1	A	962	ARG	NE-CZ-NH2	5.70	123.15	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	990	LEU	CB-CG-CD1	-5.50	101.65	111.00
1	C	1037	VAL	CG1-CB-CG2	-5.35	102.33	110.90
1	B	922	ASP	CB-CG-OD1	-5.31	113.52	118.30
2	D	6	ASP	CB-CG-OD2	5.25	123.03	118.30
1	A	1012	LEU	CA-CB-CG	5.17	127.19	115.30
1	B	1039	ASP	CB-CG-OD1	5.15	122.93	118.30
1	C	982	GLU	OE1-CD-OE2	-5.12	117.16	123.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	1038	ILE	Mainchain

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1042	0	1093	28	0
1	B	1073	0	1127	21	0
1	C	1073	0	1127	37	0
2	D	94	0	92	3	0
2	F	87	0	87	1	0
3	A	36	0	0	2	0
3	B	44	0	0	3	0
3	C	35	0	0	0	0
3	D	3	0	0	1	0
3	F	1	0	0	0	0
All	All	3488	0	3526	87	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 13.

All (87) 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:A:947:PRO:HA	1:A:950:TYR:CE2	2.12	0.84
1:A:947:PRO:HA	1:A:950:TYR:CZ	2.16	0.81
1:C:1007:TYR:O	1:C:1013:GLN:HB2	1.83	0.78
1:A:1009:MET:H	1:A:1013:GLN:NE2	1.81	0.77
1:A:976:PRO:HD3	1:A:1045:MET:HG2	1.67	0.76
1:B:965:LEU:HD22	1:B:987:GLN:HG2	1.68	0.76
1:B:1013:GLN:HB3	3:B:40:HOH:O	1.89	0.72
1:A:1009:MET:H	1:A:1013:GLN:HE21	1.37	0.72
1:B:985:MET:CE	1:B:988:LYS:HD2	2.20	0.70
1:C:943:GLN:HB3	1:C:944:PRO:HD3	1.74	0.70
1:C:943:GLN:HB3	1:C:944:PRO:CD	2.24	0.67
1:C:1010:THR:HG22	1:C:1012:LEU:H	1.60	0.67
1:B:985:MET:HE3	1:B:988:LYS:HD2	1.77	0.65
1:B:951:VAL:HB	1:B:952:PRO:HD3	1.79	0.64
1:B:993:ASP:OD2	1:B:1030:ASP:OD2	2.21	0.59
1:A:951:VAL:HG12	1:A:955:LYS:HE3	1.84	0.59
1:C:1038:ILE:O	1:C:1042:ARG:HG3	2.02	0.58
1:A:947:PRO:HB3	1:A:950:TYR:OH	2.03	0.58
1:B:965:LEU:CD2	1:B:987:GLN:HG2	2.34	0.56
1:A:946:PRO:HG2	1:A:949:GLU:HB2	1.87	0.56
1:C:1025:HIS:O	1:C:1029:VAL:HG23	2.05	0.56
1:B:1012:LEU:HG	1:C:985:MET:HG3	1.88	0.56
1:A:1014:GLN:HE21	1:A:1018:LYS:NZ	2.04	0.55
1:A:949:GLU:HA	3:A:93:HOH:O	2.05	0.55
1:C:943:GLN:CB	1:C:944:PRO:CD	2.85	0.54
1:C:942:ILE:HG13	1:C:950:TYR:HB3	1.90	0.54
2:D:4:GLU:HG3	3:D:37:HOH:O	2.06	0.54
1:B:909:ILE:HD12	3:B:19:HOH:O	2.08	0.53
1:B:1000:LYS:HD2	1:B:1019:GLN:HB3	1.90	0.53
1:C:1039:ASP:C	1:C:1041:ALA:N	2.63	0.52
1:C:945:ALA:HB1	1:C:949:GLU:HB2	1.93	0.51
1:A:1045:MET:HA	1:A:1045:MET:CE	2.40	0.51
1:A:951:VAL:HB	1:A:952:PRO:HD3	1.92	0.50
1:C:927:ASN:ND2	1:C:967:THR:OG1	2.45	0.50
1:A:1014:GLN:HE21	1:A:1018:LYS:CE	2.25	0.49
1:C:941:LYS:O	1:C:943:GLN:N	2.45	0.49
1:A:1008:VAL:HG22	1:A:1009:MET:HG2	1.94	0.48
1:C:968:VAL:HG21	1:C:1034:LEU:HD21	1.95	0.48
1:A:951:VAL:N	1:A:952:PRO:CD	2.77	0.47
1:A:972:ILE:N	1:A:973:PRO:CD	2.76	0.47
1:A:976:PRO:HD3	1:A:1045:MET:CG	2.42	0.47
1:C:1003:LEU:HD13	1:C:1016:TYR:CE1	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:916:ASN:OD1	1:A:916:ASN:N	2.48	0.47
1:C:1014:GLN:O	1:C:1014:GLN:NE2	2.47	0.47
1:B:985:MET:HE3	1:B:988:LYS:CD	2.45	0.47
1:A:943:GLN:O	3:A:73:HOH:O	2.20	0.47
1:B:945:ALA:O	1:B:1017:LYS:NZ	2.42	0.47
1:B:1014:GLN:HG2	3:B:59:HOH:O	2.13	0.46
1:B:938:MET:HE1	1:B:954:VAL:HG22	1.98	0.46
1:C:990:LEU:HD23	1:C:1027:LEU:HD12	1.98	0.46
1:B:966:ALA:O	1:B:969:ASP:HB2	2.16	0.46
1:A:939:SER:O	1:A:943:GLN:HB2	2.15	0.45
1:C:947:PRO:HB3	1:C:1005:GLN:HE21	1.82	0.45
1:C:1038:ILE:O	1:C:1038:ILE:HG22	2.15	0.45
1:C:962:ARG:HG3	2:F:5:LEU:HD21	1.98	0.45
1:B:985:MET:HG3	1:C:1012:LEU:HG	1.98	0.45
2:D:5:LEU:HA	2:D:8:LEU:HD12	1.99	0.44
1:A:947:PRO:CA	1:A:950:TYR:CZ	2.94	0.44
1:C:1010:THR:HG22	1:C:1011:SER:N	2.33	0.44
1:C:972:ILE:HG22	1:C:980:HIS:CE1	2.53	0.44
2:D:3:ARG:O	2:D:7:GLU:HG2	2.18	0.43
1:C:1012:LEU:HD13	1:C:1016:TYR:HE2	1.82	0.43
1:B:1045:MET:HA	1:B:1045:MET:CE	2.48	0.43
1:C:972:ILE:HB	1:C:973:PRO:HD3	2.00	0.43
1:B:996:GLU:O	1:B:1000:LYS:HG2	2.19	0.43
1:A:946:PRO:O	1:A:947:PRO:C	2.57	0.43
1:B:909:ILE:HG13	1:B:910:SER:N	2.34	0.43
1:C:918:ASP:OD1	1:C:918:ASP:C	2.58	0.42
1:C:985:MET:CE	1:C:985:MET:HA	2.49	0.42
1:C:1038:ILE:C	1:C:1041:ALA:H	2.23	0.42
1:C:939:SER:HA	1:C:1021:LEU:HD22	2.02	0.42
1:B:938:MET:O	1:B:942:ILE:HB	2.19	0.42
1:C:972:ILE:N	1:C:973:PRO:CD	2.83	0.42
1:A:946:PRO:O	1:A:948:GLU:N	2.52	0.42
1:C:945:ALA:O	1:C:1017:LYS:NZ	2.53	0.42
1:C:1000:LYS:HG3	1:C:1019:GLN:HB3	2.02	0.41
1:C:990:LEU:CD2	1:C:1027:LEU:HD12	2.50	0.41
1:A:950:TYR:HB3	1:A:953:MET:CE	2.50	0.41
1:B:1017:LYS:O	1:B:1020:MET:HB2	2.21	0.41
1:A:1009:MET:N	1:A:1013:GLN:HE21	2.13	0.41
1:A:1008:VAL:HA	1:A:1013:GLN:HE21	1.85	0.41
1:C:942:ILE:HG23	1:C:943:GLN:N	2.35	0.41
1:C:964:LEU:O	1:C:968:VAL:HG23	2.21	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1015:GLU:O	1:A:1019:GLN:HG3	2.21	0.41
1:C:938:MET:HA	1:C:953:MET:SD	2.61	0.40
1:C:994:LEU:HD12	1:C:994:LEU:HA	1.96	0.40
1:A:936:ILE:HD13	1:A:936:ILE:HG21	1.79	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	A	132/161 (82%)	127 (96%)	4 (3%)	1 (1%)	19 20
1	B	137/161 (85%)	136 (99%)	1 (1%)	0	100 100
1	C	137/161 (85%)	121 (88%)	11 (8%)	5 (4%)	3 1
2	D	10/13 (77%)	10 (100%)	0	0	100 100
2	F	9/13 (69%)	8 (89%)	1 (11%)	0	100 100
All	All	425/509 (84%)	402 (95%)	17 (4%)	6 (1%)	11 9

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	942	ILE
1	C	943	GLN
1	C	953	MET
1	A	947	PRO
1	C	944	PRO
1	C	952	PRO

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	117/141 (83%)	104 (89%)	13 (11%)	6	5
1	B	121/141 (86%)	115 (95%)	6 (5%)	24	28
1	C	121/141 (86%)	111 (92%)	10 (8%)	11	11
2	D	11/11 (100%)	11 (100%)	0	100	100
2	F	10/11 (91%)	7 (70%)	3 (30%)	0	0
All	All	380/445 (85%)	348 (92%)	32 (8%)	11	10

All (32) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	916	ASN
1	A	923	LYS
1	A	944	PRO
1	A	948	GLU
1	A	950	TYR
1	A	953	MET
1	A	981	ARG
1	A	984	GLU
1	A	988	LYS
1	A	1012	LEU
1	A	1020	MET
1	A	1035	LEU
1	A	1045	MET
1	B	910	SER
1	B	923	LYS
1	B	943	GLN
1	B	985	MET
1	B	1044	LYS
1	B	1045	MET
1	C	910	SER
1	C	933	LYS
1	C	948	GLU
1	C	956	GLU

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Mol	Chain	Res	Type
1	C	973	PRO
1	C	985	MET
1	C	1008	VAL
1	C	1009	MET
1	C	1011	SER
1	C	1035	LEU
2	F	3	ARG
2	F	5	LEU
2	F	11	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	916	ASN
1	A	1013	GLN
1	A	1014	GLN
1	B	921	ASN
1	B	927	ASN
1	C	927	ASN
1	C	1005	GLN
1	C	1014	GLN
1	C	1033	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

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	134/161 (83%)	-0.06	0 100 100	37, 54, 73, 87	0
1	B	139/161 (86%)	0.03	0 100 100	30, 48, 63, 70	0
1	C	139/161 (86%)	0.32	11 (7%) 12 19	20, 56, 108, 116	0
2	D	12/13 (92%)	2.13	6 (50%) 0 0	70, 89, 103, 105	0
2	F	11/13 (84%)	6.73	11 (100%) 0 0	131, 132, 135, 137	0
All	All	435/509 (85%)	0.32	28 (6%) 19 28	20, 53, 106, 137	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	12	LEU	13.6
2	F	9	MET	8.7
2	F	8	LEU	7.3
2	F	3	ARG	6.9
2	F	5	LEU	6.6
1	C	1009	MET	6.3
2	F	4	GLU	6.2
2	F	10	ALA	6.0
1	C	942	ILE	5.8
2	D	3	ARG	5.5
2	F	6	ASP	5.1
2	F	11	SER	5.0
2	F	2	THR	4.6
2	F	7	GLU	4.1
1	C	949	GLU	3.9
2	D	13	SER	3.7
1	C	950	TYR	3.6
1	C	948	GLU	3.5
1	C	941	LYS	3.3
1	C	940	SER	3.1

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Mol	Chain	Res	Type	RSRZ
1	C	1008	VAL	2.7
1	C	943	GLN	2.7
2	D	2	THR	2.6
2	D	4	GLU	2.5
1	C	953	MET	2.4
2	D	12	LEU	2.3
2	D	10	ALA	2.2
1	C	962	ARG	2.2

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.