



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 05:24 PM UTC

PDB ID : 6CB0 / pdb_00006cb0
Title : Crystal Structure of the FAK FERM domain
Authors : Dementiev, A.; Marlowe, T.
Deposited on : 2018-02-01
Resolution : 1.97 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

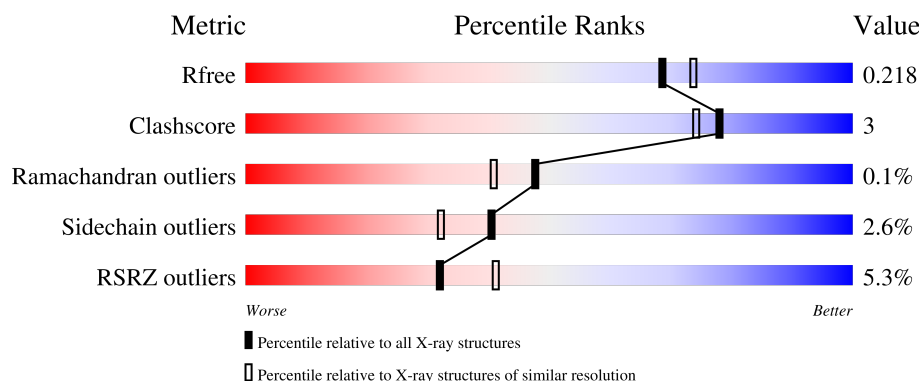
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.97 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	1506 (1.98-1.98)
Clashscore	190562	1534 (1.98-1.98)
Ramachandran outliers	187476	1518 (1.98-1.98)
Sidechain outliers	187428	1518 (1.98-1.98)
RSRZ outliers	180081	1506 (1.98-1.98)

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	378	
1	B	378	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 5890 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
1	A	357	Total	C	N	O	S	0	4	0
			2838	1810	485	530	13			
1	B	343	Total	C	N	O	S	0	1	0
			2653	1704	443	496	10			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	28	GLY	-	expression tag	UNP Q00944
A	29	SER	-	expression tag	UNP Q00944
A	30	MET	-	expression tag	UNP Q00944
B	28	GLY	-	expression tag	UNP Q00944
B	29	SER	-	expression tag	UNP Q00944
B	30	MET	-	expression tag	UNP Q00944

- Molecule 2 is water.

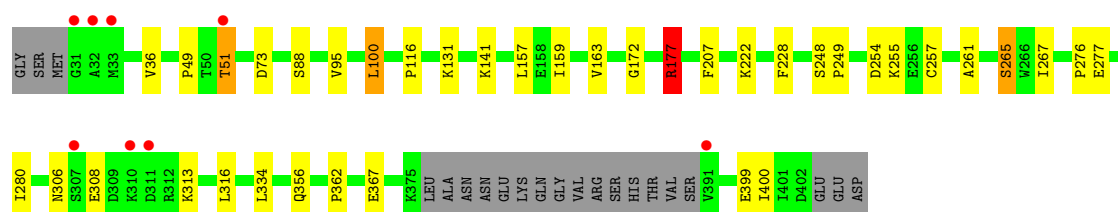
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	219	Total	O	0	0
			219	219		
2	B	180	Total	O	0	0
			180	180		

3 Residue-property plots

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.

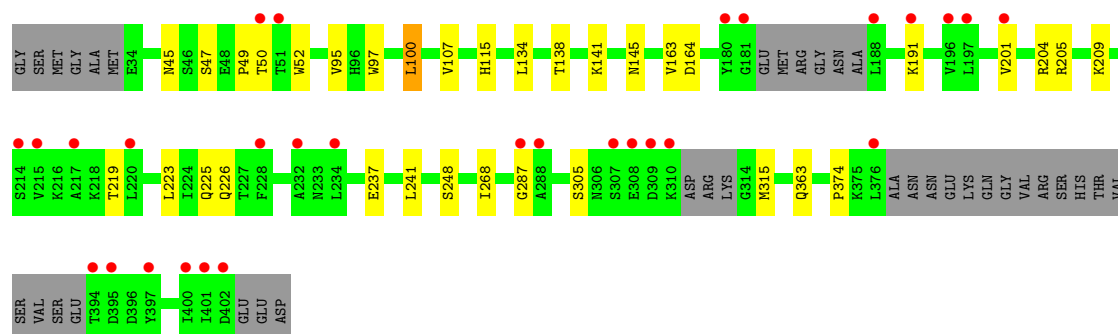
• Molecule 1: Focal adhesion kinase 1

Chain A: 



• Molecule 1: Focal adhesion kinase 1

Chain B: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	50.15Å 123.90Å 135.16Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.01 – 1.97 50.01 – 1.97	Depositor EDS
% Data completeness (in resolution range)	92.4 (50.01-1.97) 92.4 (50.01-1.97)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.12 (at 1.97Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.171 , 0.212 0.181 , 0.218	Depositor DCC
R_{free} test set	2819 reflections (4.68%)	wwPDB-VP
Wilson B-factor (Å ²)	35.8	Xtriage
Anisotropy	0.350	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 43.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5890	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.54% 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

5.1 Standard geometry

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	1.28	7/2909 (0.2%)	1.09	7/3938 (0.2%)
1	B	1.26	4/2713 (0.1%)	1.08	4/3688 (0.1%)
All	All	1.27	11/5622 (0.2%)	1.08	11/7626 (0.1%)

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	1
1	B	0	1
All	All	0	2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	241	LEU	C-O	6.85	1.32	1.24
1	A	177	ARG	CD-NE	-6.09	1.37	1.46
1	B	97	TRP	C-O	-5.95	1.16	1.24
1	A	277	GLU	C-O	-5.78	1.16	1.24
1	B	115	HIS	CA-C	-5.65	1.46	1.52
1	A	141	LYS	N-CA	5.54	1.52	1.46
1	B	223	LEU	N-CA	5.26	1.52	1.46
1	A	280	ILE	C-O	5.20	1.29	1.24
1	A	73	ASP	N-CA	5.16	1.52	1.46
1	A	265	SER	CA-C	-5.05	1.48	1.52
1	A	400	ILE	C-O	-5.01	1.18	1.24

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	177	ARG	NE-CZ-NH2	-8.02	111.98	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	177	ARG	CG-CD-NE	6.97	127.33	112.00
1	B	248	SER	CA-C-N	6.23	126.70	119.47
1	B	248	SER	C-N-CA	6.23	126.70	119.47
1	A	177	ARG	NE-CZ-NH1	5.98	127.48	121.50
1	B	241	LEU	N-CA-C	5.87	117.68	111.28
1	A	116	PRO	CA-C-N	5.81	125.94	119.32
1	A	116	PRO	C-N-CA	5.81	125.94	119.32
1	A	177	ARG	CD-NE-CZ	5.80	132.53	124.40
1	A	36	VAL	N-CA-C	-5.78	99.80	108.12
1	B	268	ILE	N-CA-C	5.76	116.16	107.75

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	177	ARG	Sidechain
1	B	287	GLY	Peptide

5.2 Too-close contacts ⓘ

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	2838	0	2777	18	1
1	B	2653	0	2525	12	1
2	A	219	0	0	7	1
2	B	180	0	0	4	1
All	All	5890	0	5302	30	2

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 3.

All (30) 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:88[A]:SER:OG	2:A:501:HOH:O	1.84	0.93

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:222:LYS:HD3	2:A:605:HOH:O	1.86	0.75
1:A:356:GLN:OE1	2:A:502:HOH:O	2.05	0.74
1:A:255:LYS:NZ	1:A:257:CYS:SG	2.61	0.73
1:A:362:PRO:HA	2:A:533:HOH:O	1.92	0.68
1:B:100:LEU:HD13	2:B:646:HOH:O	1.94	0.68
1:B:134:LEU:O	1:B:138:THR:HG23	1.96	0.65
1:B:45:ASN:HD22	1:B:47:SER:HB3	1.68	0.59
1:B:201:VAL:HG12	1:B:205:ARG:HD2	1.87	0.55
1:B:374:PRO:O	2:B:502:HOH:O	2.18	0.54
1:B:141:LYS:HE3	1:B:237:GLU:OE1	2.10	0.51
1:A:248:SER:HB2	1:A:249:PRO:HD3	1.92	0.51
1:A:261:ALA:HB1	1:A:267:ILE:HG22	1.94	0.49
1:B:145:ASN:ND2	2:B:501:HOH:O	2.10	0.48
1:A:177:ARG:HA	1:A:177:ARG:HD2	1.53	0.47
1:A:222:LYS:CD	2:A:605:HOH:O	2.51	0.46
1:B:305:SER:HB2	1:B:315:MET:HE2	1.97	0.46
1:A:265:SER:HB3	2:B:659:HOH:O	2.17	0.45
1:A:100:LEU:HD13	2:A:651:HOH:O	2.15	0.45
1:A:172:GLY:HA3	1:A:207:PHE:CE1	2.53	0.44
1:A:177:ARG:HD3	1:A:228:PHE:CZ	2.53	0.43
1:A:367:GLU:HB3	2:A:533:HOH:O	2.19	0.43
1:A:306:ASN:HA	1:A:313:LYS:O	2.19	0.42
1:A:49:PRO:C	1:A:51:THR:H	2.28	0.42
1:B:204:ARG:NH1	1:B:209:LYS:CB	2.83	0.42
1:B:49:PRO:HA	1:B:52:TRP:CE2	2.54	0.42
1:A:254:ASP:O	1:A:276:PRO:HD2	2.21	0.41
1:B:163:VAL:O	1:B:164:ASP:C	2.63	0.41
1:B:201:VAL:CG1	1:B:205:ARG:HD2	2.49	0.41
1:A:159:ILE:HD12	1:A:163:VAL:CG1	2.50	0.41

All (2) 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)
2:A:717:HOH:O	2:B:672:HOH:O[1_455]	1.93	0.27
1:A:399:GLU:OE1	1:B:226:GLN:NE2[3_554]	2.18	0.02

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	357/378 (94%)	346 (97%)	11 (3%)	0	100	100
1	B	336/378 (89%)	323 (96%)	12 (4%)	1 (0%)	36	27
All	All	693/756 (92%)	669 (96%)	23 (3%)	1 (0%)	48	41

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	50	THR

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	303/334 (91%)	295 (97%)	8 (3%)	40	32
1	B	274/334 (82%)	266 (97%)	8 (3%)	37	28
All	All	577/668 (86%)	561 (97%)	16 (3%)	40	29

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	THR
1	A	95	VAL
1	A	100	LEU
1	A	131	LYS
1	A	157	LEU

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Mol	Chain	Res	Type
1	A	308	GLU
1	A	316	LEU
1	A	334	LEU
1	B	95	VAL
1	B	100	LEU
1	B	107[A]	VAL
1	B	107[B]	VAL
1	B	191	LYS
1	B	219	THR
1	B	225	GLN
1	B	363	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	115	HIS
1	A	225	GLN
1	A	230	GLN
1	A	306	ASN
1	A	317	GLN
1	B	45	ASN
1	B	352	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	357/378 (94%)	0.14	8 (2%) 62 71	19, 37, 67, 99	4 (1%)
1	B	343/378 (90%)	0.37	29 (8%) 16 23	22, 43, 90, 120	1 (0%)
All	All	700/756 (92%)	0.25	37 (5%) 32 41	19, 40, 87, 120	5 (0%)

All (37) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	394	THR	4.7
1	A	31	GLY	4.3
1	B	310	LYS	4.2
1	B	50	THR	3.8
1	A	32	ALA	3.6
1	B	397	TYR	3.5
1	A	391	VAL	3.4
1	A	311	ASP	3.2
1	B	228	PHE	3.2
1	B	307	SER	3.0
1	A	33	MET	2.9
1	B	309	ASP	2.9
1	B	402	ASP	2.9
1	B	51	THR	2.7
1	B	201	VAL	2.7
1	B	287	GLY	2.7
1	B	188	LEU	2.7
1	A	310	LYS	2.7
1	B	191	LYS	2.7
1	B	215	VAL	2.5
1	B	180	TYR	2.4
1	B	288	ALA	2.4
1	B	196	VAL	2.4
1	B	401	ILE	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	214	SER	2.3
1	B	220	LEU	2.3
1	A	51	THR	2.3
1	B	181	GLY	2.3
1	B	376	LEU	2.3
1	B	197	LEU	2.3
1	B	234	LEU	2.2
1	A	307	SER	2.2
1	B	232	ALA	2.1
1	B	217	ALA	2.1
1	B	308	GLU	2.1
1	B	395	ASP	2.1
1	B	400	ILE	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.