



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 29, 2026 – 04:23 am BST

PDB ID : 9TVZ / pdb_00009tvz
Title : FgFR4-D2 domain in complex with Fab 5936
Authors : Mathieu, M.; Pouzieux, S.
Deposited on : 2026-01-13
Resolution : 2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 Phenix2.2
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.2
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.015 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.51

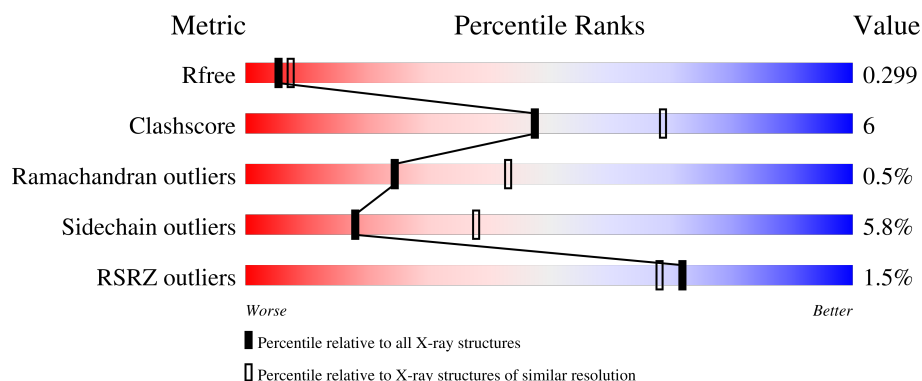
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	107	
1	B	107	
2	H	223	
2	I	223	
3	L	213	

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Mol	Chain	Length	Quality of chain
3	M	213	86% 13% •

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 8288 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 Fibroblast growth factor receptor 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	94	Total	C	N	O	S	0	0	0
			753	480	136	133	4			
1	B	94	Total	C	N	O	S	0	0	0
			753	480	136	133	4			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	107	LEU	-	expression tag	UNP P22455
B	107	LEU	-	expression tag	UNP P22455

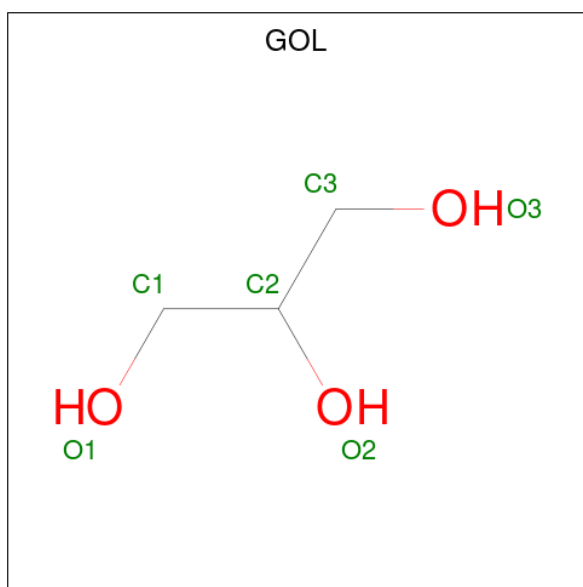
- Molecule 2 is a protein called Fab 5936 Heavy Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	215	Total	C	N	O	S	0	0	0
			1641	1040	269	324	8			
2	I	219	Total	C	N	O	S	0	0	0
			1671	1056	276	331	8			

- Molecule 3 is a protein called Fab 5936 Light Chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	213	Total	C	N	O	S	0	0	0
			1651	1042	270	335	4			
3	M	213	Total	C	N	O	S	0	0	0
			1651	1042	270	335	4			

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	L	1	Total	C	O	0	0
			6	3	3		

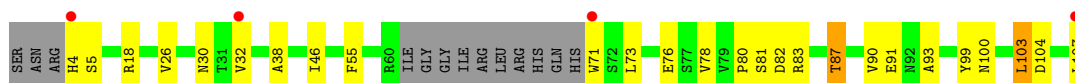
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	14	Total	O	0	0
			14	14		
5	B	12	Total	O	0	0
			12	12		
5	H	32	Total	O	0	0
			32	32		
5	I	36	Total	O	0	0
			36	36		
5	L	25	Total	O	0	0
			25	25		
5	M	43	Total	O	0	0
			43	43		

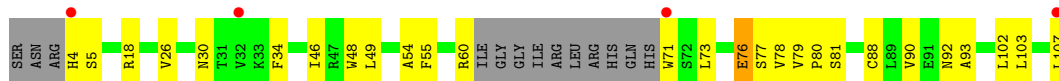
3 Residue-property plots [i](#)

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.

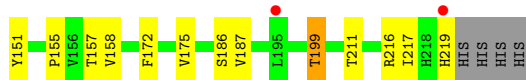
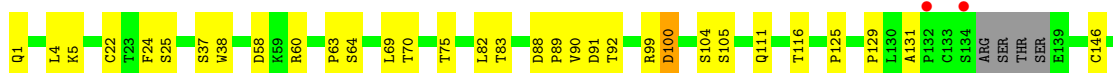
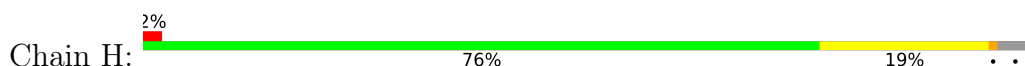
- Molecule 1: Fibroblast growth factor receptor 4



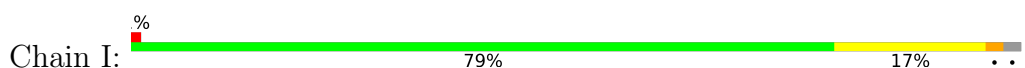
- Molecule 1: Fibroblast growth factor receptor 4



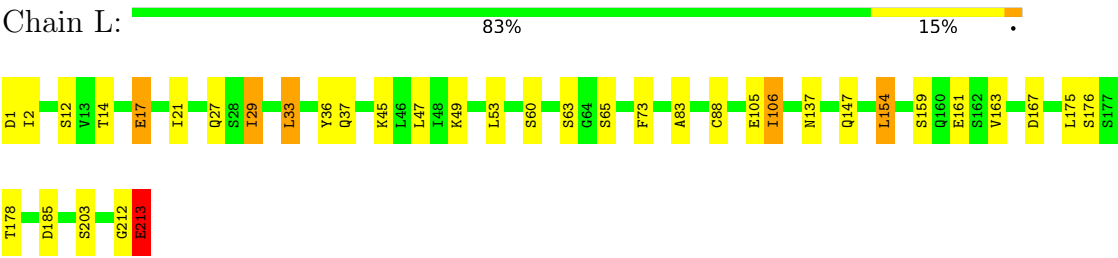
- Molecule 2: Fab 5936 Heavy Chain



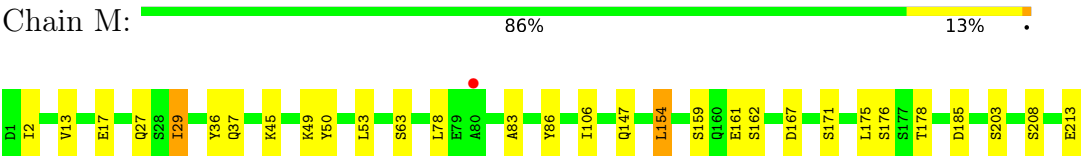
- Molecule 2: Fab 5936 Heavy Chain



- Molecule 3: Fab 5936 Light Chain



● Molecule 3: Fab 5936 Light Chain



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	229.21Å 64.42Å 98.77Å 90.00° 92.59° 90.00°	Depositor
Resolution (Å)	38.38 – 2.50 38.38 – 2.50	Depositor EDS
% Data completeness (in resolution range)	98.0 (38.38-2.50) 97.9 (38.38-2.50)	Depositor EDS
R_{merge}	0.13	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.00 (at 2.51Å)	Xtriage
Refinement program	BUSTER 2.11.5	Depositor
R, R_{free}	0.211 , 0.263 0.238 , 0.299	Depositor DCC
R_{free} test set	2448 reflections (4.87%)	wwPDB-VP
Wilson B-factor (Å ²)	41.3	Xtriage
Anisotropy	0.592	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 55.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.000 for -h,-k,l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8288	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 45.24 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.3605e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL

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	0.91	0/776	1.30	5/1058 (0.5%)
1	B	0.87	0/776	1.31	8/1058 (0.8%)
2	H	0.86	3/1684 (0.2%)	1.23	4/2302 (0.2%)
2	I	0.86	0/1715	1.24	3/2345 (0.1%)
3	L	0.80	0/1690	1.22	4/2297 (0.2%)
3	M	0.83	0/1690	1.19	2/2297 (0.1%)
All	All	0.85	3/8331 (0.0%)	1.24	26/11357 (0.2%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	105	SER	CA-C	8.41	1.64	1.52
2	H	172	PHE	CA-C	-5.07	1.46	1.53
2	H	104	SER	C-N	5.07	1.40	1.33

The worst 5 of 26 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	I	10	THR	N-CA-C	-6.99	105.28	113.88
2	H	100	ASP	CA-CB-CG	6.61	119.21	112.60
2	I	104	SER	N-CA-C	-5.97	98.00	108.20
1	B	93	ALA	CA-C-N	5.93	128.84	120.42
1	B	93	ALA	C-N-CA	5.93	128.84	120.42

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	753	0	731	12	0
1	B	753	0	731	14	0
2	H	1641	0	1611	15	0
2	I	1671	0	1642	19	0
3	L	1651	0	1598	18	0
3	M	1651	0	1598	15	0
4	L	6	0	8	0	0
5	A	14	0	0	0	0
5	B	12	0	0	0	0
5	H	32	0	0	0	0
5	I	36	0	0	0	0
5	L	25	0	0	0	0
5	M	43	0	0	0	0
All	All	8288	0	7919	89	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 6.

The worst 5 of 89 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:46:ILE:HD11	1:B:88:CYS:HB2	1.57	0.85
2:H:4:LEU:HD23	2:H:24:PHE:HB3	1.73	0.70
3:L:21:ILE:HD12	3:L:73:PHE:HD2	1.58	0.67
2:I:92:THR:HG23	2:I:116:THR:HA	1.76	0.67
3:M:2:ILE:HD13	3:M:29:ILE:HG22	1.79	0.64

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	90/107 (84%)	89 (99%)	1 (1%)	0	100	100
1	B	90/107 (84%)	87 (97%)	2 (2%)	1 (1%)	11	22
2	H	211/223 (95%)	202 (96%)	8 (4%)	1 (0%)	24	43
2	I	217/223 (97%)	207 (95%)	7 (3%)	3 (1%)	9	17
3	L	211/213 (99%)	198 (94%)	13 (6%)	0	100	100
3	M	211/213 (99%)	198 (94%)	13 (6%)	0	100	100
All	All	1030/1086 (95%)	981 (95%)	44 (4%)	5 (0%)	24	43

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	5	SER
2	I	105	SER
2	I	195	LEU
2	H	155	PRO
2	I	155	PRO

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	81/92 (88%)	75 (93%)	6 (7%)	13	27
1	B	81/92 (88%)	77 (95%)	4 (5%)	22	45
2	H	191/199 (96%)	179 (94%)	12 (6%)	16	34
2	I	195/199 (98%)	186 (95%)	9 (5%)	24	48
3	L	188/188 (100%)	175 (93%)	13 (7%)	14	30
3	M	188/188 (100%)	178 (95%)	10 (5%)	20	42
All	All	924/958 (96%)	870 (94%)	54 (6%)	18	38

5 of 54 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	I	175	VAL
3	L	63	SER
3	M	176	SER
2	I	187	VAL
3	L	17	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
3	L	160	GLN
3	L	210	ASN
3	M	160	GLN
3	M	137	ASN
2	I	86	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

1 ligand is modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	GOL	L	301	-	5,5,5	0.17	0	5,5,5	0.42	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	GOL	L	301	-	-	0/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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	94/107 (87%)	0.43	4 (4%) 40 35	23, 52, 77, 89	0
1	B	94/107 (87%)	0.56	4 (4%) 40 35	43, 54, 79, 99	0
2	H	215/223 (96%)	0.25	4 (1%) 66 62	17, 50, 79, 111	0
2	I	219/223 (98%)	0.17	3 (1%) 73 70	32, 48, 68, 92	0
3	L	213/213 (100%)	0.12	0 100 100	36, 51, 65, 79	0
3	M	213/213 (100%)	0.13	1 (0%) 87 85	34, 48, 65, 83	0
All	All	1048/1086 (96%)	0.23	16 (1%) 72 68	17, 50, 72, 111	0

The worst 5 of 16 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	107	LEU	4.6
1	A	107	LEU	4.2
2	I	219	HIS	3.3
1	B	4	HIS	3.3
2	H	219	HIS	3.3

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](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	GOL	L	301	6/6	0.63	0.17	65,68,71,71	0

6.5 Other polymers [i](#)

There are no such residues in this entry.