



# wwPDB X-ray Structure Validation Summary Report ⓘ

Jun 22, 2024 – 02:22 PM EDT

PDB ID : 6G0K  
Title : Crystal structure of Enterococcus faecium D63r Penicillin-Binding protein 5 (PBP5fm)  
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Deposited on : 2018-03-19  
Resolution : 2.90 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](mailto: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>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 2022.3.0, CSD as543be (2022)  
Xtriage (Phenix) : 1.20.1  
EDS : 2.37.1  
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) : 2.37.1

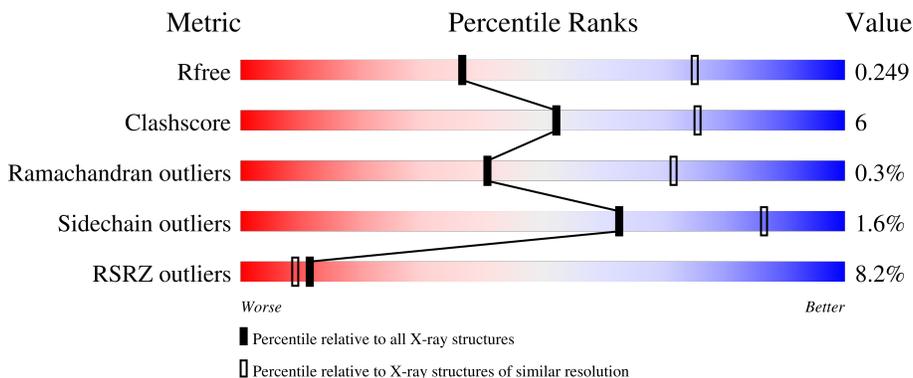
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.90 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))
$R_{free}$	130704	1957 (2.90-2.90)
Clashscore	141614	2172 (2.90-2.90)
Ramachandran outliers	138981	2115 (2.90-2.90)
Sidechain outliers	138945	2117 (2.90-2.90)
RSRZ outliers	127900	1906 (2.90-2.90)

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  $\geq 3$ , 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	649	 10% 84% 12% ••
1	B	649	 7% 82% 11% • 6%
1	C	649	 7% 80% 11% 8%

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 27340 atoms, of which 13208 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 Low affinity penicillin-binding protein 5 (PBP5).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	C	H	N	O				S
1	A	629	9208	3004	4411	793	987	13	0	0	0
1	B	609	9084	2927	4416	771	957	13	0	0	0
1	C	595	8943	2858	4381	756	935	13	0	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	32	MET	-	initiating methionine	UNP Q47759
A	33	GLY	-	expression tag	UNP Q47759
A	679	LEU	-	expression tag	UNP Q47759
A	680	GLU	-	expression tag	UNP Q47759
B	32	MET	-	initiating methionine	UNP Q47759
B	33	GLY	-	expression tag	UNP Q47759
B	679	LEU	-	expression tag	UNP Q47759
B	680	GLU	-	expression tag	UNP Q47759
C	32	MET	-	initiating methionine	UNP Q47759
C	33	GLY	-	expression tag	UNP Q47759
C	679	LEU	-	expression tag	UNP Q47759
C	680	GLU	-	expression tag	UNP Q47759

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O<sub>4</sub>S).



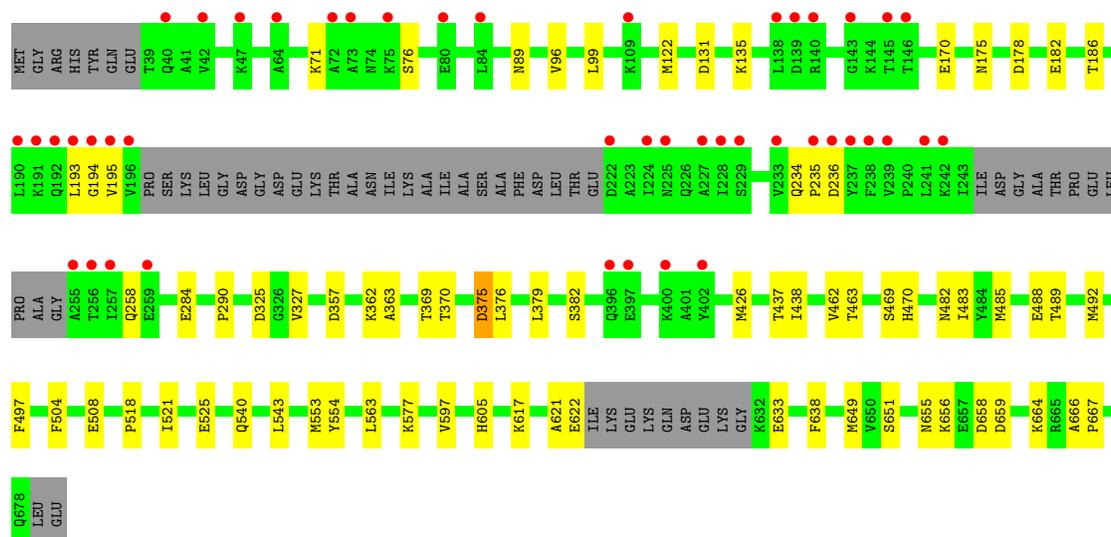
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	A	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		
2	B	1	Total	O	S	0	0
			5	4	1		

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<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>			<b>ZeroOcc</b>	<b>AltConf</b>
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0
2	C	1	Total 5	O 4	S 1	0	0





## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	79.84Å 128.85Å 236.25Å 90.00° 93.88° 90.00°	Depositor
Resolution (Å)	47.14 – 2.90 47.14 – 2.90	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.14-2.90) 99.9 (47.14-2.90)	Depositor EDS
$R_{merge}$	0.16	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.43 (at 2.91Å)	Xtrriage
Refinement program	PHENIX (1.10.1_2155: ???)	Depositor
R, $R_{free}$	0.198 , 0.247 0.201 , 0.249	Depositor DCC
$R_{free}$ test set	2689 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	46.5	Xtrriage
Anisotropy	0.590	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 36.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	27340	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	51.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.30% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: SO4

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	0.72	0/4872	0.79	4/6593 (0.1%)
1	B	0.76	5/4738 (0.1%)	0.80	4/6405 (0.1%)
1	C	0.71	3/4631 (0.1%)	0.80	2/6260 (0.0%)
All	All	0.73	8/14241 (0.1%)	0.80	10/19258 (0.1%)

The worst 5 of 8 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	284	GLU	CG-CD	6.71	1.62	1.51
1	C	182	GLU	CG-CD	6.30	1.61	1.51
1	B	157	GLU	CG-CD	6.00	1.60	1.51
1	B	42	VAL	CB-CG2	-5.43	1.41	1.52
1	B	403	GLU	CG-CD	5.40	1.60	1.51

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	357	ASP	CB-CG-OD1	6.12	123.81	118.30
1	C	357	ASP	CB-CG-OD2	-6.03	112.88	118.30
1	B	312	ARG	NE-CZ-NH1	5.99	123.30	120.30
1	B	509	ASP	CB-CG-OD2	5.53	123.28	118.30
1	A	464	ARG	NE-CZ-NH2	-5.52	117.54	120.30

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	4797	4411	4733	55	0
1	B	4668	4416	4611	53	0
1	C	4562	4381	4502	53	0
2	A	35	0	0	0	0
2	B	35	0	0	0	0
2	C	35	0	0	0	0
All	All	14132	13208	13846	154	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 154 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:C:234:GLN:HB3	1:C:235:PRO:HD2	1.61	0.82
1:B:214:ALA:HB2	1:B:224:ILE:HD12	1.63	0.79
1:A:211:LYS:HD3	1:A:221:GLU:OE2	1.83	0.79
1:B:213:ILE:HG21	1:B:255:ALA:CB	2.14	0.78
1:B:214:ALA:HB2	1:B:224:ILE:CD1	2.14	0.78

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	625/649 (96%)	587 (94%)	36 (6%)	2 (0%)	41 71

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	601/649 (93%)	576 (96%)	22 (4%)	3 (0%)	29	61
1	C	587/649 (90%)	563 (96%)	24 (4%)	0	100	100
All	All	1813/1947 (93%)	1726 (95%)	82 (4%)	5 (0%)	41	71

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	218	ASP
1	B	143	GLY
1	A	252	PRO
1	B	504	PHE
1	A	199	LYS

### 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	519/537 (97%)	512 (99%)	7 (1%)	69	90
1	B	506/537 (94%)	497 (98%)	9 (2%)	59	85
1	C	495/537 (92%)	487 (98%)	8 (2%)	62	86
All	All	1520/1611 (94%)	1496 (98%)	24 (2%)	62	86

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	509	ASP
1	C	170	GLU
1	C	135	LYS
1	C	178	ASP
1	A	529	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	470	HIS
1	A	605	HIS
1	B	540	GLN
1	C	470	HIS

### 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](#)

21 ligands are 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	$\# Z  > 2$
2	SO4	B	706	-	4,4,4	0.42	0	6,6,6	0.53	0
2	SO4	B	707	-	4,4,4	0.34	0	6,6,6	0.34	0
2	SO4	B	702	-	4,4,4	0.39	0	6,6,6	0.44	0
2	SO4	B	703	-	4,4,4	0.46	0	6,6,6	0.39	0
2	SO4	A	706	-	4,4,4	0.31	0	6,6,6	0.49	0
2	SO4	C	705	-	4,4,4	0.45	0	6,6,6	0.41	0
2	SO4	A	701	-	4,4,4	0.20	0	6,6,6	1.09	0
2	SO4	C	702	-	4,4,4	0.28	0	6,6,6	0.51	0
2	SO4	A	707	-	4,4,4	0.29	0	6,6,6	0.24	0
2	SO4	C	706	-	4,4,4	0.41	0	6,6,6	0.49	0
2	SO4	C	703	-	4,4,4	0.33	0	6,6,6	0.35	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	SO4	C	707	-	4,4,4	0.28	0	6,6,6	0.44	0
2	SO4	B	701	-	4,4,4	0.41	0	6,6,6	1.08	0
2	SO4	C	704	-	4,4,4	0.46	0	6,6,6	0.46	0
2	SO4	A	705	-	4,4,4	0.39	0	6,6,6	0.19	0
2	SO4	B	704	-	4,4,4	0.41	0	6,6,6	0.73	0
2	SO4	B	705	-	4,4,4	0.45	0	6,6,6	0.51	0
2	SO4	A	703	-	4,4,4	0.37	0	6,6,6	0.19	0
2	SO4	C	701	-	4,4,4	0.31	0	6,6,6	0.70	0
2	SO4	A	702	-	4,4,4	0.39	0	6,6,6	0.29	0
2	SO4	A	704	-	4,4,4	0.30	0	6,6,6	0.49	0

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	629/649 (96%)	0.56	62 (9%) 7 5	24, 43, 96, 129	0
1	B	609/649 (93%)	0.51	43 (7%) 16 12	24, 41, 94, 126	0
1	C	595/649 (91%)	0.46	45 (7%) 13 10	28, 46, 83, 120	0
All	All	1833/1947 (94%)	0.51	150 (8%) 11 9	24, 43, 91, 129	0

The worst 5 of 150 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	212	ALA	9.2
1	B	213	ILE	8.9
1	A	254	GLY	8.5
1	B	195	VAL	8.0
1	A	250	GLU	7.9

### 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](#)

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, 95<sup>th</sup> 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
2	SO4	B	706	5/5	0.64	0.37	76,76,82,99	0
2	SO4	B	704	5/5	0.80	0.20	66,71,93,96	0
2	SO4	C	702	5/5	0.82	0.27	83,85,102,107	0
2	SO4	C	706	5/5	0.84	0.29	76,77,84,98	0
2	SO4	C	707	5/5	0.84	0.32	80,83,99,108	0
2	SO4	B	707	5/5	0.85	0.21	67,69,76,91	0
2	SO4	A	706	5/5	0.87	0.35	58,62,74,82	0
2	SO4	C	705	5/5	0.89	0.17	53,54,71,86	0
2	SO4	B	703	5/5	0.90	0.26	54,54,67,85	0
2	SO4	B	701	5/5	0.90	0.14	55,60,64,71	0
2	SO4	B	705	5/5	0.90	0.17	52,52,62,83	0
2	SO4	A	707	5/5	0.92	0.29	66,70,82,91	0
2	SO4	A	705	5/5	0.92	0.27	54,55,70,84	0
2	SO4	B	702	5/5	0.92	0.18	61,67,77,79	0
2	SO4	A	703	5/5	0.93	0.20	59,63,79,81	0
2	SO4	A	701	5/5	0.93	0.19	49,51,57,58	0
2	SO4	A	702	5/5	0.93	0.40	66,69,77,83	0
2	SO4	C	703	5/5	0.94	0.17	61,61,87,88	0
2	SO4	C	701	5/5	0.94	0.17	52,52,61,61	0
2	SO4	C	704	5/5	0.95	0.12	58,60,63,78	0
2	SO4	A	704	5/5	0.96	0.11	59,66,75,83	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.