



wwPDB X-ray Structure Validation Summary Report ⓘ

Sep 13, 2023 – 10:28 pm BST

PDB ID : 8BMX
Title : Bacteroides thetaiotaomicron B12 TonB dependent transporter in complex with a surface lipoprotein
Authors : Abellon-Ruiz, J.; Jana, K.; Silale, A.; Basle, A.; Kleinekathofer, U.; van den Berg, B.
Deposited on : 2022-11-11
Resolution : 3.72 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 : 4.02b-467
Xtriage (Phenix) : 1.13
EDS : 2.35.1
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) : 2.35.1

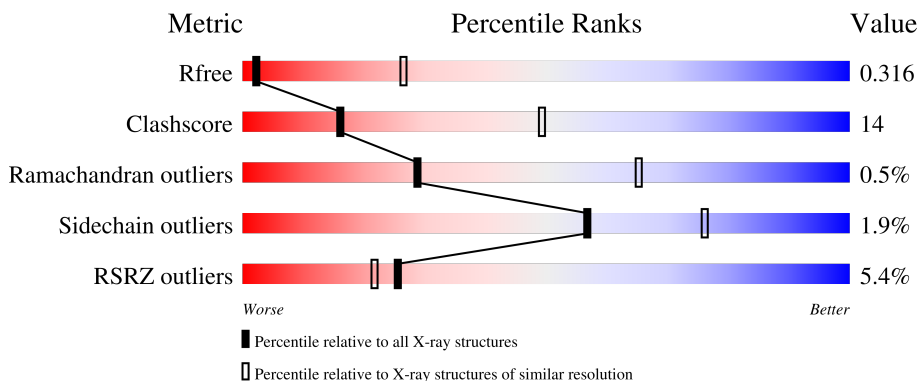
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.72 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.



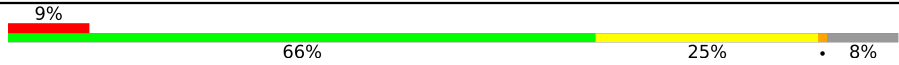
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1089 (3.90-3.54)
Clashscore	141614	1012 (3.88-3.56)
Ramachandran outliers	138981	1114 (3.90-3.54)
Sidechain outliers	138945	1110 (3.90-3.54)
RSRZ outliers	127900	1020 (3.90-3.54)

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	698	 4% 58% 30% • 10%
1	B	698	 5% 58% 30% • 10%
1	C	698	 4% 59% 31% • 9%
2	D	366	 4% 66% 25% • 8%
2	E	366	 5% 69% 22% • 8%

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Mol	Chain	Length	Quality of chain
2	F	366	 <p>A horizontal bar chart representing the quality of chain. The bar is divided into four segments: a red segment at the beginning labeled '9%', a large green segment labeled '66%', a yellow segment labeled '25%', and a small grey segment at the end labeled '8%'.</p>

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 23366 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 Putative TonB-linked outer membrane receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	C	633	5078	3239	860	960	19	0	0	0
1	A	628	5038	3213	853	953	19	0	0	0
1	B	627	5021	3200	851	951	19	0	0	0

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	693	HIS	-	expression tag	UNP Q8A6D1
C	694	HIS	-	expression tag	UNP Q8A6D1
C	695	HIS	-	expression tag	UNP Q8A6D1
C	696	HIS	-	expression tag	UNP Q8A6D1
C	697	HIS	-	expression tag	UNP Q8A6D1
C	698	HIS	-	expression tag	UNP Q8A6D1
A	693	HIS	-	expression tag	UNP Q8A6D1
A	694	HIS	-	expression tag	UNP Q8A6D1
A	695	HIS	-	expression tag	UNP Q8A6D1
A	696	HIS	-	expression tag	UNP Q8A6D1
A	697	HIS	-	expression tag	UNP Q8A6D1
A	698	HIS	-	expression tag	UNP Q8A6D1
B	693	HIS	-	expression tag	UNP Q8A6D1
B	694	HIS	-	expression tag	UNP Q8A6D1
B	695	HIS	-	expression tag	UNP Q8A6D1
B	696	HIS	-	expression tag	UNP Q8A6D1
B	697	HIS	-	expression tag	UNP Q8A6D1
B	698	HIS	-	expression tag	UNP Q8A6D1

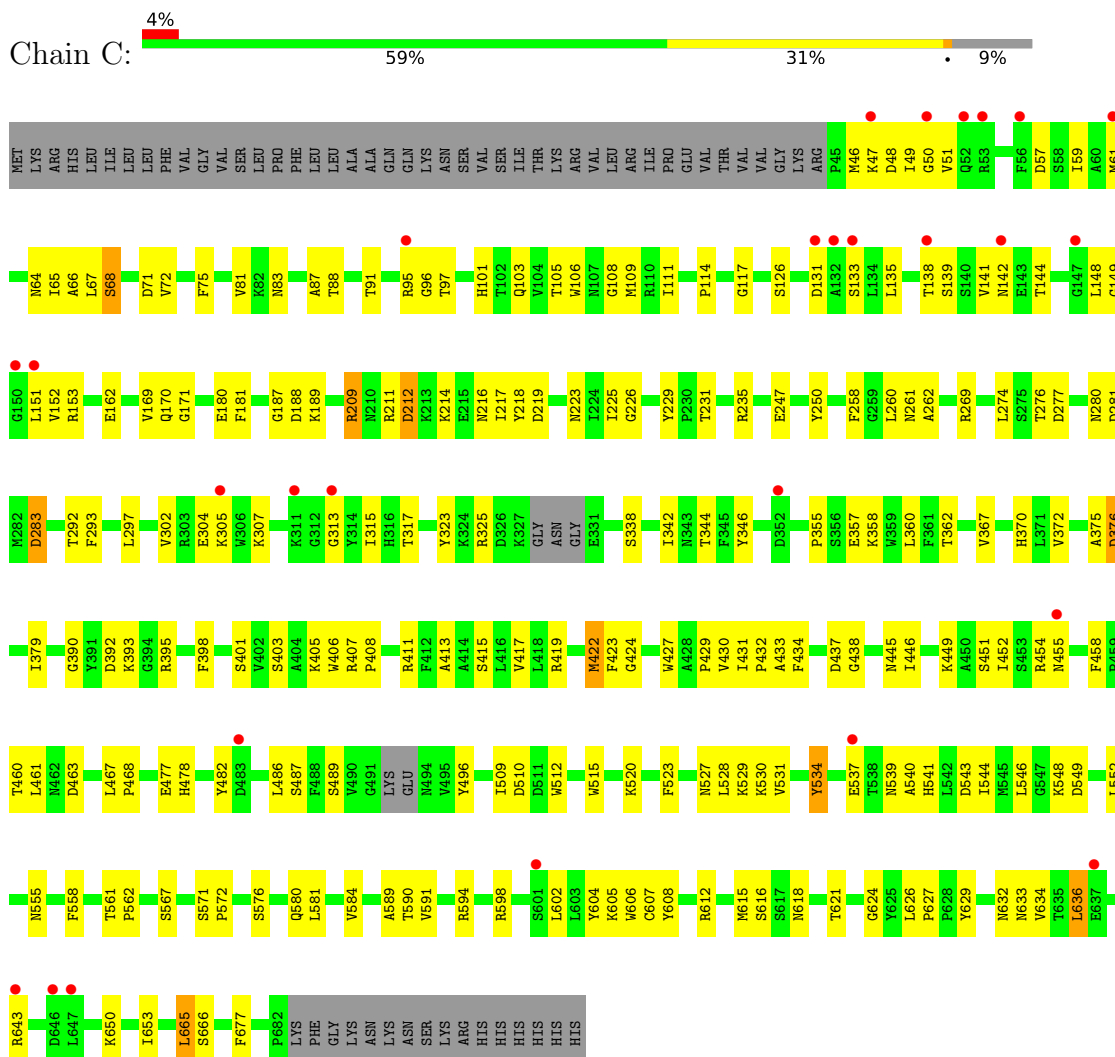
- Molecule 2 is a protein called YncE family protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	D	335	Total 2743	C 1769	N 434	O 526	S 14	0	0	0
2	E	335	Total 2743	C 1769	N 434	O 526	S 14	0	0	0
2	F	335	Total 2743	C 1769	N 434	O 526	S 14	0	0	0

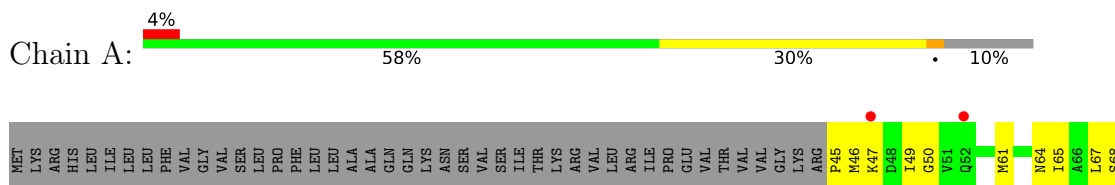
3 Residue-property plots [i](#)

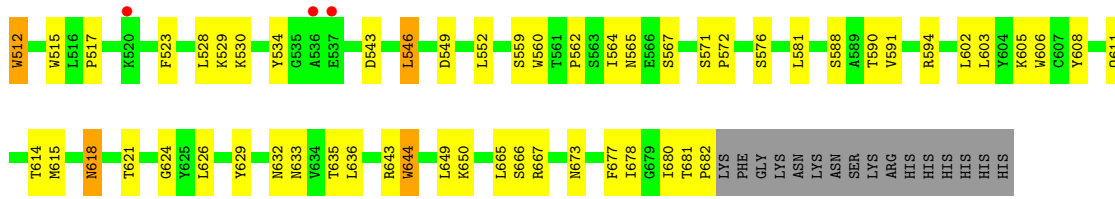
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Putative TonB-linked outer membrane receptor

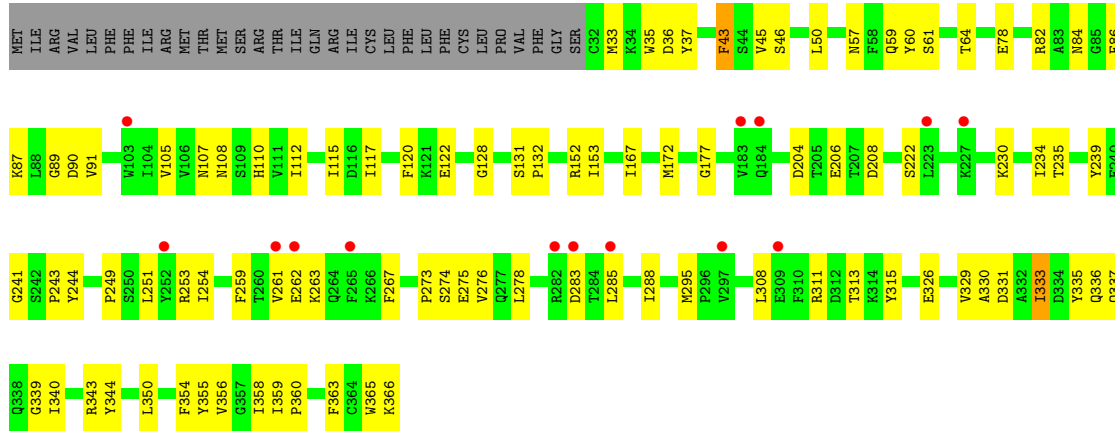


- Molecule 1: Putative TonB-linked outer membrane receptor

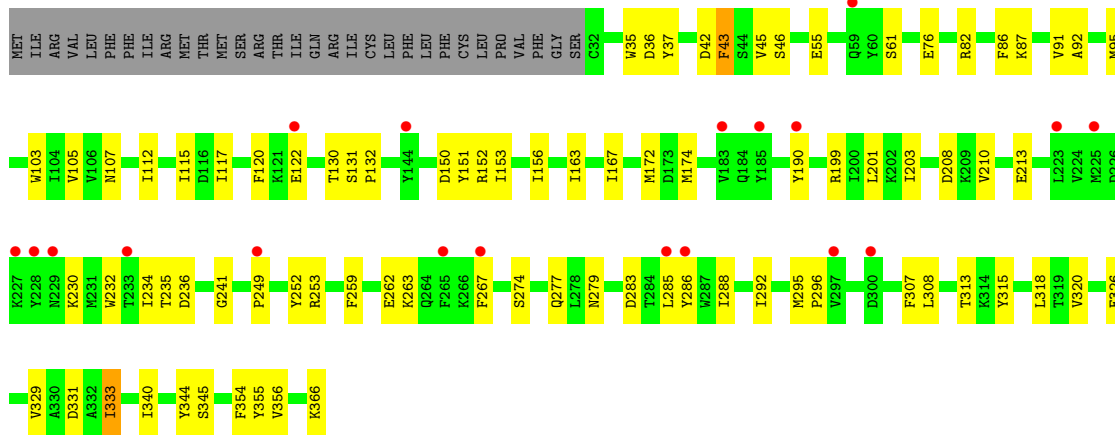




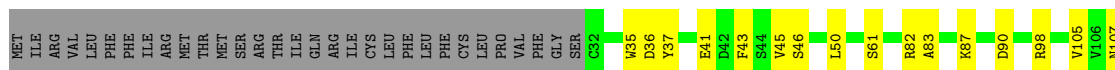
• Molecule 2: YncE family protein

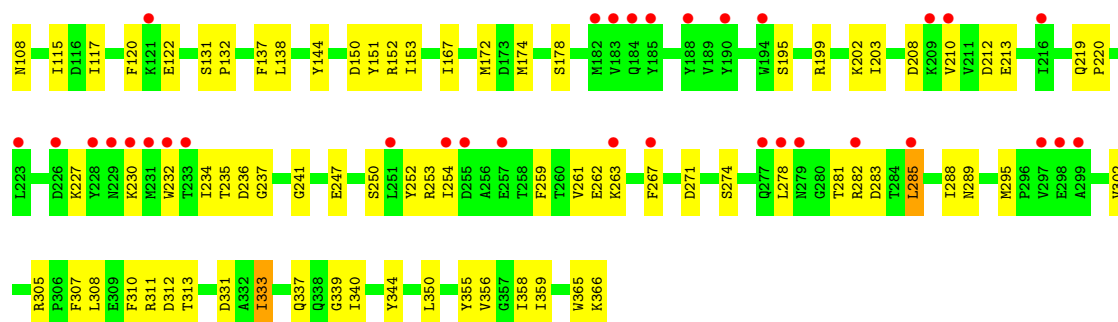


• Molecule 2: YncE family protein



• Molecule 2: YncE family protein





4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	280.25Å 154.30Å 107.51Å 90.00° 106.96° 90.00°	Depositor
Resolution (Å)	72.06 – 3.72 76.33 – 3.72	Depositor EDS
% Data completeness (in resolution range)	99.1 (72.06-3.72) 99.2 (76.33-3.72)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.32 (at 3.67Å)	Xtrriage
Refinement program	PHENIX 1.20.1_4487, PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.253 , 0.318 0.252 , 0.316	Depositor DCC
R_{free} test set	2232 reflections (4.89%)	wwPDB-VP
Wilson B-factor (Å ²)	110.2	Xtrriage
Anisotropy	0.258	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.29 , 69.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.27$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.84	EDS
Total number of atoms	23366	wwPDB-VP
Average B, all atoms (Å ²)	124.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.47% 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	A	0.27	0/5176	0.58	1/7013 (0.0%)
1	B	0.27	0/5158	0.58	2/6989 (0.0%)
1	C	0.27	0/5218	0.58	0/7071
2	D	0.31	0/2820	0.69	0/3836
2	E	0.29	0/2820	0.68	0/3836
2	F	0.28	0/2820	0.68	2/3836 (0.1%)
All	All	0.28	0/24012	0.62	5/32581 (0.0%)

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	265	ILE	CG1-CB-CG2	-7.07	95.84	111.40
1	B	603	LEU	CA-CB-CG	5.18	127.21	115.30
1	A	265	ILE	CG1-CB-CG2	-5.08	100.22	111.40
2	F	285	LEU	CA-CB-CG	5.08	126.99	115.30
2	F	278	LEU	CA-CB-CG	5.07	126.97	115.30

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	5038	0	4827	166	0
1	B	5021	0	4806	168	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	5078	0	4868	174	0
2	D	2743	0	2601	73	0
2	E	2743	0	2601	57	0
2	F	2743	0	2601	67	0
All	All	23366	0	22304	660	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 14.

The worst 5 of 660 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:219:ASP:HB3	1:C:225:ILE:HD11	1.44	0.99
1:C:235:ARG:HG2	1:C:281:ASP:HB2	1.56	0.87
1:A:442:LYS:H	1:A:442:LYS:HD2	1.40	0.83
1:C:247:GLU:HB3	1:C:261:ASN:HB3	1.62	0.81
1:B:362:THR:HG1	1:B:403:SER:HG	1.29	0.81

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	620/698 (89%)	575 (93%)	43 (7%)	2 (0%)	41	74
1	B	619/698 (89%)	575 (93%)	41 (7%)	3 (0%)	29	65
1	C	627/698 (90%)	584 (93%)	41 (6%)	2 (0%)	41	74
2	D	333/366 (91%)	313 (94%)	18 (5%)	2 (1%)	25	61
2	E	333/366 (91%)	314 (94%)	17 (5%)	2 (1%)	25	61
2	F	333/366 (91%)	314 (94%)	17 (5%)	2 (1%)	25	61

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	2865/3192 (90%)	2675 (93%)	177 (6%)	13 (0%)	29 65

5 of 13 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	68	SER
1	A	68	SER
1	A	306	TRP
1	B	68	SER
1	B	644	TRP

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	545/607 (90%)	532 (98%)	13 (2%)	49 70
1	B	543/607 (90%)	531 (98%)	12 (2%)	52 72
1	C	549/607 (90%)	534 (97%)	15 (3%)	44 68
2	D	297/327 (91%)	294 (99%)	3 (1%)	76 86
2	E	297/327 (91%)	295 (99%)	2 (1%)	84 91
2	F	297/327 (91%)	295 (99%)	2 (1%)	84 91
All	All	2528/2802 (90%)	2481 (98%)	47 (2%)	57 76

5 of 47 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	209	ARG
1	B	512	TRP
1	B	216	ASN
1	B	376	ASP
1	B	618	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	508	HIS
1	B	101	HIS
2	F	54	ASN
1	B	503	ASN
1	C	618	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	628/698 (89%)	0.25	27 (4%) 35 29	77, 113, 166, 271	0
1	B	627/698 (89%)	0.31	37 (5%) 22 17	98, 141, 187, 248	0
1	C	633/698 (90%)	0.28	27 (4%) 35 29	72, 108, 158, 251	0
2	D	335/366 (91%)	0.38	14 (4%) 36 30	81, 109, 153, 214	0
2	E	335/366 (91%)	0.44	19 (5%) 23 19	88, 114, 153, 191	0
2	F	335/366 (91%)	0.56	33 (9%) 7 6	91, 135, 180, 260	0
All	All	2893/3192 (90%)	0.34	157 (5%) 25 22	72, 119, 173, 271	0

The worst 5 of 157 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	F	190	TYR	5.0
2	F	255	ASP	4.9
1	C	138	THR	4.9
2	F	278	LEU	4.8
1	B	131	ASP	4.7

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.