



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 02:04 AM UTC

PDB ID : 6H6G / pdb_00006h6g
Title : Crystal Structure of TcdB2-TccC3 without hypervariable C-terminal region
Authors : Gatsogiannis, C.; Merino, F.; Roderer, D.; Balchin, D.; Schubert, E.; Kuhlee, A.; Hayer-Hartl, M.; Raunser, S.
Deposited on : 2018-07-27
Resolution : 3.00 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

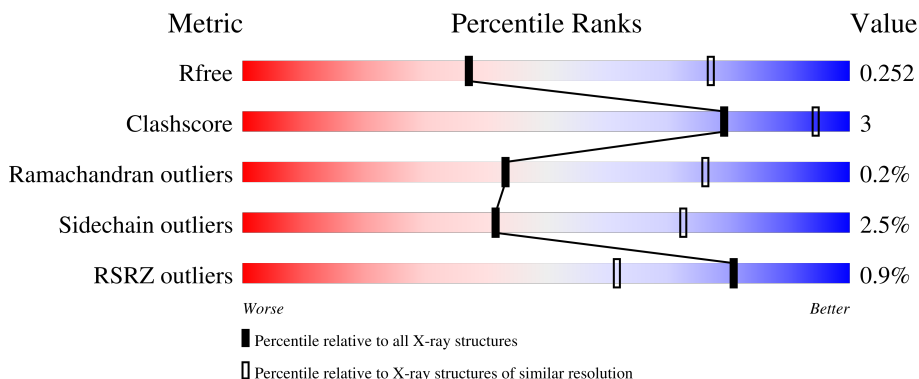
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

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	2157	

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 33609 atoms, of which 16415 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 TcdB2,TccC3.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	2139	Total	C	H	N	O	S	0	0	0
			33474	10689	16415	3027	3309	34			

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1475	PRO	-	linker	UNP Q8GF99
A	1476	GLY	-	linker	UNP Q8GF99
A	1477	SER	-	linker	UNP Q8GF99
A	1478	ARG	-	linker	UNP Q8GF99
A	1479	PRO	-	linker	UNP Q8GF99

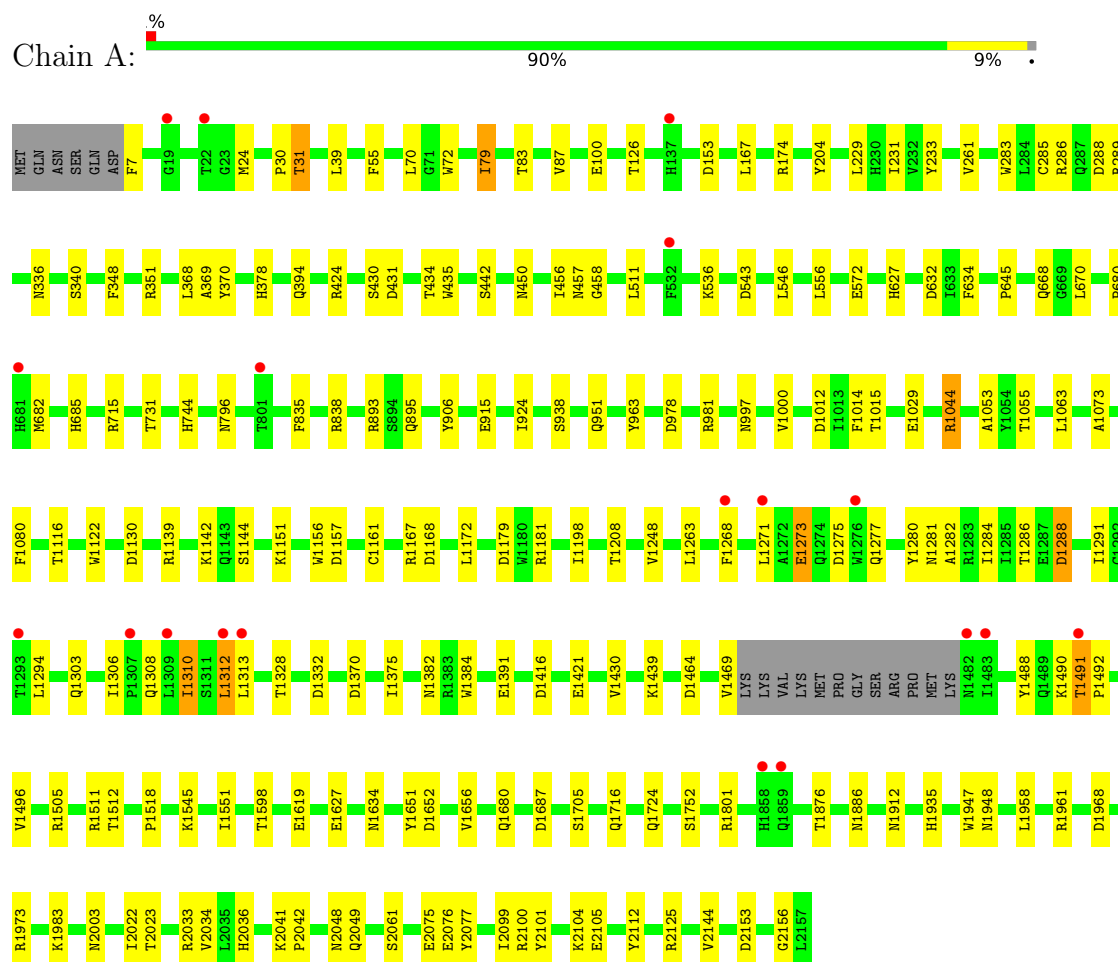
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	135	Total	O	0	0
			135	135		

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: TcdB2,TccC3



4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α , β , γ	231.33Å 231.33Å 141.97Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	48.64 – 3.00 48.64 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.9 (48.64-3.00) 99.9 (48.64-3.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.12 (at 3.01Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.216 , 0.253 0.218 , 0.252	Depositor DCC
R_{free} test set	4361 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	73.2	Xtriage
Anisotropy	0.491	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 46.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.015 for -h,-k,l	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	33609	wwPDB-VP
Average B, all atoms (Å ²)	88.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 1.78% 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	0.13	0/17480	0.33	0/23832

There are no bond length outliers.

There are no bond angle outliers.

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	17059	16415	16419	90	0
2	A	135	0	0	1	0
All	All	17194	16415	16419	90	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 3.

All (90) 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:1680:GLN:O	1:A:1973:ARG:NH2	2.20	0.74
1:A:7:PHE:N	2:A:2201:HOH:O	2.22	0.72
1:A:286:ARG:NH2	1:A:288:ASP:OD1	2.26	0.67
1:A:1983:LYS:NZ	1:A:2105:GLU:OE1	2.30	0.65

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:978:ASP:OD1	1:A:981:ARG:NH2	2.31	0.64
1:A:442:SER:OG	1:A:458:GLY:N	2.31	0.63
1:A:1029:GLU:N	1:A:1029:GLU:OE1	2.34	0.61
1:A:1961:ARG:NH1	1:A:1968:ASP:OD1	2.35	0.60
1:A:431:ASP:OD1	1:A:715:ARG:NH1	2.36	0.58
1:A:997:ASN:OD1	1:A:1000:VAL:N	2.37	0.57
1:A:153:ASP:O	1:A:174:ARG:NH1	2.39	0.55
1:A:1716:GLN:OE1	1:A:2003:ASN:ND2	2.40	0.54
1:A:2041:LYS:NZ	1:A:2042:PRO:O	2.40	0.54
1:A:1912:ASN:O	1:A:2125:ARG:NH2	2.36	0.54
1:A:893:ARG:HB3	1:A:915:GLU:HB2	1.90	0.53
1:A:434:THR:OG1	1:A:435:TRP:N	2.41	0.53
1:A:1286:THR:OG1	1:A:1288:ASP:O	2.21	0.53
1:A:1332:ASP:OD1	1:A:1332:ASP:N	2.42	0.52
1:A:1619:GLU:N	1:A:1619:GLU:OE1	2.41	0.52
1:A:682:MET:O	1:A:685:HIS:ND1	2.40	0.52
1:A:1724:GLN:NE2	1:A:2023:THR:O	2.41	0.51
1:A:336:ASN:HB2	1:A:348:PHE:HB3	1.93	0.50
1:A:24:MET:HE1	1:A:351:ARG:H	1.78	0.49
1:A:2075:GLU:CD	1:A:2100:ARG:HD3	2.38	0.48
1:A:2153:ASP:OD2	1:A:2156:GLY:N	2.45	0.48
1:A:1248:VAL:O	1:A:1328:THR:OG1	2.30	0.47
1:A:1263:LEU:HA	1:A:1312:LEU:HD11	1.97	0.47
1:A:1179:ASP:OD2	1:A:1181:ARG:NH2	2.41	0.47
1:A:1545:LYS:NZ	1:A:1551:ILE:O	2.46	0.47
1:A:1651:TYR:CD1	1:A:1656:VAL:HB	2.50	0.47
1:A:1382:ASN:OD1	1:A:1384:TRP:NE1	2.43	0.46
1:A:1886:ASN:OD1	1:A:2125:ARG:NH2	2.44	0.46
1:A:1273:GLU:O	1:A:1277:GLN:N	2.43	0.46
1:A:2061:SER:O	1:A:2077:TYR:OH	2.20	0.46
1:A:1370:ASP:OD1	1:A:1370:ASP:N	2.50	0.45
1:A:1416:ASP:N	1:A:1416:ASP:OD1	2.49	0.45
1:A:31:THR:O	1:A:31:THR:OG1	2.33	0.45
1:A:1496:VAL:HB	1:A:1505:ARG:HB2	1.99	0.45
1:A:231:ILE:HG12	1:A:261:VAL:HG22	1.99	0.45
1:A:2036:HIS:ND1	1:A:2048:ASN:OD1	2.41	0.45
1:A:838:ARG:NH1	1:A:895:GLN:OE1	2.45	0.45
1:A:424:ARG:NH1	1:A:430:SER:O	2.50	0.45
1:A:1430:VAL:HB	1:A:1439:LYS:HB3	1.99	0.45
1:A:1958:LEU:N	1:A:1968:ASP:O	2.49	0.44
1:A:634:PHE:CE1	1:A:645:PRO:HG3	2.53	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:231:ILE:HG21	1:A:233:TYR:CZ	2.52	0.44
1:A:1282:ALA:HB3	1:A:1284:ILE:HD12	2.00	0.44
1:A:1263:LEU:HD21	1:A:1310:ILE:HG13	2.00	0.44
1:A:1080:PHE:HB2	1:A:1122:TRP:HB2	2.00	0.43
1:A:1014:PHE:CZ	1:A:1044:ARG:HD2	2.54	0.43
1:A:2061:SER:N	1:A:2100:ARG:O	2.51	0.43
1:A:1303:GLN:N	1:A:1303:GLN:OE1	2.52	0.43
1:A:1511:ARG:HH21	1:A:1518:PRO:HG3	1.83	0.43
1:A:1464:ASP:OD2	1:A:1491:THR:HG23	2.18	0.43
1:A:450:ASN:ND2	1:A:511:LEU:O	2.52	0.43
1:A:1144:SER:HB2	1:A:1151:LYS:HG2	2.00	0.43
1:A:1935:HIS:HB3	1:A:1947:TRP:CE2	2.54	0.43
1:A:2144:VAL:O	1:A:2144:VAL:HG23	2.19	0.43
1:A:796:ASN:ND2	1:A:1391:GLU:OE2	2.52	0.42
1:A:285:CYS:SG	1:A:289:ARG:HD3	2.59	0.42
1:A:556:LEU:O	1:A:572:GLU:HA	2.19	0.42
1:A:2022:ILE:O	1:A:2033:ARG:HA	2.19	0.42
1:A:1198:ILE:HA	1:A:1208:THR:O	2.19	0.42
1:A:1627:GLU:HG3	1:A:1652:ASP:HA	2.01	0.42
1:A:835:PHE:CG	1:A:893:ARG:HB2	2.55	0.42
1:A:1053:ALA:O	1:A:1073:ALA:N	2.53	0.42
1:A:2101:TYR:HB3	1:A:2112:TYR:CZ	2.55	0.42
1:A:369:ALA:HB2	1:A:1294:LEU:HD11	2.02	0.41
1:A:1490:LYS:C	1:A:1492:PRO:HD3	2.45	0.41
1:A:2075:GLU:OE2	1:A:2100:ARG:HD3	2.21	0.41
1:A:543:ASP:OD1	1:A:543:ASP:N	2.39	0.41
1:A:370:TYR:CD2	1:A:370:TYR:N	2.89	0.41
1:A:1130:ASP:HB2	1:A:1142:LYS:HB2	2.01	0.41
1:A:1139:ARG:HD3	1:A:1156:TRP:CH2	2.55	0.41
1:A:1157:ASP:OD1	1:A:1161:CYS:N	2.47	0.41
1:A:1375:ILE:HD11	1:A:1421:GLU:HG2	2.01	0.41
1:A:1488:TYR:O	1:A:1491:THR:HG22	2.21	0.41
1:A:1055:THR:HB	1:A:1073:ALA:HB2	2.03	0.41
1:A:627:HIS:NE2	1:A:632:ASP:OD1	2.54	0.41
1:A:2034:VAL:HA	1:A:2049:GLN:O	2.20	0.41
1:A:2099:ILE:HG23	1:A:2104:LYS:C	2.46	0.41
1:A:924:ILE:HD13	1:A:963:TYR:CE1	2.56	0.41
1:A:72:TRP:HZ2	1:A:368:LEU:HD13	1.86	0.40
1:A:668:GLN:HB3	1:A:670:LEU:HD13	2.03	0.40
1:A:55:PHE:CZ	1:A:229:LEU:HD21	2.56	0.40
1:A:79:ILE:HG22	1:A:167:LEU:HD22	2.02	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:204:TYR:CE1	1:A:229:LEU:HD13	2.56	0.40
1:A:1012:ASP:OD2	1:A:1044:ARG:NH1	2.54	0.40
1:A:1263:LEU:HD21	1:A:1291:ILE:HD11	2.03	0.40
1:A:1168:ASP:OD2	1:A:1172:LEU:HD12	2.22	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	2135/2157 (99%)	2031 (95%)	99 (5%)	5 (0%)	43 76

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	30	PRO
1	A	536	LYS
1	A	1273	GLU
1	A	1948	ASN
1	A	680	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	1846/1863 (99%)	1799 (98%)	47 (2%)	42 72

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	31	THR
1	A	39	LEU
1	A	70	LEU
1	A	79	ILE
1	A	83	THR
1	A	87	VAL
1	A	100	GLU
1	A	126	THR
1	A	283	TRP
1	A	340	SER
1	A	378	HIS
1	A	394	GLN
1	A	456	ILE
1	A	457	ASN
1	A	546	LEU
1	A	731	THR
1	A	744	HIS
1	A	906	TYR
1	A	938	SER
1	A	951	GLN
1	A	1015	THR
1	A	1044	ARG
1	A	1063	LEU
1	A	1116	THR
1	A	1167	ARG
1	A	1268	PHE
1	A	1271	LEU
1	A	1275	ASP
1	A	1280	TYR
1	A	1281	ASN
1	A	1288	ASP
1	A	1306	ILE
1	A	1308	GLN
1	A	1310	ILE
1	A	1312	LEU
1	A	1313	LEU
1	A	1469	VAL
1	A	1491	THR

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Mol	Chain	Res	Type
1	A	1512	THR
1	A	1598	THR
1	A	1634	ASN
1	A	1687	ASP
1	A	1705	SER
1	A	1752	SER
1	A	1801	ARG
1	A	1876	THR
1	A	2076	GLU

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	58	ASN
1	A	199	GLN
1	A	450	ASN
1	A	663	GLN
1	A	900	GLN
1	A	1506	ASN
1	A	1558	GLN
1	A	1892	HIS
1	A	2011	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 [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	2139/2157 (99%)	-0.20	19 (0%)	81 61	50, 82, 136, 208	0

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1483	ILE	6.3
1	A	1268	PHE	3.2
1	A	1313	LEU	2.9
1	A	1491	THR	2.8
1	A	532	PHE	2.8
1	A	1312	LEU	2.8
1	A	1858	HIS	2.8
1	A	1482	ASN	2.7
1	A	137	HIS	2.7
1	A	1271	LEU	2.7
1	A	681	HIS	2.6
1	A	1859	GLN	2.5
1	A	801	THR	2.5
1	A	1309	LEU	2.5
1	A	1293	THR	2.4
1	A	22	THR	2.2
1	A	1307	PRO	2.1
1	A	1276	TRP	2.0
1	A	19	GLY	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.