



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2026 – 10:20 PM UTC

PDB ID : 3SDL / pdb_00003sdl
Title : Crystal structure of human ISG15 in complex with NS1 N-terminal region from influenza B virus, Northeast Structural Genomics Consortium Target IDs HX6481, HR2873, and OR2
Authors : Guan, R.; Ma, L.-C.; Krug, R.M.; Montelione, G.T.; Northeast Structural Genomics Consortium (NESG)
Deposited on : 2011-06-09
Resolution : 2.29 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

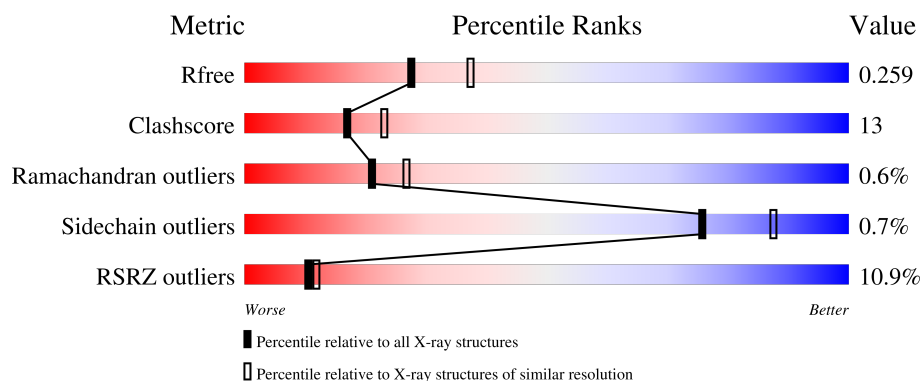
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.29 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	113	
1	B	113	
2	C	164	
2	D	164	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4018 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 Non-structural protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	95	Total	C	N	O	S	0	1	0
			772	484	139	144	5			
1	B	97	Total	C	N	O	S	0	0	0
			786	494	141	146	5			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	MET	-	expression tag	UNP P03502
A	-8	GLY	-	expression tag	UNP P03502
A	-7	HIS	-	expression tag	UNP P03502
A	-6	HIS	-	expression tag	UNP P03502
A	-5	HIS	-	expression tag	UNP P03502
A	-4	HIS	-	expression tag	UNP P03502
A	-3	HIS	-	expression tag	UNP P03502
A	-2	HIS	-	expression tag	UNP P03502
A	-1	SER	-	expression tag	UNP P03502
A	0	HIS	-	expression tag	UNP P03502
B	-9	MET	-	expression tag	UNP P03502
B	-8	GLY	-	expression tag	UNP P03502
B	-7	HIS	-	expression tag	UNP P03502
B	-6	HIS	-	expression tag	UNP P03502
B	-5	HIS	-	expression tag	UNP P03502
B	-4	HIS	-	expression tag	UNP P03502
B	-3	HIS	-	expression tag	UNP P03502
B	-2	HIS	-	expression tag	UNP P03502
B	-1	SER	-	expression tag	UNP P03502
B	0	HIS	-	expression tag	UNP P03502

- Molecule 2 is a protein called Ubiquitin-like protein ISG15.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	151	Total 1159	C 734	N 200	O 221	S 4	0	0	0
2	D	151	Total 1159	C 734	N 200	O 221	S 4	0	0	0

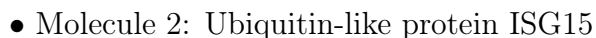
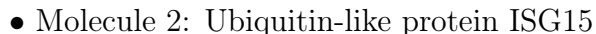
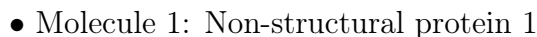
There are 14 discrepancies between the modelled and reference sequences:

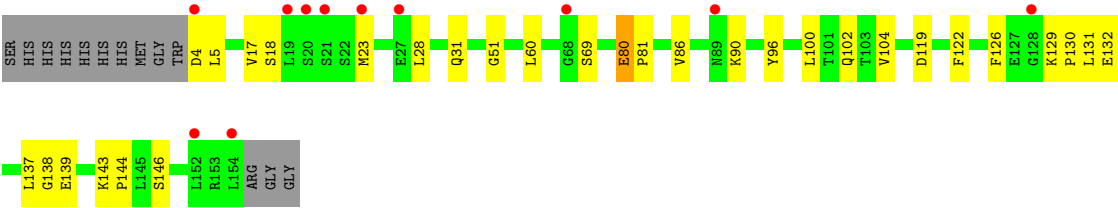
Chain	Residue	Modelled	Actual	Comment	Reference
C	-6	SER	-	expression tag	UNP P05161
C	-5	HIS	-	expression tag	UNP P05161
C	-4	HIS	-	expression tag	UNP P05161
C	-3	HIS	-	expression tag	UNP P05161
C	-2	HIS	-	expression tag	UNP P05161
C	-1	HIS	-	expression tag	UNP P05161
C	0	HIS	-	expression tag	UNP P05161
D	-6	SER	-	expression tag	UNP P05161
D	-5	HIS	-	expression tag	UNP P05161
D	-4	HIS	-	expression tag	UNP P05161
D	-3	HIS	-	expression tag	UNP P05161
D	-2	HIS	-	expression tag	UNP P05161
D	-1	HIS	-	expression tag	UNP P05161
D	0	HIS	-	expression tag	UNP P05161

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	33	Total 33	O 33	0	0
3	B	17	Total 17	O 17	0	0
3	C	46	Total 46	O 46	0	0
3	D	46	Total 46	O 46	0	0

- Molecule 1: Non-structural protein 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	39.01Å 56.14Å 74.02Å 70.59° 84.24° 83.91°	Depositor
Resolution (Å)	36.72 – 2.29 36.72 – 2.29	Depositor EDS
% Data completeness (in resolution range)	86.1 (36.72-2.29) 86.2 (36.72-2.29)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.67 (at 2.29Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.6.4_486)	Depositor
R, R_{free}	0.222 , 0.261 0.217 , 0.259	Depositor DCC
R_{free} test set	1175 reflections (4.81%)	wwPDB-VP
Wilson B-factor (Å ²)	49.3	Xtriage
Anisotropy	0.299	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 61.3	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	0.94	EDS
Total number of atoms	4018	wwPDB-VP
Average B, all atoms (Å ²)	68.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.32% 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	0.30	0/788	0.70	0/1054
1	B	0.31	0/801	0.74	1/1072 (0.1%)
2	C	0.27	0/1177	0.67	0/1594
2	D	0.27	0/1177	0.72	2/1594 (0.1%)
All	All	0.28	0/3943	0.71	3/5314 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	100	PHE	CB-CA-C	-5.42	110.31	116.54
2	D	80	GLU	CA-C-N	5.22	125.14	119.76
2	D	80	GLU	C-N-CA	5.22	125.14	119.76

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	772	0	778	32	0
1	B	786	0	788	27	0
2	C	1159	0	1190	29	0
2	D	1159	0	1190	21	0
3	A	33	0	0	0	0
3	B	17	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	C	46	0	0	1	0
3	D	46	0	0	2	0
All	All	4018	0	3946	99	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 13.

All (99) 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)
2:C:17:VAL:HG13	2:C:31:GLN:HG2	1.56	0.87
2:C:136:PRO:HG2	2:C:139:GLU:HG2	1.72	0.72
1:B:12:VAL:HG23	1:B:13:GLY:H	1.57	0.70
1:A:95:ALA:N	1:A:96:GLY:HA3	2.07	0.69
1:A:25:ALA:HA	1:A:55:LEU:HD21	1.73	0.69
1:A:101:GLU:HB2	2:C:72:LEU:HB3	1.72	0.69
1:A:99:GLY:O	1:A:100:PHE:HB2	1.96	0.66
1:A:50:ARG:HH21	1:A:54:LYS:HD2	1.59	0.66
2:C:129:LYS:HE3	2:C:140:TYR:HD2	1.60	0.66
1:A:83:LYS:HD3	1:A:98:GLU:HB2	1.80	0.63
1:B:12:VAL:HG23	1:B:13:GLY:N	2.13	0.62
1:B:94:SER:HA	2:D:51:GLY:O	2.00	0.62
1:B:25:ALA:HA	1:B:55:LEU:HD21	1.82	0.61
1:A:51:LEU:O	1:A:55:LEU:HB2	2.00	0.61
1:A:83:LYS:HD3	1:A:98:GLU:CB	2.30	0.61
1:A:87:VAL:CG2	1:A:96:GLY:HA2	2.31	0.61
1:B:101:GLU:N	1:B:102:PRO:HD3	2.16	0.60
1:A:100:PHE:CD2	2:C:8:LYS:HE2	2.37	0.60
1:A:100:PHE:HD2	2:C:8:LYS:HE2	1.65	0.60
1:B:100:PHE:C	1:B:102:PRO:HD3	2.28	0.59
2:C:99:ARG:O	2:C:102:GLN:HG2	2.02	0.59
1:B:72:MET:HA	1:B:76:GLU:OE2	2.02	0.59
1:B:68:GLU:HA	1:B:71:ARG:HD3	1.86	0.58
2:D:102:GLN:O	2:D:137:LEU:HG	2.05	0.57
2:C:10:LEU:O	2:C:11:ALA:HB3	2.04	0.57
2:C:23:MET:HB3	2:C:60:LEU:HB2	1.87	0.57
1:B:72:MET:HB2	1:B:77:ARG:CZ	2.35	0.56
1:B:36:TRP:CD1	2:C:77:LYS:HB3	2.40	0.56
1:B:101:GLU:N	1:B:102:PRO:CD	2.67	0.56
1:B:29:GLU:HG3	1:B:33:ARG:HD2	1.87	0.56
2:D:119:ASP:HA	2:D:122:PHE:CE1	2.41	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:48:LEU:C	1:A:48:LEU:HD23	2.30	0.56
1:B:79:ALA:O	1:B:83:LYS:HG3	2.06	0.55
2:D:80:GLU:HG2	3:D:200:HOH:O	2.07	0.54
2:C:44:ARG:HB2	2:C:74:VAL:CG1	2.36	0.54
2:C:39:HIS:ND1	2:C:136:PRO:HG3	2.23	0.54
2:D:5:LEU:HD11	2:D:69:SER:HB2	1.90	0.54
1:B:48:LEU:C	1:B:48:LEU:HD23	2.33	0.53
2:C:119:ASP:HA	2:C:122:PHE:CE1	2.44	0.53
2:D:100:LEU:HD22	2:D:138:GLY:HA2	1.91	0.52
2:D:86:VAL:HB	2:D:96:TYR:CE1	2.44	0.52
2:D:104:VAL:HB	2:D:132:GLU:O	2.11	0.51
1:A:87:VAL:HG22	1:A:96:GLY:HA2	1.92	0.51
2:C:5:LEU:HD22	2:C:19:LEU:HD11	1.93	0.50
1:A:68:GLU:OE1	1:A:71:ARG:HD2	2.11	0.50
2:C:104:VAL:HG23	2:C:135:LEU:O	2.12	0.49
2:D:80:GLU:HG3	3:D:181:HOH:O	2.13	0.49
1:B:67:PRO:O	1:B:71:ARG:HG3	2.12	0.49
2:D:4:ASP:HA	2:D:18:SER:HA	1.94	0.49
2:C:27:GLU:HA	2:C:27:GLU:OE1	2.12	0.48
2:D:104:VAL:HG21	2:D:131:LEU:HB3	1.94	0.48
1:B:95:ALA:O	1:B:101:GLU:HG2	2.13	0.48
1:B:46:ASP:O	1:B:50:ARG:HG3	2.14	0.48
2:C:114:LEU:C	2:C:114:LEU:HD23	2.38	0.48
1:A:98:GLU:C	1:A:100:PHE:H	2.22	0.47
1:A:99:GLY:O	2:C:10:LEU:HD12	2.14	0.47
2:C:44:ARG:HB2	2:C:74:VAL:HG13	1.95	0.47
1:B:92:ASP:OD1	1:B:94:SER:HB2	2.13	0.47
2:C:137:LEU:HB3	2:C:142:LEU:HD12	1.96	0.47
1:A:89:LEU:HD21	1:B:30:CYS:SG	2.54	0.46
1:A:90:PHE:CD1	1:B:102:PRO:HG3	2.50	0.46
1:A:29:GLU:O	1:A:33:ARG:HG3	2.15	0.46
2:C:120:ASP:HA	3:C:201:HOH:O	2.15	0.46
2:D:143:LYS:HB3	2:D:144:PRO:HD2	1.98	0.46
1:A:72:MET:HG2	1:A:76:GLU:OE2	2.16	0.46
1:A:50:ARG:HG3	1:A:51:LEU:N	2.30	0.46
2:D:17:VAL:HG13	2:D:31:GLN:OE1	2.15	0.46
2:D:86:VAL:HB	2:D:96:TYR:HE1	1.81	0.46
1:B:74:LEU:O	1:B:78:LYS:HG3	2.17	0.45
2:C:107:LEU:O	2:C:111:VAL:HG23	2.17	0.45
2:C:17:VAL:CG1	2:C:31:GLN:HG2	2.37	0.45
2:D:126:PHE:CE1	2:D:146:SER:HB3	2.50	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:100:PHE:O	1:A:101:GLU:HB3	2.17	0.44
1:A:48:LEU:HD23	1:A:48:LEU:O	2.18	0.44
1:A:86:LYS:HB3	1:A:95:ALA:HB1	1.98	0.44
1:A:91:MET:HG2	1:B:33:ARG:HH21	1.82	0.44
2:C:10:LEU:O	2:C:11:ALA:CB	2.66	0.44
2:C:118:GLN:HB2	2:C:121:LEU:HD12	1.98	0.44
2:C:129:LYS:HE3	2:C:140:TYR:CD2	2.48	0.44
2:C:82:LEU:HD12	2:C:82:LEU:C	2.43	0.43
1:A:67:PRO:O	1:A:71:ARG:HG3	2.18	0.43
1:A:50:ARG:NH2	1:A:54:LYS:HD2	2.31	0.42
1:B:95:ALA:HA	1:B:98:GLU:OE1	2.19	0.42
2:C:105:ALA:O	2:C:109:GLN:HG3	2.19	0.42
1:B:24:GLU:OE1	1:B:58:ARG:NH2	2.49	0.42
2:D:23:MET:O	2:D:60:LEU:HG	2.20	0.42
2:D:28:LEU:HD23	2:D:28:LEU:O	2.19	0.42
2:D:80:GLU:HA	2:D:81:PRO:HD3	1.82	0.42
2:D:90:LYS:HD3	2:D:90:LYS:HA	1.82	0.41
1:B:86:LYS:HB3	1:B:96:GLY:O	2.20	0.41
1:A:82:VAL:HG12	1:A:86:LYS:HE3	2.02	0.41
1:A:78:LYS:O	1:A:82:VAL:HG23	2.20	0.41
1:A:101:GLU:CD	1:A:101:GLU:C	2.89	0.41
2:D:129:LYS:HA	2:D:130:PRO:HD3	1.80	0.41
2:D:139:GLU:O	2:D:139:GLU:HG3	2.20	0.41
1:B:100:PHE:O	1:B:101:GLU:CB	2.69	0.41
1:A:31:TYR:OH	1:B:24:GLU:HG2	2.21	0.40
2:C:143:LYS:HB3	2:C:144:PRO:HD2	2.04	0.40
1:A:48:LEU:C	1:A:48:LEU:CD2	2.94	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	94/113 (83%)	90 (96%)	4 (4%)	0	100	100
1	B	95/113 (84%)	86 (90%)	6 (6%)	3 (3%)	3	2
2	C	149/164 (91%)	146 (98%)	3 (2%)	0	100	100
2	D	149/164 (91%)	146 (98%)	3 (2%)	0	100	100
All	All	487/554 (88%)	468 (96%)	16 (3%)	3 (1%)	21	27

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	101	GLU
1	B	94	SER
1	B	98	GLU

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	83/98 (85%)	82 (99%)	1 (1%)	63	79
1	B	84/98 (86%)	82 (98%)	2 (2%)	43	62
2	C	132/142 (93%)	132 (100%)	0	100	100
2	D	132/142 (93%)	132 (100%)	0	100	100
All	All	431/480 (90%)	428 (99%)	3 (1%)	76	87

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	LEU
1	B	97	ILE
1	B	101	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	49	HIS
2	C	102	GLN
2	C	110	GLN

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	95/113 (84%)	0.71	7 (7%) 20 22	36, 63, 113, 125	1 (1%)
1	B	97/113 (85%)	1.16	20 (20%) 2 3	37, 64, 142, 160	0
2	C	151/164 (92%)	0.82	16 (10%) 11 12	40, 60, 109, 156	0
2	D	151/164 (92%)	0.74	11 (7%) 21 23	38, 64, 102, 145	0
All	All	494/554 (89%)	0.84	54 (10%) 10 12	36, 63, 120, 160	1 (0%)

All (54) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	96	GLY	5.8
1	B	95	ALA	5.5
2	D	20	SER	4.8
1	B	100	PHE	4.6
1	B	99	GLY	4.0
1	B	101	GLU	4.0
1	A	100	PHE	3.8
1	B	97	ILE	3.8
2	C	22	SER	3.7
1	B	13	GLY	3.6
2	D	4	ASP	3.5
1	B	102	PRO	3.3
1	B	12	VAL	3.2
2	C	24	SER	3.1
1	B	94	SER	3.1
1	B	9	GLN	3.1
1	B	103	TYR	3.0
2	C	47	VAL	3.0
2	C	21	SER	3.0
2	C	58	VAL	2.8
2	C	20	SER	2.8

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Mol	Chain	Res	Type	RSRZ
2	C	19	LEU	2.8
2	D	21	SER	2.7
2	D	68	GLY	2.7
1	B	61	THR	2.7
1	A	8	THR	2.7
2	D	19	LEU	2.7
1	B	8	THR	2.6
2	C	66	GLY	2.6
2	D	89	ASN	2.5
2	C	63	GLN	2.5
1	A	95	ALA	2.5
1	A	57	SER	2.5
2	C	119	ASP	2.4
1	A	25	ALA	2.4
2	C	62	SER	2.4
1	B	10	ILE	2.4
2	D	27	GLU	2.4
1	B	7	THR	2.3
2	C	82	LEU	2.3
1	B	17	THR	2.3
2	C	23	MET	2.2
1	B	67	PRO	2.2
2	D	128	GLY	2.2
2	D	152	LEU	2.1
2	D	154	LEU	2.1
2	D	23	MET	2.1
1	A	14	PRO	2.1
1	B	65	SER	2.1
2	C	53	ALA	2.1
2	C	152	LEU	2.1
2	C	61	ALA	2.0
1	B	69	ASN	2.0
1	A	65	SER	2.0

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

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

6.3 Carbohydrates ⓘ

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.