



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 14, 2026 – 05:29 PM UTC

PDB ID : 4LEI / pdb_00004lei
Title : Spinosyn Forosaminyltransferase SpnP
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Deposited on : 2013-06-25
Resolution : 3.15 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
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
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

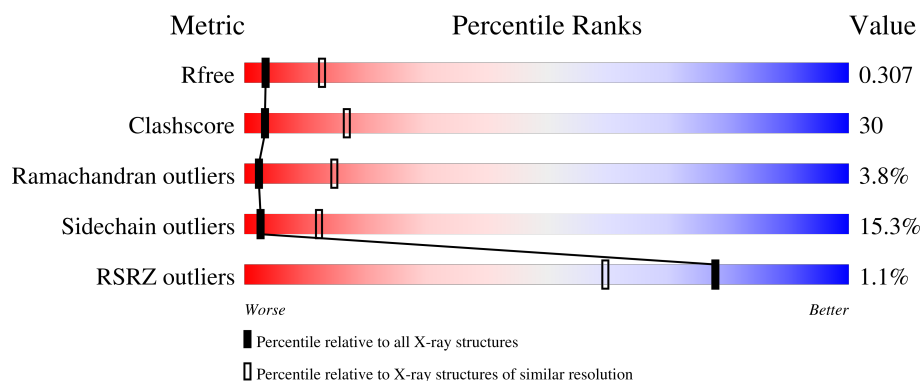
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.15 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	2361 (3.20-3.12)
Clashscore	190562	2486 (3.20-3.12)
Ramachandran outliers	187476	2405 (3.20-3.12)
Sidechain outliers	187428	2404 (3.20-3.12)
RSRZ outliers	180081	2361 (3.20-3.12)

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	455	42% 31% 9% • 18%
1	B	455	39% 33% 9% • 18%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5958 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 NDP-forosamyltransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	375	Total	C	N	O	S	0	0	0
			2922	1852	514	543	13			
1	B	373	Total	C	N	O	S	0	0	0
			2905	1840	511	541	13			

There are 32 discrepancies between the modelled and reference sequences:

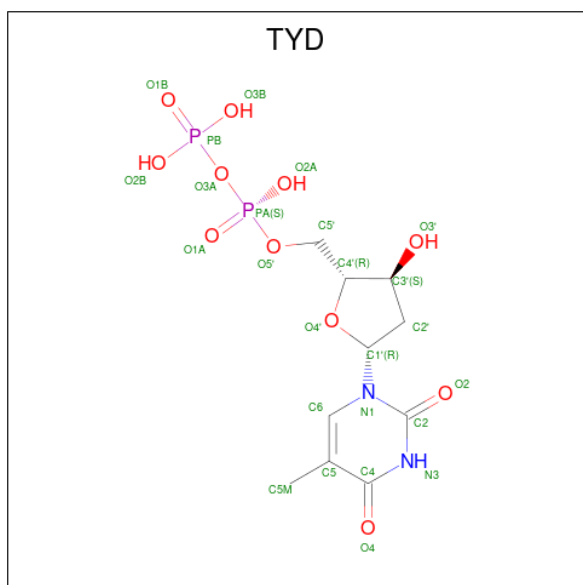
Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	HIS	-	expression tag	UNP Q9ALN7
A	-14	HIS	-	expression tag	UNP Q9ALN7
A	-13	HIS	-	expression tag	UNP Q9ALN7
A	-12	HIS	-	expression tag	UNP Q9ALN7
A	-11	HIS	-	expression tag	UNP Q9ALN7
A	-10	HIS	-	expression tag	UNP Q9ALN7
A	-9	SER	-	expression tag	UNP Q9ALN7
A	-8	SER	-	expression tag	UNP Q9ALN7
A	-7	GLY	-	expression tag	UNP Q9ALN7
A	-6	LEU	-	expression tag	UNP Q9ALN7
A	-5	VAL	-	expression tag	UNP Q9ALN7
A	-4	PRO	-	expression tag	UNP Q9ALN7
A	-3	ARG	-	expression tag	UNP Q9ALN7
A	-2	GLY	-	expression tag	UNP Q9ALN7
A	-1	SER	-	expression tag	UNP Q9ALN7
A	0	HIS	-	expression tag	UNP Q9ALN7
B	-15	HIS	-	expression tag	UNP Q9ALN7
B	-14	HIS	-	expression tag	UNP Q9ALN7
B	-13	HIS	-	expression tag	UNP Q9ALN7
B	-12	HIS	-	expression tag	UNP Q9ALN7
B	-11	HIS	-	expression tag	UNP Q9ALN7
B	-10	HIS	-	expression tag	UNP Q9ALN7
B	-9	SER	-	expression tag	UNP Q9ALN7
B	-8	SER	-	expression tag	UNP Q9ALN7
B	-7	GLY	-	expression tag	UNP Q9ALN7

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	LEU	-	expression tag	UNP Q9ALN7
B	-5	VAL	-	expression tag	UNP Q9ALN7
B	-4	PRO	-	expression tag	UNP Q9ALN7
B	-3	ARG	-	expression tag	UNP Q9ALN7
B	-2	GLY	-	expression tag	UNP Q9ALN7
B	-1	SER	-	expression tag	UNP Q9ALN7
B	0	HIS	-	expression tag	UNP Q9ALN7

- Molecule 2 is THYMIDINE-5'-DIPHOSPHATE (CCD ID: TYD) (formula: $C_{10}H_{16}N_2O_{11}P_2$).

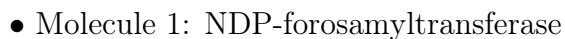


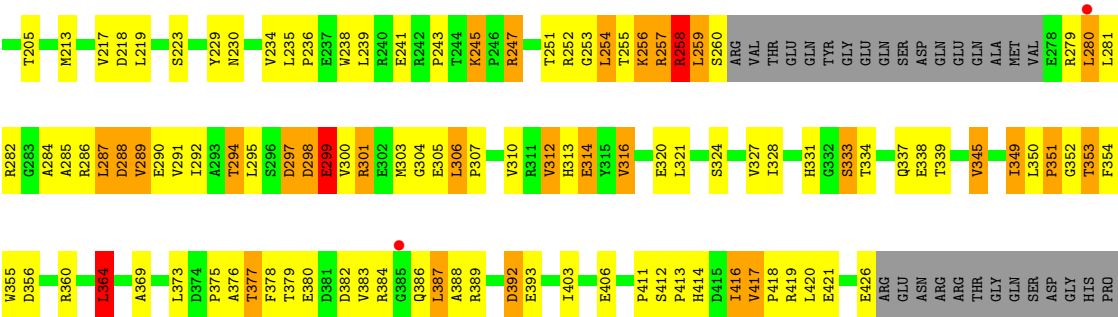
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			25	10	2	11	2		
2	B	1	Total	C	N	O	P	0	0
			25	10	2	11	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	40	Total	O	0	0
			40	40		
3	B	41	Total	O	0	0
			41	41		

- Molecule 1: NDP-forosamyltransferase





4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	162.37Å 162.37Å 81.28Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	114.81 – 3.15 114.81 – 3.15	Depositor EDS
% Data completeness (in resolution range)	99.0 (114.81-3.15) 99.1 (114.81-3.15)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.13 (at 3.12Å)	Xtriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.209 , 0.314 0.210 , 0.307	Depositor DCC
R_{free} test set	990 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	67.6	Xtriage
Anisotropy	0.004	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 56.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.42$, $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	5958	wwPDB-VP
Average B, all atoms (Å ²)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.03% 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 ⓘ

5.1 Standard geometry ⓘ

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

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	0.96	2/2983 (0.1%)	1.22	11/4065 (0.3%)
1	B	0.94	0/2969	1.21	20/4048 (0.5%)
All	All	0.95	2/5952 (0.0%)	1.22	31/8113 (0.4%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	212	TRP	CD2-CE2	5.30	1.50	1.41
1	A	299	GLU	CA-C	5.01	1.59	1.52

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	245	LYS	CA-C-N	-10.92	108.84	119.76
1	A	245	LYS	C-N-CA	-10.92	108.84	119.76
1	B	297	ASP	CB-CA-C	-9.28	102.88	116.53
1	B	129	TRP	N-CA-C	7.44	121.03	108.90
1	A	42	MET	N-CA-C	-7.24	103.08	110.97
1	B	339	THR	N-CA-C	-7.19	103.38	111.07
1	B	8	LEU	N-CA-C	-6.81	101.18	109.83
1	A	125	ASP	N-CA-C	-6.38	105.53	113.38
1	B	297	ASP	N-CA-C	6.34	114.84	108.75
1	B	297	ASP	CA-C-O	6.15	122.20	118.33
1	B	349	ILE	N-CA-C	5.81	116.22	107.80
1	B	193	ALA	N-CA-C	5.77	118.80	109.40
1	A	356	ASP	N-CA-C	-5.63	103.98	111.02
1	A	213	MET	N-CA-C	5.41	119.36	112.87
1	A	43	VAL	CB-CA-C	-5.38	104.97	112.02
1	B	312	VAL	N-CA-C	5.38	116.53	109.21
1	A	330	HIS	N-CA-C	5.36	116.42	108.86

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	417	VAL	CA-C-N	-5.30	113.33	119.47
1	B	417	VAL	C-N-CA	-5.30	113.33	119.47
1	B	24	LEU	CA-C-N	-5.24	113.26	120.28
1	B	24	LEU	C-N-CA	-5.24	113.26	120.28
1	A	156	VAL	CB-CA-C	-5.22	105.28	111.97
1	B	364	LEU	N-CA-C	-5.22	105.49	111.07
1	B	141	ARG	N-CA-C	-5.18	105.55	111.14
1	A	295	LEU	N-CA-C	5.12	117.94	109.85
1	A	231	GLY	N-CA-C	-5.09	101.95	112.34
1	B	345	VAL	N-CA-C	5.09	112.91	107.76
1	B	25	ARG	N-CA-CB	5.09	117.60	110.12
1	B	229	TYR	N-CA-C	-5.07	100.64	108.90
1	B	172	PRO	CA-C-N	5.00	126.09	119.84
1	B	172	PRO	C-N-CA	5.00	126.09	119.84

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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	2922	0	2933	164	0
1	B	2905	0	2906	194	0
2	A	25	0	13	5	0
2	B	25	0	13	8	0
3	A	40	0	0	6	0
3	B	41	0	0	4	0
All	All	5958	0	5865	354	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 30.

All (354) 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:273:GLU:HA	1:A:274:GLN:HB3	1.23	1.18
1:B:287:LEU:HD23	1:B:384:ARG:HB2	1.28	1.09
1:A:316:VAL:HG21	1:A:321:LEU:HD22	1.38	1.06
1:B:287:LEU:CD2	1:B:384:ARG:HB2	1.87	1.05
1:A:273:GLU:CA	1:A:274:GLN:HB3	1.89	1.03
1:B:419:ARG:NH2	3:B:632:HOH:O	1.93	1.01
1:B:297:ASP:OD1	1:B:312:VAL:HA	1.63	0.98
1:A:299:GLU:HB2	1:A:300:VAL:CB	1.94	0.97
1:A:299:GLU:HB2	1:A:300:VAL:HB	1.46	0.97
1:A:17:LEU:HD23	1:A:150:MET:HE3	1.48	0.95
1:B:287:LEU:HD13	1:B:380:GLU:HB3	1.50	0.92
1:A:152:VAL:O	1:A:334:THR:HG21	1.69	0.92
1:B:254:LEU:HB3	1:B:255:THR:HA	1.53	0.87
1:A:389:ARG:HG2	1:A:389:ARG:HH11	1.40	0.87
1:A:153:ALA:HB1	1:A:355:TRP:N	1.89	0.87
1:A:257:ARG:NH2	1:A:260:SER:HB2	1.89	0.87
1:B:253:GLY:O	1:B:331:HIS:CE1	2.28	0.86
1:A:300:VAL:HG22	1:A:305:GLU:N	1.90	0.85
1:B:253:GLY:H	1:B:254:LEU:HD22	1.42	0.85
1:B:173:PRO:HA	1:B:176:ARG:HD2	1.58	0.85
1:B:254:LEU:HD11	1:B:257:ARG:HG3	1.59	0.85
1:B:301:ARG:HA	1:B:301:ARG:NE	1.92	0.84
1:A:247:ARG:HH11	1:A:247:ARG:CG	1.87	0.83
1:B:297:ASP:OD2	1:B:312:VAL:HG13	1.77	0.83
1:B:301:ARG:HA	1:B:301:ARG:HE	1.43	0.82
1:A:257:ARG:HH21	1:A:260:SER:HB2	1.42	0.81
1:A:60:ILE:CG2	1:A:259:LEU:HD22	2.12	0.80
1:B:134:CYS:O	1:B:138:VAL:HG23	1.82	0.80
1:B:254:LEU:CD1	1:B:255:THR:HA	2.12	0.78
1:A:252:ARG:NE	1:A:331:HIS:HB2	1.98	0.78
1:B:12:SER:CB	2:B:501:TYD:O1A	2.31	0.78
1:A:242:ARG:HD2	1:A:243:PRO:HD2	1.66	0.77
1:A:299:GLU:HB2	1:A:300:VAL:CA	2.14	0.77
1:B:254:LEU:HB3	1:B:255:THR:CA	2.14	0.77
1:B:12:SER:HB3	2:B:501:TYD:O1A	1.83	0.77
1:B:287:LEU:CD1	1:B:380:GLU:HB3	2.15	0.76
1:A:252:ARG:HB2	1:A:331:HIS:HD2	1.50	0.76
1:B:254:LEU:CB	1:B:255:THR:HA	2.15	0.75
1:B:306:LEU:HD22	1:B:306:LEU:H	1.51	0.74
1:A:338:GLU:O	1:A:342:VAL:N	2.16	0.74
1:B:115:LEU:HG	1:B:139:VAL:HG21	1.70	0.74
1:A:273:GLU:CA	1:A:274:GLN:CB	2.65	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:256:LYS:O	1:A:257:ARG:C	2.32	0.72
1:B:234:VAL:O	1:B:236:PRO:HD3	1.90	0.72
1:A:147:HIS:CD2	1:A:202:GLY:HA2	2.25	0.71
1:A:230:ASN:O	1:A:315:TYR:OH	2.06	0.71
1:B:287:LEU:HB2	1:B:380:GLU:HG2	1.74	0.69
1:B:257:ARG:HG3	1:B:257:ARG:HH11	1.58	0.69
1:B:287:LEU:CD2	1:B:384:ARG:CB	2.69	0.69
1:A:257:ARG:HD3	3:A:636:HOH:O	1.92	0.69
1:B:53:VAL:HG22	1:B:114:ASP:HB3	1.75	0.69
1:A:389:ARG:HG2	1:A:393:GLU:OE2	1.92	0.68
1:A:371:LEU:HD13	1:A:386:GLN:OE1	1.94	0.68
1:B:141:ARG:CG	1:B:199:ILE:HD11	2.23	0.68
1:B:295:LEU:HD12	1:B:310:VAL:HG22	1.74	0.68
1:B:253:GLY:HA2	1:B:331:HIS:CD2	2.29	0.68
1:A:252:ARG:NE	1:A:252:ARG:HA	2.10	0.67
1:B:2:ARG:NH2	1:B:123:GLN:O	2.25	0.67
1:B:285:ALA:O	1:B:289:VAL:HG13	1.94	0.67
1:B:297:ASP:CG	1:B:312:VAL:HA	2.18	0.67
1:A:252:ARG:HE	1:A:331:HIS:HB2	1.59	0.67
1:A:209:ILE:HG22	1:A:210:PRO:HD2	1.77	0.67
1:B:186:ALA:O	1:B:189:ALA:HB3	1.94	0.67
1:B:141:ARG:HG3	1:B:199:ILE:HD11	1.77	0.66
1:B:7:PRO:HA	1:B:130:ASP:HB2	1.77	0.66
1:B:43:VAL:HG12	1:B:48:LEU:O	1.95	0.66
1:B:389:ARG:HG2	1:B:393:GLU:OE2	1.95	0.66
1:B:9:PRO:HD3	1:B:106:LEU:HD11	1.76	0.66
1:A:7:PRO:HA	1:A:130:ASP:HB2	1.78	0.65
1:B:254:LEU:HD13	1:B:256:LYS:H	1.60	0.65
1:A:247:ARG:HH11	1:A:247:ARG:HG3	1.60	0.65
1:A:286:ARG:HG2	1:A:286:ARG:HH11	1.62	0.64
1:B:254:LEU:HD11	1:B:257:ARG:CG	2.28	0.64
1:B:254:LEU:HD12	1:B:255:THR:HA	1.79	0.64
1:A:60:ILE:HG23	1:A:259:LEU:HD22	1.81	0.63
1:A:298:ASP:C	1:A:299:GLU:HG3	2.23	0.63
1:A:259:LEU:HA	1:A:260:SER:C	2.24	0.63
1:A:373:LEU:CD2	1:A:386:GLN:HG3	2.28	0.63
1:B:353:THR:HB	1:B:354:PHE:HD2	1.62	0.63
1:B:99:ASP:OD2	1:B:102:GLU:HB2	2.00	0.62
1:A:247:ARG:HG3	1:A:247:ARG:NH1	2.13	0.62
1:A:273:GLU:N	1:A:274:GLN:HB3	2.15	0.61
1:B:12:SER:HB2	2:B:501:TYD:O1A	2.00	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:30:GLU:HA	3:B:633:HOH:O	2.00	0.61
1:B:253:GLY:HA2	1:B:331:HIS:CE1	2.34	0.61
1:A:316:VAL:HG21	1:A:321:LEU:CD2	2.23	0.61
1:B:106:LEU:HB3	1:B:135:SER:HB3	1.81	0.61
1:B:149:ARG:NH1	1:B:205:THR:OG1	2.34	0.61
1:B:230:ASN:HB3	2:B:501:TYD:O2	2.01	0.61
1:B:38:ASN:HD22	1:B:38:ASN:H	1.47	0.61
1:A:403:ILE:O	1:A:407:ILE:HG12	2.02	0.60
1:B:334:THR:O	1:B:338:GLU:HG2	2.01	0.60
1:B:255:THR:O	1:B:256:LYS:HB2	2.01	0.60
1:B:257:ARG:HH11	1:B:257:ARG:CG	2.14	0.60
1:B:279:ARG:HA	1:B:281:LEU:HG	1.84	0.60
1:A:404:ARG:NH1	1:A:405:ARG:NH2	2.50	0.59
1:B:353:THR:HB	1:B:354:PHE:CD2	2.37	0.59
1:A:254:LEU:HD22	1:A:254:LEU:H	1.67	0.59
1:A:335:THR:OG1	2:A:501:TYD:O1A	2.20	0.59
1:B:282:ARG:HH22	1:B:286:ARG:HH11	1.51	0.59
1:A:17:LEU:CD2	1:A:150:MET:HE3	2.28	0.59
1:B:327:VAL:HG12	1:B:328:ILE:N	2.18	0.59
1:B:168:GLN:NE2	1:B:177:VAL:O	2.36	0.59
1:B:280:LEU:HB2	1:B:378:PHE:HZ	1.69	0.58
1:A:146:ARG:NH2	1:A:426:GLU:HB2	2.18	0.58
1:A:173:PRO:HA	1:A:176:ARG:HD2	1.84	0.58
1:B:256:LYS:H	1:B:257:ARG:HB2	1.68	0.58
1:B:247:ARG:HG2	1:B:294:THR:HG23	1.85	0.58
1:A:1:MET:H	1:A:29:HIS:HD2	1.51	0.58
1:A:9:PRO:O	1:A:39:MET:HE2	2.04	0.58
1:A:32:ARG:NH1	3:A:622:HOH:O	2.29	0.58
1:A:259:LEU:HG	1:A:259:LEU:O	2.03	0.58
1:B:331:HIS:NE2	1:B:333:SER:HB2	2.19	0.58
1:B:282:ARG:HH22	1:B:286:ARG:NH1	2.02	0.57
1:B:331:HIS:O	1:B:351:PRO:HA	2.04	0.57
1:A:213:MET:HE1	1:A:360:ARG:HB3	1.85	0.57
1:A:355:TRP:N	1:A:355:TRP:CD1	2.73	0.57
1:B:169:GLU:OE2	1:B:176:ARG:NH2	2.37	0.57
1:B:213:MET:SD	1:B:360:ARG:HG2	2.45	0.57
1:B:243:PRO:HG3	1:B:324:SER:HB2	1.87	0.57
1:B:257:ARG:NH1	1:B:299:GLU:OE1	2.37	0.57
1:B:306:LEU:HD22	1:B:306:LEU:N	2.18	0.57
1:A:13:HIS:HB3	1:A:130:ASP:OD2	2.05	0.57
1:A:226:PHE:CE2	1:A:228:PRO:HG3	2.40	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:279:ARG:HH21	1:B:301:ARG:HB3	1.70	0.57
1:A:106:LEU:HB2	1:A:135:SER:HB2	1.86	0.56
1:A:259:LEU:H	1:A:260:SER:HB3	1.70	0.56
1:A:258:ARG:O	1:A:259:LEU:HB3	2.05	0.56
1:A:316:VAL:CG2	1:A:321:LEU:HD22	2.26	0.56
1:B:285:ALA:HA	1:B:288:ASP:OD1	2.05	0.56
1:B:116:MET:HE1	1:B:139:VAL:HA	1.88	0.56
1:B:16:ASN:HD22	1:B:152:VAL:HG22	1.70	0.56
1:A:257:ARG:O	1:A:259:LEU:N	2.39	0.56
1:B:386:GLN:O	1:B:387:LEU:C	2.48	0.56
1:A:247:ARG:HH11	1:A:247:ARG:HG2	1.67	0.56
1:B:99:ASP:O	1:B:100:ALA:CB	2.54	0.55
1:B:253:GLY:HA2	1:B:331:HIS:NE2	2.21	0.55
1:B:280:LEU:HB2	1:B:378:PHE:CZ	2.41	0.55
1:A:273:GLU:N	1:A:274:GLN:CB	2.70	0.55
1:A:252:ARG:HH12	1:A:333:SER:HB3	1.71	0.55
1:A:297:ASP:O	1:A:298:ASP:HB3	2.07	0.55
1:B:141:ARG:HG2	1:B:199:ILE:HD11	1.89	0.55
1:B:301:ARG:NE	1:B:301:ARG:CA	2.67	0.55
1:A:252:ARG:HB2	1:A:331:HIS:CD2	2.38	0.54
1:B:152:VAL:O	1:B:334:THR:HG21	2.06	0.54
1:A:134:CYS:O	1:A:137:PRO:HD2	2.06	0.54
1:A:226:PHE:HE2	1:A:228:PRO:HG3	1.73	0.54
1:A:246:PRO:O	1:A:289:VAL:HB	2.07	0.54
1:B:256:LYS:N	1:B:257:ARG:HB2	2.23	0.54
1:A:1:MET:H	1:A:29:HIS:CD2	2.26	0.54
1:B:108:ASP:O	1:B:112:LEU:HB2	2.08	0.54
1:B:328:ILE:HG22	1:B:345:VAL:HG12	1.89	0.54
1:B:253:GLY:C	1:B:331:HIS:CE1	2.85	0.53
1:A:147:HIS:HD2	1:A:202:GLY:HA2	1.71	0.53
1:B:281:LEU:HD12	1:B:282:ARG:N	2.24	0.53
1:A:146:ARG:HD2	1:A:203:GLN:OE1	2.09	0.53
1:B:255:THR:O	1:B:256:LYS:CB	2.55	0.53
1:B:364:LEU:CD1	1:B:369:ALA:HB3	2.39	0.53
1:B:294:THR:OG1	3:B:630:HOH:O	1.98	0.53
1:B:298:ASP:O	1:B:299:GLU:HB2	2.09	0.53
1:B:38:ASN:H	1:B:38:ASN:ND2	2.07	0.53
1:A:389:ARG:HG2	1:A:389:ARG:NH1	2.15	0.52
1:A:414:HIS:CD2	1:B:414:HIS:CD2	2.98	0.52
1:A:7:PRO:HB3	1:A:17:LEU:HD12	1.91	0.52
1:A:209:ILE:HG22	1:A:210:PRO:CD	2.39	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:112:LEU:HD21	1:A:138:VAL:HG11	1.91	0.52
1:B:22:TRP:O	1:B:23:ALA:C	2.52	0.52
1:A:146:ARG:HH22	1:A:426:GLU:HB2	1.73	0.52
1:B:55:ASP:OD1	1:B:110:ARG:NH1	2.41	0.51
1:B:287:LEU:HD13	1:B:380:GLU:C	2.35	0.51
1:A:226:PHE:CD2	1:A:338:GLU:HB2	2.46	0.51
1:B:254:LEU:HD13	1:B:255:THR:HA	1.91	0.51
1:B:306:LEU:H	1:B:306:LEU:CD2	2.21	0.51
1:B:352:GLY:HA3	1:B:353:THR:HG23	1.92	0.51
1:B:141:ARG:HG3	1:B:199:ILE:CD1	2.41	0.51
1:B:189:ALA:O	1:B:190:LYS:C	2.54	0.51
1:B:297:ASP:CG	1:B:298:ASP:N	2.62	0.51
1:A:286:ARG:HG2	1:A:286:ARG:NH1	2.21	0.51
1:A:404:ARG:HH11	1:A:405:ARG:NH2	2.09	0.51
1:B:154:LEU:HD12	1:B:356:ASP:HB2	1.92	0.51
1:A:164:PHE:O	1:A:165:LEU:C	2.53	0.50
1:A:256:LYS:HD3	1:A:257:ARG:N	2.26	0.50
1:B:300:VAL:O	1:B:301:ARG:NH2	2.45	0.50
1:A:106:LEU:N	1:A:106:LEU:HD23	2.27	0.50
1:A:250:ILE:HG12	1:A:329:ILE:HB	1.93	0.50
1:A:342:VAL:HG22	1:A:407:ILE:HG21	1.94	0.50
1:A:337:GLN:O	1:A:340:ALA:HB3	2.11	0.50
1:B:256:LYS:CA	1:B:257:ARG:HB2	2.42	0.50
1:A:166:GLU:O	1:A:169:GLU:HB3	2.12	0.49
1:B:196:ASP:O	1:B:199:ILE:HG12	2.11	0.49
1:B:287:LEU:HD12	1:B:380:GLU:OE1	2.12	0.49
1:B:350:LEU:HD11	1:B:378:PHE:CE1	2.48	0.49
1:A:115:LEU:HD23	1:A:139:VAL:HG21	1.94	0.49
1:B:253:GLY:HA2	1:B:331:HIS:CG	2.47	0.49
1:A:135:SER:O	1:A:139:VAL:HG23	2.13	0.49
1:B:11:SER:O	1:B:12:SER:C	2.55	0.49
1:B:253:GLY:O	1:B:331:HIS:HE1	1.90	0.49
1:A:41:SER:HA	1:A:44:THR:HG22	1.95	0.49
1:A:368:GLY:O	1:A:396:PHE:HA	2.13	0.49
1:B:327:VAL:CG1	1:B:328:ILE:N	2.75	0.48
1:B:254:LEU:HD23	1:B:298:ASP:OD2	2.13	0.48
1:A:18:VAL:O	1:A:21:ALA:HB3	2.12	0.48
1:A:278:GLU:O	1:A:282:ARG:HG2	2.13	0.48
1:B:355:TRP:CD1	1:B:356:ASP:H	2.32	0.48
1:B:257:ARG:HG3	1:B:257:ARG:NH1	2.25	0.48
1:A:139:VAL:HG12	1:A:143:LEU:HD12	1.96	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:314:GLU:H	1:B:314:GLU:CD	2.18	0.48
1:B:350:LEU:HD12	1:B:373:LEU:HB2	1.96	0.48
1:A:37:PRO:HA	1:A:40:VAL:HG23	1.94	0.48
1:A:322:LEU:HD21	1:A:328:ILE:HD12	1.95	0.48
1:A:18:VAL:HB	1:A:19:PRO:HD3	1.96	0.47
1:A:315:TYR:CE1	2:A:501:TYD:C2	2.98	0.47
1:B:387:LEU:C	1:B:387:LEU:CD1	2.87	0.47
1:A:23:ALA:HB2	1:B:26:ALA:HB1	1.95	0.47
1:A:7:PRO:HB3	1:A:17:LEU:CD1	2.44	0.47
1:A:35:ILE:O	1:A:52:PRO:HA	2.15	0.47
1:B:375:PRO:O	1:B:377:THR:N	2.40	0.47
1:A:247:ARG:HB2	3:A:605:HOH:O	2.14	0.47
1:A:416:ILE:O	1:A:417:VAL:C	2.58	0.47
1:B:55:ASP:CG	1:B:110:ARG:HD3	2.40	0.47
1:B:316:VAL:HG21	1:B:321:LEU:HD22	1.96	0.47
1:B:116:MET:HE1	1:B:142:ALA:HB3	1.97	0.47
1:A:234:VAL:O	1:A:236:PRO:HD3	2.15	0.47
1:A:253:GLY:HA3	2:A:501:TYD:H5'1	1.96	0.47
1:A:299:GLU:HB2	1:A:300:VAL:CG2	2.44	0.47
1:B:287:LEU:HD13	1:B:380:GLU:CB	2.35	0.47
1:B:186:ALA:O	1:B:189:ALA:CB	2.63	0.46
1:A:238:TRP:CZ3	1:A:239:LEU:HD13	2.49	0.46
1:A:257:ARG:HE	1:A:257:ARG:CA	2.29	0.46
1:A:260:SER:O	1:A:262:VAL:N	2.49	0.46
1:B:253:GLY:CA	1:B:331:HIS:CE1	2.98	0.46
1:A:179:PRO:O	1:A:180:LEU:C	2.59	0.46
1:B:146:ARG:HG2	1:B:146:ARG:HH11	1.79	0.46
1:B:412:SER:O	1:B:413:PRO:C	2.58	0.46
1:A:232:PRO:HB3	1:B:44:THR:HB	1.97	0.46
1:A:373:LEU:HD21	1:A:386:GLN:HG3	1.97	0.46
1:B:281:LEU:O	1:B:284:ALA:HB3	2.16	0.46
1:A:132:MET:HB3	1:A:132:MET:HE3	1.68	0.45
1:A:286:ARG:NH2	1:A:380:GLU:OE1	2.49	0.45
1:A:299:GLU:HB2	1:A:300:VAL:HA	1.93	0.45
1:B:18:VAL:O	1:B:21:ALA:HB3	2.16	0.45
1:A:159:TRP:O	1:A:162:SER:HB3	2.16	0.45
1:A:33:VAL:HB	1:A:43:VAL:HG11	1.97	0.45
1:A:259:LEU:CA	1:A:260:SER:C	2.89	0.45
1:B:130:ASP:O	1:B:132:MET:N	2.50	0.45
1:B:383:VAL:O	1:B:387:LEU:HB2	2.17	0.45
1:A:333:SER:CB	2:A:501:TYD:O2B	2.64	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:355:TRP:N	1:A:355:TRP:HD1	2.13	0.45
1:A:175:GLN:O	1:A:177:VAL:N	2.45	0.45
1:B:12:SER:O	1:B:13:HIS:C	2.60	0.45
1:B:379:THR:HG22	1:B:382:ASP:CG	2.41	0.45
1:A:252:ARG:NH1	1:A:333:SER:HB3	2.30	0.45
1:B:135:SER:OG	1:B:136:GLY:N	2.50	0.45
1:B:403:ILE:O	1:B:406:GLU:HB2	2.16	0.45
1:B:190:LYS:HE2	1:B:190:LYS:HB3	1.70	0.45
1:A:418:PRO:HA	1:A:421:GLU:HG3	1.99	0.44
1:A:226:PHE:CE2	1:A:338:GLU:HB2	2.52	0.44
1:A:286:ARG:HB2	1:A:384:ARG:HD3	1.99	0.44
1:B:282:ARG:NH1	1:B:286:ARG:HG3	2.32	0.44
1:A:49:THR:HG22	3:A:610:HOH:O	2.17	0.44
1:B:24:LEU:O	1:B:25:ARG:C	2.55	0.44
1:B:117:GLY:HA2	1:B:120:GLU:OE1	2.18	0.44
1:B:218:ASP:O	1:B:219:LEU:HD23	2.16	0.44
1:B:388:ALA:O	1:B:392:ASP:HB2	2.17	0.44
1:A:141:ARG:NH1	1:A:196:ASP:HB2	2.31	0.44
1:B:282:ARG:NH2	1:B:286:ARG:HH11	2.15	0.44
1:A:388:ALA:O	1:A:392:ASP:HB2	2.18	0.44
1:A:300:VAL:O	1:A:305:GLU:N	2.51	0.44
1:A:280:LEU:HD11	1:A:350:LEU:HD22	2.00	0.44
1:A:298:ASP:C	1:A:299:GLU:CG	2.88	0.44
1:B:241:GLU:OE1	1:B:241:GLU:HA	2.16	0.44
1:B:18:VAL:HB	1:B:19:PRO:HD3	1.99	0.43
1:A:322:LEU:HD11	1:A:328:ILE:HD12	2.00	0.43
1:B:254:LEU:CB	1:B:255:THR:CA	2.85	0.43
1:B:4:LEU:HD23	1:B:127:VAL:HG22	2.00	0.43
1:B:188:LEU:HD13	1:B:195:PHE:HA	2.00	0.43
1:B:417:VAL:O	1:B:418:PRO:C	2.60	0.43
1:A:14:PHE:CD2	1:A:42:MET:HE3	2.53	0.43
1:B:289:VAL:CG2	1:B:290:GLU:N	2.80	0.43
1:A:1:MET:HG3	1:A:29:HIS:CD2	2.54	0.43
1:A:422:LYS:C	1:A:422:LYS:HD3	2.44	0.43
1:B:254:LEU:O	2:B:501:TYD:O3A	2.37	0.43
1:B:37:PRO:HD2	1:B:55:ASP:O	2.18	0.43
1:B:254:LEU:HB2	2:B:501:TYD:H6	2.01	0.43
1:B:258:ARG:O	1:B:259:LEU:C	2.62	0.43
1:A:167:TYR:O	1:A:168:GLN:C	2.61	0.43
1:B:13:HIS:HB3	1:B:130:ASP:OD2	2.19	0.43
1:B:230:ASN:HD22	2:B:501:TYD:H2'1	1.84	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:259:LEU:O	1:B:260:SER:C	2.61	0.43
1:A:330:HIS:CE1	1:A:337:GLN:HG2	2.54	0.43
1:B:258:ARG:H	1:B:258:ARG:HG3	1.48	0.43
1:B:297:ASP:OD2	1:B:298:ASP:N	2.52	0.43
1:A:213:MET:CE	1:A:360:ARG:HB3	2.49	0.43
1:A:283:GLY:O	1:A:286:ARG:HG3	2.19	0.43
1:B:230:ASN:HD22	2:B:501:TYD:C2'	2.31	0.43
1:A:111:SER:O	1:A:112:LEU:C	2.62	0.43
1:A:172:PRO:HA	1:A:173:PRO:HD2	1.89	0.43
1:A:338:GLU:O	1:A:342:VAL:HB	2.19	0.42
3:A:602:HOH:O	1:B:47:GLY:HA2	2.18	0.42
1:B:129:TRP:CD2	1:B:137:PRO:HD3	2.53	0.42
1:A:181:GLY:O	1:A:184:LEU:HB2	2.19	0.42
1:B:164:PHE:CZ	1:B:168:GLN:HG3	2.54	0.42
1:B:199:ILE:HD13	1:B:199:ILE:N	2.34	0.42
1:B:116:MET:O	1:B:120:GLU:HG3	2.19	0.42
1:A:299:GLU:CB	1:A:300:VAL:CA	2.92	0.42
1:B:13:HIS:HD1	1:B:130:ASP:CG	2.28	0.42
1:B:251:THR:HG22	1:B:298:ASP:CG	2.45	0.42
1:B:297:ASP:OD1	1:B:313:HIS:N	2.53	0.42
1:A:213:MET:HE3	1:A:360:ARG:HA	2.00	0.42
1:B:119:ALA:O	1:B:120:GLU:C	2.62	0.42
1:B:411:PRO:HB2	1:B:416:ILE:HD13	2.01	0.42
1:B:162:SER:HA	1:B:165:LEU:HB2	2.02	0.42
1:A:295:LEU:O	1:A:314:GLU:HA	2.19	0.42
1:B:129:TRP:HE1	1:B:147:HIS:HD2	1.66	0.42
1:B:258:ARG:HB2	1:B:259:LEU:H	1.49	0.42
1:B:98:THR:C	1:B:103:GLN:HE21	2.27	0.42
1:B:164:PHE:CD2	1:B:164:PHE:C	2.97	0.42
1:A:122:TRP:O	1:A:123:GLN:HB2	2.20	0.42
1:B:419:ARG:NH2	3:B:620:HOH:O	2.49	0.42
1:A:172:PRO:HB2	1:A:175:GLN:HG3	2.02	0.41
1:A:252:ARG:NH1	2:A:501:TYD:O2A	2.46	0.41
1:A:345:VAL:HA	1:A:346:PRO:HD3	1.95	0.41
1:B:287:LEU:HD11	1:B:290:GLU:OE1	2.20	0.41
1:A:371:LEU:HD21	1:A:396:PHE:CZ	2.54	0.41
1:B:298:ASP:O	1:B:299:GLU:CB	2.68	0.41
1:A:212:TRP:CZ3	1:A:213:MET:HG3	2.55	0.41
1:B:316:VAL:HG21	1:B:321:LEU:CD2	2.50	0.41
1:A:362:GLU:O	1:A:365:ALA:HB3	2.20	0.41
1:B:4:LEU:HD23	1:B:127:VAL:CG2	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:118:PHE:O	1:A:119:ALA:C	2.63	0.41
1:A:298:ASP:O	1:A:299:GLU:HG3	2.20	0.41
1:A:322:LEU:HD11	1:A:328:ILE:CD1	2.50	0.41
1:B:141:ARG:CG	1:B:199:ILE:CD1	2.95	0.41
1:B:245:LYS:HG2	1:B:294:THR:HG22	2.02	0.41
1:B:420:LEU:O	1:B:421:GLU:C	2.63	0.41
1:B:20:LEU:O	1:B:23:ALA:HB3	2.21	0.41
1:B:116:MET:HE1	1:B:142:ALA:CB	2.50	0.41
1:B:128:VAL:HA	1:B:148:VAL:O	2.21	0.41
1:B:289:VAL:HG11	1:B:307:PRO:HG2	2.02	0.41
1:A:53:VAL:HG22	1:A:114:ASP:HB3	2.01	0.41
1:B:252:ARG:O	1:B:331:HIS:HB3	2.21	0.41
1:A:166:GLU:O	1:A:169:GLU:CB	2.70	0.40
1:B:55:ASP:OD2	1:B:110:ARG:HD3	2.20	0.40
1:B:253:GLY:H	1:B:254:LEU:CD2	2.22	0.40
1:A:223:SER:N	3:A:633:HOH:O	2.53	0.40
1:A:295:LEU:N	1:A:313:HIS:O	2.54	0.40
1:A:338:GLU:HA	1:A:341:THR:HB	2.02	0.40
1:A:119:ALA:HB1	1:A:143:LEU:CD1	2.51	0.40
1:A:195:PHE:CG	1:A:196:ASP:N	2.88	0.40
1:B:136:GLY:N	1:B:137:PRO:HD2	2.36	0.40
1:B:238:TRP:CH2	1:B:313:HIS:ND1	2.90	0.40
1:A:32:ARG:NH1	1:B:320:GLU:HG3	2.37	0.40
1:A:358:SER:O	1:A:362:GLU:N	2.50	0.40
1:B:364:LEU:HD13	1:B:369:ALA:HB3	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	365/455 (80%)	308 (84%)	42 (12%)	15 (4%)	2 14

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	367/455 (81%)	298 (81%)	56 (15%)	13 (4%)	3	16
All	All	732/910 (80%)	606 (83%)	98 (13%)	28 (4%)	2	15

All (28) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	135	SER
1	A	257	ARG
1	A	258	ARG
1	A	259	LEU
1	A	261	ARG
1	A	274	GLN
1	B	0	HIS
1	B	100	ALA
1	B	256	LYS
1	B	258	ARG
1	B	299	GLU
1	B	305	GLU
1	B	351	PRO
1	A	176	ARG
1	A	256	LYS
1	A	298	ASP
1	A	380	GLU
1	B	259	LEU
1	B	376	ALA
1	A	299	GLU
1	B	190	LYS
1	A	365	ALA
1	A	366	ASP
1	B	12	SER
1	B	298	ASP
1	A	173	PRO
1	A	217	VAL
1	B	304	GLY

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	319/386 (83%)	267 (84%)	52 (16%)	2	10
1	B	316/386 (82%)	271 (86%)	45 (14%)	3	15
All	All	635/772 (82%)	538 (85%)	97 (15%)	3	12

All (97) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	ARG
1	A	44	THR
1	A	49	THR
1	A	53	VAL
1	A	57	LEU
1	A	60	ILE
1	A	62	LEU
1	A	104	LEU
1	A	109	ASP
1	A	132	MET
1	A	150	MET
1	A	157	SER
1	A	171	LYS
1	A	177	VAL
1	A	209	ILE
1	A	217	VAL
1	A	237	GLU
1	A	247	ARG
1	A	252	ARG
1	A	254	LEU
1	A	257	ARG
1	A	259	LEU
1	A	277	VAL
1	A	281	LEU
1	A	295	LEU
1	A	298	ASP
1	A	299	GLU
1	A	305	GLU
1	A	306	LEU
1	A	311	ARG
1	A	316	VAL
1	A	322	LEU
1	A	334	THR
1	A	335	THR

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Mol	Chain	Res	Type
1	A	336	THR
1	A	337	GLN
1	A	338	GLU
1	A	343	ASN
1	A	350	LEU
1	A	355	TRP
1	A	358	SER
1	A	363	LEU
1	A	371	LEU
1	A	373	LEU
1	A	381	ASP
1	A	382	ASP
1	A	389	ARG
1	A	395	SER
1	A	405	ARG
1	A	410	SER
1	A	422	LYS
1	A	424	VAL
1	B	4	LEU
1	B	32	ARG
1	B	38	ASN
1	B	53	VAL
1	B	57	LEU
1	B	104	LEU
1	B	111	SER
1	B	112	LEU
1	B	141	ARG
1	B	148	VAL
1	B	150	MET
1	B	165	LEU
1	B	184	LEU
1	B	217	VAL
1	B	223	SER
1	B	235	LEU
1	B	239	LEU
1	B	245	LYS
1	B	247	ARG
1	B	254	LEU
1	B	257	ARG
1	B	258	ARG
1	B	280	LEU
1	B	287	LEU

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Mol	Chain	Res	Type
1	B	288	ASP
1	B	289	VAL
1	B	291	VAL
1	B	292	ILE
1	B	294	THR
1	B	299	GLU
1	B	301	ARG
1	B	303	MET
1	B	306	LEU
1	B	314	GLU
1	B	316	VAL
1	B	333	SER
1	B	337	GLN
1	B	349	ILE
1	B	353	THR
1	B	364	LEU
1	B	377	THR
1	B	387	LEU
1	B	392	ASP
1	B	416	ILE
1	B	426	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	29	HIS
1	A	175	GLN
1	A	331	HIS
1	A	337	GLN
1	A	399	ASN
1	B	16	ASN
1	B	38	ASN
1	B	103	GLN
1	B	147	HIS
1	B	230	ASN
1	B	347	GLN
1	B	399	ASN

5.3.3 RNA ⓘ

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](#)

2 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	TYD	A	501	-	25,26,26	1.34	5 (20%)	38,40,40	1.83	10 (26%)
2	TYD	B	501	-	25,26,26	1.54	6 (24%)	38,40,40	2.17	12 (31%)

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
2	TYD	A	501	-	-	1/16/28/28	0/2/2/2
2	TYD	B	501	-	-	7/16/28/28	0/2/2/2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	TYD	C6-C5	3.62	1.40	1.34
2	B	501	TYD	C2-N1	3.53	1.44	1.38
2	B	501	TYD	C4-C5	3.02	1.49	1.44
2	A	501	TYD	PA-O3A	3.00	1.62	1.59
2	A	501	TYD	C4-C5	2.60	1.49	1.44
2	B	501	TYD	PA-O3A	2.48	1.62	1.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	TYD	C6-C5	2.36	1.38	1.34
2	A	501	TYD	C2-N3	-2.31	1.33	1.38
2	A	501	TYD	C4-N3	-2.23	1.34	1.38
2	B	501	TYD	C4-N3	-2.23	1.34	1.38
2	B	501	TYD	C6-N1	-2.20	1.34	1.38

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	TYD	N3-C2-N1	6.52	123.37	114.89
2	B	501	TYD	C4-N3-C2	-5.26	120.44	127.34
2	A	501	TYD	C5M-C5-C4	4.34	123.41	118.78
2	B	501	TYD	O4'-C1'-N1	3.88	114.75	107.86
2	A	501	TYD	C5-C4-N3	3.77	118.60	115.32
2	B	501	TYD	O4-C4-C5	-3.64	120.75	124.92
2	A	501	TYD	C4-N3-C2	-3.61	122.61	127.34
2	A	501	TYD	O4'-C1'-N1	3.60	114.25	107.86
2	A	501	TYD	N3-C2-N1	3.52	119.48	114.89
2	B	501	TYD	C5-C6-N1	-3.41	119.61	123.31
2	A	501	TYD	C5-C6-N1	-2.99	120.06	123.31
2	B	501	TYD	C6-C5-C4	2.95	120.45	118.02
2	B	501	TYD	O2-C2-N3	-2.94	116.07	121.49
2	A	501	TYD	C5M-C5-C6	-2.88	118.96	122.85
2	B	501	TYD	C6-N1-C2	-2.63	118.68	121.30
2	B	501	TYD	C5-C4-N3	2.43	117.44	115.32
2	B	501	TYD	C3'-C2'-C1'	2.29	108.21	102.60
2	B	501	TYD	C5M-C5-C6	-2.29	119.75	122.85
2	B	501	TYD	C1'-N1-C2	2.15	121.87	117.66
2	A	501	TYD	O3A-PB-O1B	-2.07	100.15	111.04
2	A	501	TYD	C2'-C1'-N1	-2.06	108.66	113.81
2	A	501	TYD	O2B-PB-O1B	2.02	118.71	110.83

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	TYD	C5'-O5'-PA-O1A
2	B	501	TYD	C5'-O5'-PA-O2A
2	B	501	TYD	C5'-O5'-PA-O3A
2	B	501	TYD	C3'-C4'-C5'-O5'
2	B	501	TYD	O4'-C4'-C5'-O5'
2	B	501	TYD	C2'-C1'-N1-C2

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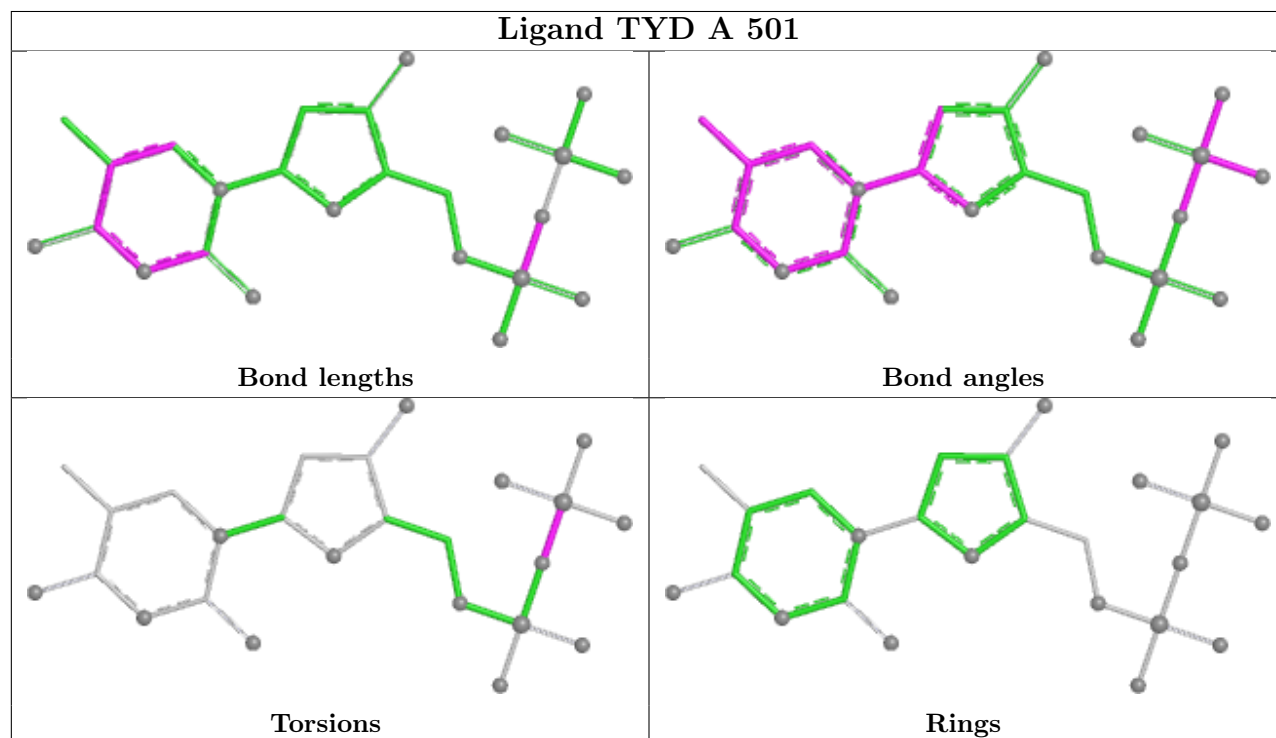
Mol	Chain	Res	Type	Atoms
2	B	501	TYD	C2'-C1'-N1-C6
2	A	501	TYD	PA-O3A-PB-O3B

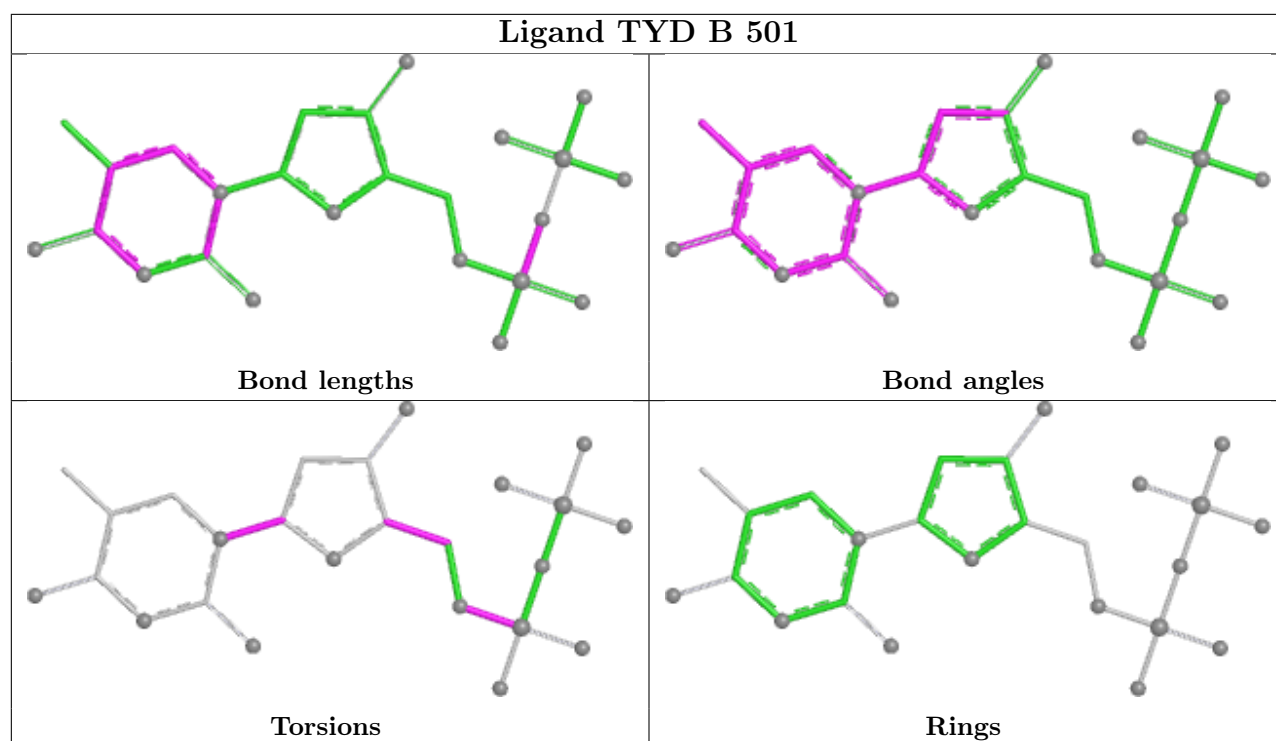
There are no ring outliers.

2 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	501	TYD	5	0
2	B	501	TYD	8	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.





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	375/455 (82%)	-0.26	5 (1%)	75 55	32, 59, 91, 119	0
1	B	373/455 (81%)	-0.28	3 (0%)	82 66	29, 53, 95, 116	0
All	All	748/910 (82%)	-0.27	8 (1%)	78 60	29, 56, 94, 119	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	262	VAL	2.9
1	A	255	THR	2.8
1	A	355	TRP	2.6
1	A	60	ILE	2.6
1	B	58	ASP	2.6
1	B	385	GLY	2.2
1	A	273	GLU	2.2
1	B	280	LEU	2.1

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.

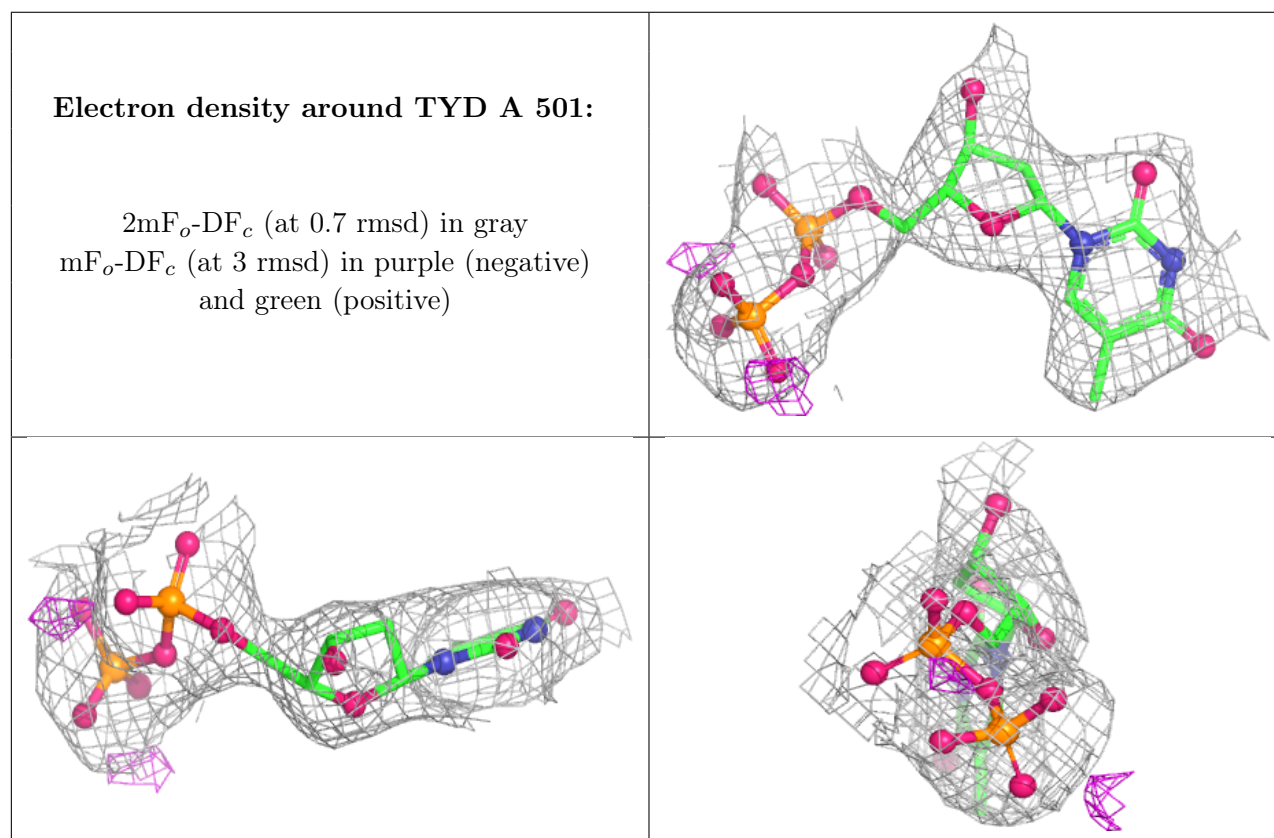
6.4 Ligands [i](#)

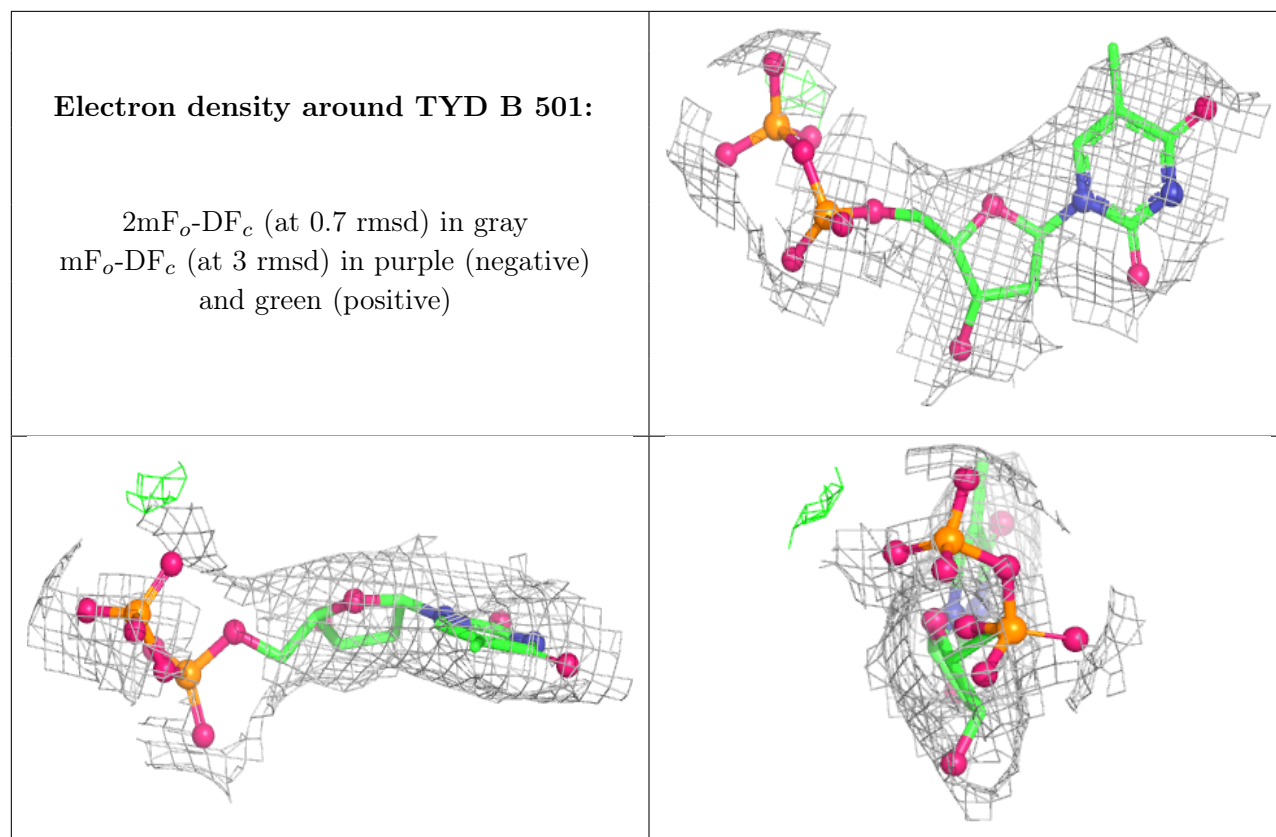
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

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(Å ²)	Q<0.9
2	TYD	A	501	25/25	0.95	0.08	50,65,71,77	0
2	TYD	B	501	25/25	0.95	0.08	59,72,78,80	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.





6.5 Other polymers [i](#)

There are no such residues in this entry.