



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 05:10 PM GMT

PDB ID : 4HFI  
Title : The GLIC pentameric Ligand-Gated Ion Channel at 2.4 Å resolution  
Authors : Sauguet, L.; Corringer, P.J.; Delarue, M.  
Deposited on : 2012-10-05  
Resolution : 2.40 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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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 : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

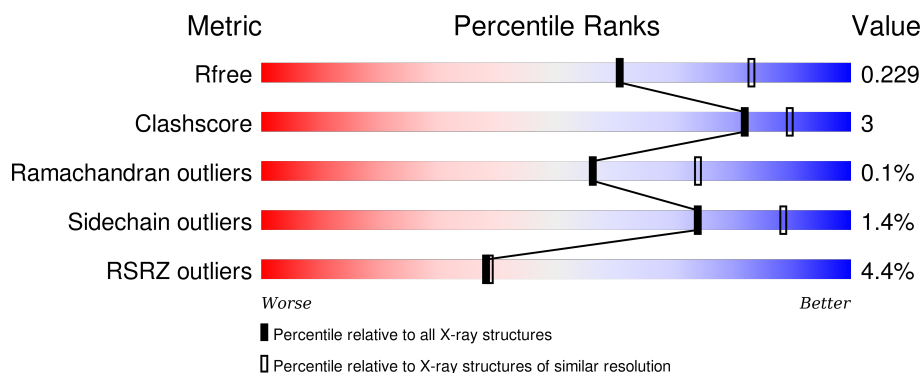
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.40 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))
$R_{free}$	91344	2919 (2.40-2.40)
Clashscore	102246	3407 (2.40-2.40)
Ramachandran outliers	100387	3351 (2.40-2.40)
Sidechain outliers	100360	3352 (2.40-2.40)
RSRZ outliers	91569	2928 (2.40-2.40)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	317	<div> <div>4%</div> <div>89%</div> <div>9%</div> <div>.</div> </div>
1	B	317	<div> <div>4%</div> <div>91%</div> <div>7%</div> <div>.</div> </div>
1	C	317	<div> <div>3%</div> <div>89%</div> <div>9%</div> <div>.</div> </div>
1	D	317	<div> <div>6%</div> <div>90%</div> <div>8%</div> <div>.</div> </div>
1	E	317	<div> <div>4%</div> <div>91%</div> <div>8%</div> <div>.</div> </div>

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	ACT	A	401	-	-	-	X
2	ACT	A	410	-	-	-	X
2	ACT	B	401	-	-	-	X
2	ACT	C	401	-	-	-	X
2	ACT	D	401	-	-	-	X
2	ACT	D	407	-	-	-	X
2	ACT	E	401	-	-	-	X
3	PLC	A	402	-	-	-	X
3	PLC	A	403	-	-	-	X
3	PLC	B	402	-	-	-	X
3	PLC	B	403	-	-	-	X
3	PLC	C	402	-	-	-	X
3	PLC	C	403	-	-	-	X
3	PLC	D	402	-	-	-	X
3	PLC	D	403	-	-	-	X
3	PLC	E	402	-	-	-	X
3	PLC	E	403	-	-	-	X
6	LMT	A	412	-	-	-	X
6	LMT	B	408	-	-	-	X
6	LMT	C	408	-	-	-	X
6	LMT	D	408	-	-	-	X

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 13762 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 Proton-gated ion channel.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	311	Total	C	N	O	S	0	3	0
			2545	1677	406	458	4			
1	B	311	Total	C	N	O	S	0	3	0
			2542	1676	405	457	4			
1	C	311	Total	C	N	O	S	0	2	0
			2537	1673	405	455	4			
1	D	311	Total	C	N	O	S	0	5	0
			2553	1683	406	460	4			
1	E	311	Total	C	N	O	S	0	3	0
			2543	1678	406	455	4			

There are 5 discrepancies between the modelled and reference sequences:

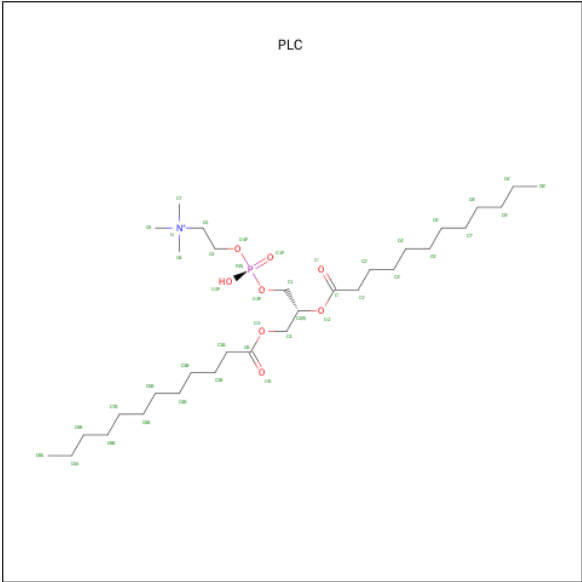
Chain	Residue	Modelled	Actual	Comment	Reference
A	1	ALA	-	EXPRESSION TAG	UNP Q7NDN8
B	1	ALA	-	EXPRESSION TAG	UNP Q7NDN8
C	1	ALA	-	EXPRESSION TAG	UNP Q7NDN8
D	1	ALA	-	EXPRESSION TAG	UNP Q7NDN8
E	1	ALA	-	EXPRESSION TAG	UNP Q7NDN8

- Molecule 2 is ACETATE ION (three-letter code: ACT) (formula: C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			4	2	2		
2	A	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	B	1	Total	C	O	0	0
			4	2	2		
2	C	1	Total	C	O	0	0
			4	2	2		
2	C	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	0
			4	2	2		
2	D	1	Total	C	O	0	0
			4	2	2		
2	E	1	Total	C	O	0	0
			4	2	2		
2	E	1	Total	C	O	0	0
			4	2	2		

- Molecule 3 is DIUNDECYL PHOSPHATIDYL CHOLINE (three-letter code: PLC) (formula:  $C_{32}H_{65}NO_8P$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
3	A	1	Total 34	C 24	N 1	O 8	P 1	0	0
3	A	1	Total C 24 24					0	0
3	A	1	Total C 12 12					0	0
3	B	1	Total 34	C 24	N 1	O 8	P 1	0	0
3	B	1	Total C 24 24					0	0
3	B	1	Total C 12 12					0	0
3	C	1	Total 34	C 24	N 1	O 8	P 1	0	0
3	C	1	Total C 24 24					0	0
3	C	1	Total C 12 12					0	0
3	D	1	Total 34	C 24	N 1	O 8	P 1	0	0
3	D	1	Total C 24 24					0	0
3	D	1	Total C 12 12					0	0
3	E	1	Total 34	C 24	N 1	O 8	P 1	0	0
3	E	1	Total C 24 24					0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	1	Total C 12 12	0	0

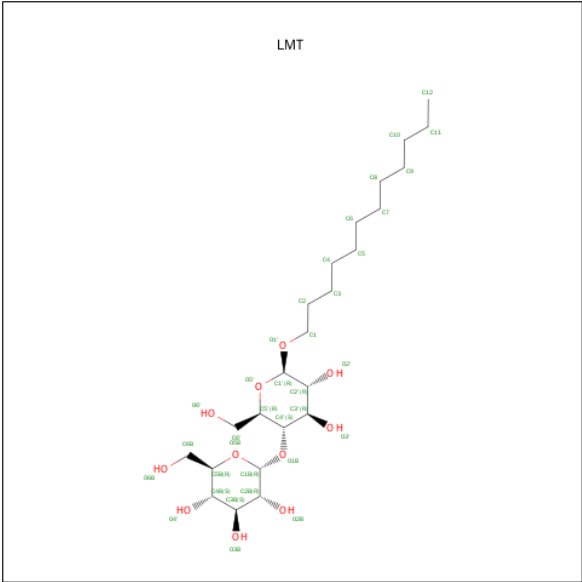
- Molecule 4 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total Cl 1 1	0	0
4	A	3	Total Cl 3 3	0	0
4	D	1	Total Cl 1 1	0	0
4	C	1	Total Cl 1 1	0	0
4	E	1	Total Cl 1 1	0	0

- Molecule 5 is SODIUM ION (three-letter code: NA) (formula: Na).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	B	1	Total Na 1 1	0	0
5	A	2	Total Na 2 2	0	0
5	D	1	Total Na 1 1	0	0
5	C	1	Total Na 1 1	0	0
5	E	1	Total Na 1 1	0	0

- Molecule 6 is DODECYL-BETA-D-MALTOSIDE (three-letter code: LMT) (formula: C<sub>24</sub>H<sub>46</sub>O<sub>11</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C 12 12	0	0
6	A	1	Total C 12 12	0	0
6	B	1	Total C 12 12	0	0
6	C	1	Total C 12 12	0	0
6	D	1	Total C 12 12	0	0
6	E	1	Total C 12 12	0	0

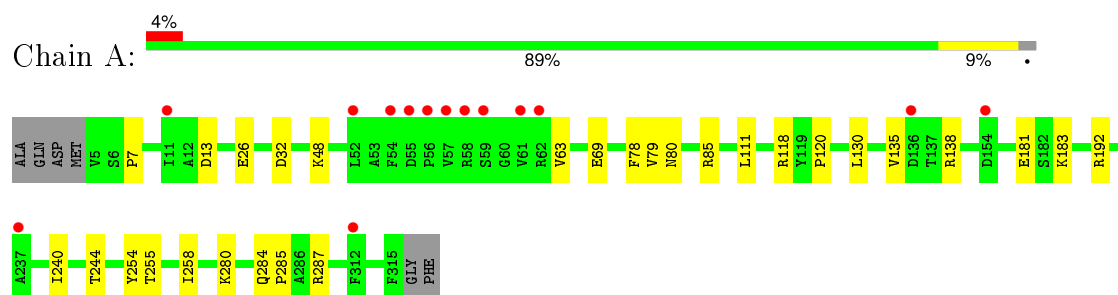
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	125	Total O 125 125	0	0
7	B	123	Total O 123 123	0	0
7	C	106	Total O 106 106	0	0
7	D	105	Total O 105 105	0	0
7	E	108	Total O 108 108	0	0

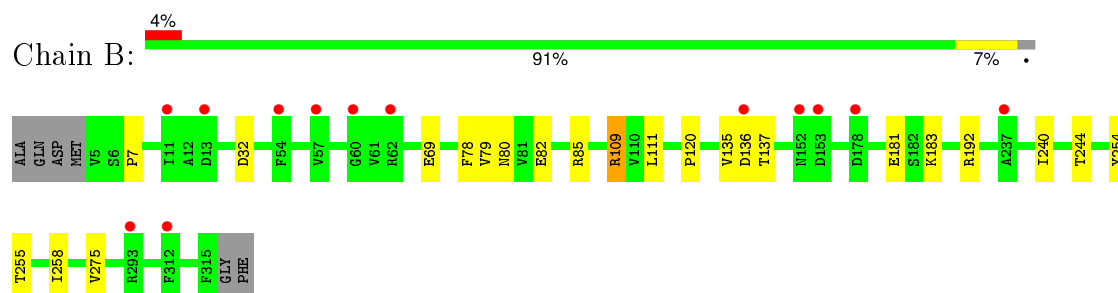
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

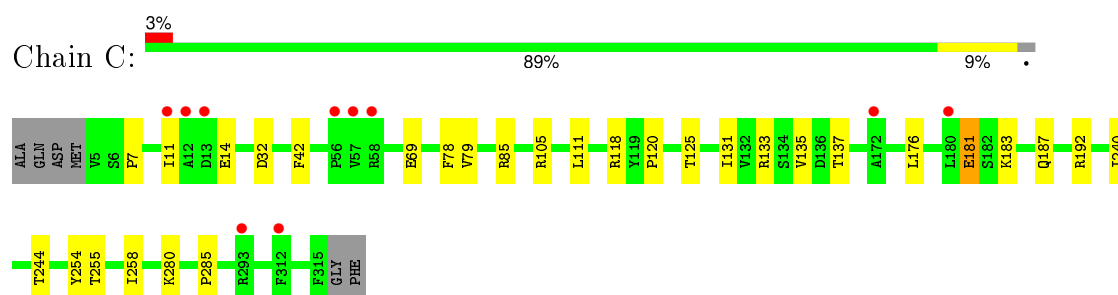
- Molecule 1: Proton-gated ion channel



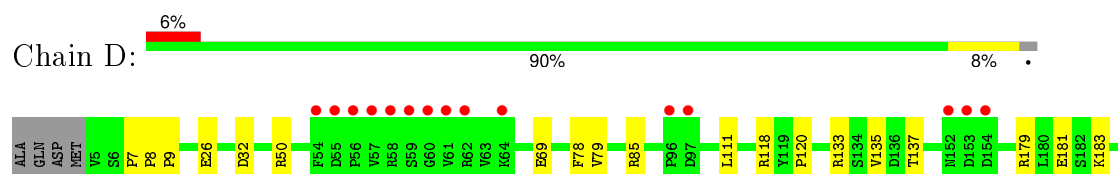
- Molecule 1: Proton-gated ion channel



- Molecule 1: Proton-gated ion channel

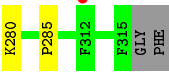
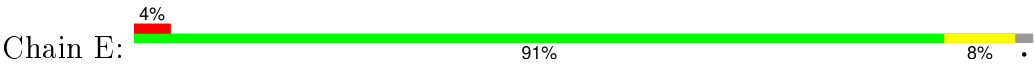


- Molecule 1: Proton-gated ion channel





● Molecule 1: Proton-gated ion channel



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	181.89Å 133.20Å 160.20Å 90.00° 102.74° 90.00°	Depositor
Resolution (Å)	54.05 – 2.40 54.05 – 2.40	Depositor EDS
% Data completeness (in resolution range)	99.0 (54.05-2.40) 98.9 (54.05-2.40)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	0.04	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.99 (at 2.39Å)	Xtriage
Refinement program	BUSTER 2.11.2	Depositor
R, $R_{free}$	0.205 , 0.216 0.218 , 0.229	Depositor DCC
$R_{free}$ test set	7215 reflections (5.29%)	DCC
Wilson B-factor (Å <sup>2</sup> )	47.2	Xtriage
Anisotropy	0.369	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 55.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	2 of 143681 reflections (0.001%)	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	13762	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.91% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: NA, ACT, LMT, PLC, CL

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	0.39	0/2619	0.62	0/3579
1	B	0.40	0/2619	0.63	0/3579
1	C	0.39	0/2611	0.62	0/3568
1	D	0.39	0/2636	0.62	0/3602
1	E	0.39	0/2620	0.63	0/3579
All	All	0.39	0/13105	0.62	0/17907

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	2545	0	2567	17	0
1	B	2542	0	2568	15	0
1	C	2537	0	2564	20	0
1	D	2553	0	2580	16	0
1	E	2543	0	2577	19	0
2	A	8	0	6	0	0
2	B	8	0	6	0	0
2	C	8	0	6	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	8	0	6	1	0
2	E	8	0	6	0	0
3	A	70	0	111	3	0
3	B	70	0	111	0	0
3	C	70	0	111	1	0
3	D	70	0	111	2	0
3	E	70	0	111	1	0
4	A	3	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
5	A	2	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
6	A	24	0	46	3	0
6	B	12	0	23	1	0
6	C	12	0	23	1	0
6	D	12	0	23	0	0
6	E	12	0	23	0	0
7	A	125	0	0	0	0
7	B	123	0	0	0	0
7	C	106	0	0	2	0
7	D	105	0	0	0	0
7	E	108	0	0	0	0
All	All	13762	0	13579	85	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 (85) 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:80:ASN:HA	1:E:26[B]:GLU:OE2	1.90	0.71
1:C:133:ARG:NH1	1:C:176:LEU:O	2.26	0.69
1:C:125:THR:HG23	7:C:527:HOH:O	1.93	0.69
1:B:7:PRO:HG2	1:B:137:THR:CG2	2.26	0.64
1:B:7:PRO:HG2	1:B:137:THR:HG21	1.79	0.62
1:A:26[B]:GLU:OE2	1:B:80:ASN:HA	2.03	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:82:GLU:HG3	1:B:109:ARG:HG2	1.86	0.58
1:B:78:PHE:CE2	1:B:85:ARG:HD3	2.40	0.57
1:A:79:VAL:O	1:E:26[B]:GLU:OE2	2.24	0.56
1:D:78:PHE:CE2	1:D:85:ARG:HD3	2.41	0.56
1:B:7:PRO:HG3	1:B:135:VAL:HG21	1.88	0.56
1:A:78:PHE:CE2	1:A:85:ARG:HD3	2.41	0.56
1:C:78:PHE:CE2	1:C:85:ARG:HD3	2.42	0.55
1:E:78:PHE:CE2	1:E:85:ARG:HD3	2.42	0.54
1:B:78:PHE:HE2	1:B:85:ARG:HD3	1.72	0.54
1:D:78:PHE:HE2	1:D:85:ARG:HD3	1.73	0.53
1:E:280[A]:LYS:HD3	1:E:285:PRO:HB3	1.90	0.53
1:E:78:PHE:HE2	1:E:85:ARG:HD3	1.74	0.53
1:A:7:PRO:HG3	1:A:135:VAL:HG21	1.89	0.53
1:D:79:VAL:HG21	1:D:183:LYS:HD2	1.91	0.52
1:A:63:VAL:HG21	1:B:136:ASP:HB3	1.90	0.52
1:A:280[A]:LYS:HD3	1:A:285:PRO:HB3	1.90	0.52
1:A:78:PHE:HE2	1:A:85:ARG:HD3	1.74	0.52
1:C:78:PHE:HE2	1:C:85:ARG:HD3	1.75	0.51
1:A:79:VAL:HG21	1:A:183:LYS:HD2	1.91	0.51
1:C:280[A]:LYS:HD3	1:C:285:PRO:HB3	1.92	0.51
1:C:79:VAL:HG21	1:C:183:LYS:HD2	1.92	0.51
1:C:7:PRO:HG3	1:C:135:VAL:HG21	1.93	0.51
1:E:79:VAL:HG21	1:E:183:LYS:HD2	1.92	0.50
1:D:7:PRO:HG3	1:D:135:VAL:HG21	1.93	0.50
1:B:79:VAL:HG21	1:B:183:LYS:HD2	1.92	0.50
1:C:105:ARG:NH1	2:D:401:ACT:OXT	2.43	0.49
1:B:120:PRO:HD3	1:B:255:THR:OG1	2.13	0.49
1:C:120:PRO:HD3	1:C:255:THR:OG1	2.13	0.49
1:A:120:PRO:HD3	1:A:255:THR:OG1	2.12	0.49
1:D:120:PRO:HD3	1:D:255:THR:OG1	2.13	0.49
1:C:32:ASP:CG	1:C:192:ARG:HH22	2.17	0.48
1:D:26[B]:GLU:OE2	1:E:79:VAL:O	2.30	0.48
1:A:32:ASP:CG	1:A:192:ARG:HH22	2.16	0.48
1:B:32:ASP:CG	1:B:192:ARG:HH22	2.17	0.48
1:E:32:ASP:CG	1:E:192:ARG:HH22	2.18	0.47
1:D:32:ASP:CG	1:D:192:ARG:HH22	2.16	0.47
1:E:120:PRO:HD3	1:E:255:THR:OG1	2.15	0.46
1:A:135:VAL:HG23	1:A:138:ARG:H	1.80	0.46
3:D:403:PLC:HT'2	1:E:275:VAL:HG22	1.98	0.46
6:A:411:LMT:H52	6:C:408:LMT:H82	1.97	0.45
1:E:7:PRO:HG3	1:E:135:VAL:HG21	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:118:ARG:HH12	3:C:402:PLC:H72	1.82	0.45
1:E:7:PRO:CG	1:E:137:THR:CG2	2.94	0.45
1:D:7:PRO:HG2	1:D:137:THR:HG21	2.00	0.44
6:A:411:LMT:H62	6:A:412:LMT:H92	1.98	0.44
1:C:7:PRO:HG2	1:C:137:THR:HG21	1.99	0.44
1:C:7:PRO:CG	1:C:137:THR:CG2	2.95	0.44
1:B:7:PRO:CG	1:B:137:THR:CG2	2.94	0.43
1:A:118:ARG:HH12	3:A:402:PLC:H72	1.83	0.43
1:D:7:PRO:HG2	1:D:137:THR:CG2	2.49	0.43
1:C:7:PRO:HG2	1:C:137:THR:CG2	2.49	0.43
1:C:131:ILE:HD11	1:C:181:GLU:HG2	2.00	0.43
3:A:402:PLC:H1'1	3:A:404:PLC:H8'2	2.01	0.42
1:D:8:PRO:HA	1:D:9:PRO:HD3	1.97	0.42
1:A:284:GLN:NE2	1:A:287:ARG:HH11	2.17	0.42
1:E:7:PRO:CG	1:E:137:THR:HG21	2.49	0.42
1:E:7:PRO:HG2	1:E:137:THR:HG21	2.01	0.42
1:B:240:ILE:O	1:B:244:THR:HG23	2.20	0.42
6:A:411:LMT:H51	6:B:408:LMT:H61	2.01	0.42
1:E:254:TYR:CZ	1:E:258:ILE:HD11	2.55	0.42
3:A:403:PLC:HT'2	1:B:275:VAL:HG22	2.02	0.42
1:A:130:LEU:HA	1:A:130:LEU:HD23	1.94	0.42
1:D:26[B]:GLU:OE2	1:E:80:ASN:HA	2.20	0.42
1:C:11:ILE:HG13	1:C:14:GLU:OE2	2.19	0.42
1:A:240:ILE:O	1:A:244:THR:HG23	2.20	0.41
1:C:7:PRO:CG	1:C:137:THR:HG21	2.49	0.41
1:A:254:TYR:CZ	1:A:258:ILE:HD11	2.55	0.41
1:D:254:TYR:CZ	1:D:258:ILE:HD11	2.55	0.41
1:E:7:PRO:HG2	1:E:137:THR:CG2	2.50	0.41
1:C:240:ILE:O	1:C:244:THR:HG23	2.20	0.41
1:E:240:ILE:O	1:E:244:THR:HG23	2.21	0.41
1:B:254:TYR:CZ	1:B:258:ILE:HD11	2.56	0.41
1:D:133:ARG:CZ	1:D:179:ARG:HB2	2.50	0.41
1:D:7:PRO:CG	1:D:137:THR:CG2	2.99	0.41
1:C:254:TYR:CZ	1:C:258:ILE:HD11	2.55	0.41
1:D:240:ILE:O	1:D:244:THR:HG23	2.20	0.40
1:E:118:ARG:HH12	3:E:402:PLC:H72	1.85	0.40
1:D:118:ARG:HH12	3:D:402:PLC:H72	1.87	0.40
1:C:187:GLN:HB3	7:C:527:HOH:O	2.21	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	312/317 (98%)	305 (98%)	6 (2%)	1 (0%)	46	63
1	B	312/317 (98%)	304 (97%)	8 (3%)	0	100	100
1	C	311/317 (98%)	303 (97%)	8 (3%)	0	100	100
1	D	314/317 (99%)	307 (98%)	7 (2%)	0	100	100
1	E	312/317 (98%)	305 (98%)	7 (2%)	0	100	100
All	All	1561/1585 (98%)	1524 (98%)	36 (2%)	1 (0%)	56	74

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	13	ASP

### 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	283/284 (100%)	279 (99%)	4 (1%)	74	88
1	B	283/284 (100%)	279 (99%)	4 (1%)	74	88
1	C	282/284 (99%)	278 (99%)	4 (1%)	74	88
1	D	285/284 (100%)	281 (99%)	4 (1%)	74	88
1	E	283/284 (100%)	280 (99%)	3 (1%)	80	92
All	All	1416/1420 (100%)	1397 (99%)	19 (1%)	74	89

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	LYS
1	A	69	GLU
1	A	111	LEU
1	A	181	GLU
1	B	69	GLU
1	B	109	ARG
1	B	111	LEU
1	B	181	GLU
1	C	42	PHE
1	C	69	GLU
1	C	111	LEU
1	C	181	GLU
1	D	50	ARG
1	D	69	GLU
1	D	111	LEU
1	D	181	GLU
1	E	48	LYS
1	E	69	GLU
1	E	111	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	284	GLN
1	A	307	ASN
1	B	307	ASN
1	C	307	ASN
1	D	307	ASN
1	E	284	GLN
1	E	307	ASN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

Of 44 ligands modelled in this entry, 13 are monoatomic - leaving 31 for Mogul analysis.

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	ACT	A	401	-	1,3,3	4.56	1 (100%)	0,3,3	0.00	-
3	PLC	A	402	-	33,33,41	1.18	3 (9%)	37,41,49	1.44	5 (13%)
3	PLC	A	403	-	22,22,41	0.39	0	20,20,49	0.49	0
3	PLC	A	404	-	11,11,41	0.38	0	10,10,49	0.58	0
2	ACT	A	410	-	1,3,3	4.02	1 (100%)	0,3,3	0.00	-
6	LMT	A	411	-	11,11,36	0.35	0	10,10,47	0.62	0
6	LMT	A	412	-	11,11,36	0.36	0	10,10,47	0.62	0
2	ACT	B	401	-	1,3,3	4.41	1 (100%)	0,3,3	0.00	-
3	PLC	B	402	-	33,33,41	1.17	2 (6%)	37,41,49	1.41	5 (13%)
3	PLC	B	403	-	22,22,41	0.40	0	20,20,49	0.47	0
3	PLC	B	404	-	11,11,41	0.37	0	10,10,49	0.57	0
2	ACT	B	407	-	1,3,3	4.15	1 (100%)	0,3,3	0.00	-
6	LMT	B	408	-	11,11,36	0.35	0	10,10,47	0.64	0
2	ACT	C	401	-	1,3,3	4.55	1 (100%)	0,3,3	0.00	-
3	PLC	C	402	-	33,33,41	1.18	4 (12%)	37,41,49	1.40	5 (13%)
3	PLC	C	403	-	22,22,41	0.41	0	20,20,49	0.47	0
3	PLC	C	404	-	11,11,41	0.39	0	10,10,49	0.58	0
2	ACT	C	407	-	1,3,3	4.04	1 (100%)	0,3,3	0.00	-
6	LMT	C	408	-	11,11,36	0.38	0	10,10,47	0.59	0
2	ACT	D	401	-	1,3,3	4.47	1 (100%)	0,3,3	0.00	-
3	PLC	D	402	-	33,33,41	1.17	3 (9%)	37,41,49	1.41	5 (13%)
3	PLC	D	403	-	22,22,41	0.42	0	20,20,49	0.46	0
3	PLC	D	404	-	11,11,41	0.35	0	10,10,49	0.62	0
2	ACT	D	407	-	1,3,3	3.93	1 (100%)	0,3,3	0.00	-

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	LMT	D	408	-	11,11,36	0.36	0	10,10,47	0.60	0
2	ACT	E	401	-	1,3,3	4.57	1 (100%)	0,3,3	0.00	-
3	PLC	E	402	-	33,33,41	1.20	4 (12%)	37,41,49	1.40	5 (13%)
3	PLC	E	403	-	22,22,41	0.41	0	20,20,49	0.49	0
3	PLC	E	404	-	11,11,41	0.37	0	10,10,49	0.59	0
2	ACT	E	407	-	1,3,3	4.25	1 (100%)	0,3,3	0.00	-
6	LMT	E	408	-	11,11,36	0.30	0	10,10,47	0.63	0

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	ACT	A	401	-	-	0/0/0/0	0/0/0/0
3	PLC	A	402	-	-	0/37/37/45	0/0/0/0
3	PLC	A	403	-	-	0/18/18/45	0/0/0/0
3	PLC	A	404	-	-	0/9/9/45	0/0/0/0
2	ACT	A	410	-	-	0/0/0/0	0/0/0/0
6	LMT	A	411	-	-	0/9/9/61	0/0/0/2
6	LMT	A	412	-	-	0/9/9/61	0/0/0/2
2	ACT	B	401	-	-	0/0/0/0	0/0/0/0
3	PLC	B	402	-	-	0/37/37/45	0/0/0/0
3	PLC	B	403	-	-	0/18/18/45	0/0/0/0
3	PLC	B	404	-	-	0/9/9/45	0/0/0/0
2	ACT	B	407	-	-	0/0/0/0	0/0/0/0
6	LMT	B	408	-	-	0/9/9/61	0/0/0/2
2	ACT	C	401	-	-	0/0/0/0	0/0/0/0
3	PLC	C	402	-	-	0/37/37/45	0/0/0/0
3	PLC	C	403	-	-	0/18/18/45	0/0/0/0
3	PLC	C	404	-	-	0/9/9/45	0/0/0/0
2	ACT	C	407	-	-	0/0/0/0	0/0/0/0
6	LMT	C	408	-	-	0/9/9/61	0/0/0/2
2	ACT	D	401	-	-	0/0/0/0	0/0/0/0
3	PLC	D	402	-	-	0/37/37/45	0/0/0/0
3	PLC	D	403	-	-	0/18/18/45	0/0/0/0
3	PLC	D	404	-	-	0/9/9/45	0/0/0/0
2	ACT	D	407	-	-	0/0/0/0	0/0/0/0
6	LMT	D	408	-	-	0/9/9/61	0/0/0/2
2	ACT	E	401	-	-	0/0/0/0	0/0/0/0
3	PLC	E	402	-	-	0/37/37/45	0/0/0/0
3	PLC	E	403	-	-	0/18/18/45	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PLC	E	404	-	-	0/9/9/45	0/0/0/0
2	ACT	E	407	-	-	0/0/0/0	0/0/0/0
6	LMT	E	408	-	-	0/9/9/61	0/0/0/2

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	402	PLC	P-O1P	2.00	1.58	1.51
3	D	402	PLC	O3-CB	2.03	1.39	1.33
3	E	402	PLC	O3-CB	2.03	1.39	1.33
3	E	402	PLC	C1-C2	2.08	1.56	1.50
3	C	402	PLC	C1-C2	2.10	1.56	1.50
3	A	402	PLC	C1-C2	2.13	1.56	1.50
3	D	402	PLC	C3-C2	2.47	1.57	1.50
3	C	402	PLC	O2-C'	2.53	1.41	1.34
3	A	402	PLC	C3-C2	2.55	1.57	1.50
3	B	402	PLC	C3-C2	2.56	1.58	1.50
3	B	402	PLC	O2-C'	2.57	1.42	1.34
3	E	402	PLC	C3-C2	2.61	1.58	1.50
3	D	402	PLC	O2-C'	2.62	1.42	1.34
3	C	402	PLC	C3-C2	2.62	1.58	1.50
3	A	402	PLC	O2-C'	2.71	1.42	1.34
3	E	402	PLC	O2-C'	2.73	1.42	1.34
2	D	407	ACT	CH3-C	3.93	1.54	1.48
2	A	410	ACT	CH3-C	4.02	1.54	1.48
2	C	407	ACT	CH3-C	4.04	1.54	1.48
2	B	407	ACT	CH3-C	4.15	1.54	1.48
2	E	407	ACT	CH3-C	4.25	1.54	1.48
2	B	401	ACT	CH3-C	4.41	1.54	1.48
2	D	401	ACT	CH3-C	4.47	1.55	1.48
2	C	401	ACT	CH3-C	4.55	1.55	1.48
2	A	401	ACT	CH3-C	4.56	1.55	1.48
2	E	401	ACT	CH3-C	4.57	1.55	1.48

All (25) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	PLC	O2-C'-O'	-3.82	113.42	123.67
3	A	402	PLC	O2-C'-O'	-3.78	113.52	123.67
3	D	402	PLC	O2-C'-O'	-3.75	113.61	123.67
3	E	402	PLC	O2-C'-O'	-3.72	113.69	123.67
3	C	402	PLC	O2-C'-O'	-3.68	113.79	123.67

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	402	PLC	O4P-P-O1P	-2.88	98.42	109.62
3	C	402	PLC	O4P-P-O1P	-2.88	98.45	109.62
3	E	402	PLC	O4P-P-O1P	-2.83	98.62	109.62
3	A	402	PLC	O4P-P-O1P	-2.79	98.77	109.62
3	D	402	PLC	O4P-P-O1P	-2.74	98.98	109.62
3	D	402	PLC	O2P-P-O3P	2.09	119.00	108.46
3	B	402	PLC	O2P-P-O3P	2.11	119.08	108.46
3	E	402	PLC	O2P-P-O3P	2.13	119.21	108.46
3	A	402	PLC	O2P-P-O3P	2.18	119.43	108.46
3	C	402	PLC	O2P-P-O3P	2.22	119.67	108.46
3	B	402	PLC	O2-C'-C1'	3.71	119.60	111.53
3	D	402	PLC	O2-C'-C1'	3.75	119.67	111.53
3	E	402	PLC	C2-O2-C'	3.84	127.11	117.89
3	B	402	PLC	C2-O2-C'	3.84	127.11	117.89
3	E	402	PLC	O2-C'-C1'	3.84	119.88	111.53
3	C	402	PLC	C2-O2-C'	3.86	127.15	117.89
3	C	402	PLC	O2-C'-C1'	3.87	119.95	111.53
3	A	402	PLC	C2-O2-C'	3.95	127.38	117.89
3	D	402	PLC	C2-O2-C'	4.09	127.70	117.89
3	A	402	PLC	O2-C'-C1'	4.31	120.89	111.53

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

12 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	402	PLC	2	0
3	A	403	PLC	1	0
3	A	404	PLC	1	0
6	A	411	LMT	3	0
6	A	412	LMT	1	0
6	B	408	LMT	1	0
3	C	402	PLC	1	0
6	C	408	LMT	1	0
2	D	401	ACT	1	0
3	D	402	PLC	1	0
3	D	403	PLC	1	0
3	E	402	PLC	1	0

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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, 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	311/317 (98%)	0.20	14 (4%) 37 38	46, 60, 116, 179	0
1	B	311/317 (98%)	0.16	13 (4%) 40 41	43, 58, 103, 133	0
1	C	311/317 (98%)	0.19	10 (3%) 51 51	44, 59, 115, 176	0
1	D	311/317 (98%)	0.33	19 (6%) 25 25	43, 59, 114, 182	0
1	E	311/317 (98%)	0.26	12 (3%) 43 44	46, 60, 112, 149	0
All	All	1555/1585 (98%)	0.23	68 (4%) 38 39	43, 59, 112, 182	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	58	ARG	9.9
1	C	58	ARG	8.9
1	D	57	VAL	7.6
1	A	57	VAL	5.9
1	D	61	VAL	5.3
1	D	54	PHE	5.2
1	C	11	ILE	5.1
1	D	58	ARG	4.9
1	A	11	ILE	4.6
1	A	58	ARG	4.3
1	B	136	ASP	4.2
1	D	59	SER	4.1
1	A	312	PHE	4.0
1	C	312	PHE	3.7
1	E	12	ALA	3.7
1	D	64	LYS	3.6
1	E	62	ARG	3.2
1	D	154	ASP	3.2
1	C	12	ALA	3.1
1	D	55	ASP	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	61	VAL	3.0
1	E	312	PHE	3.0
1	E	136	ASP	3.0
1	B	57	VAL	2.9
1	B	60	GLY	2.9
1	D	237	ALA	2.9
1	A	59	SER	2.9
1	B	62	ARG	2.8
1	C	57	VAL	2.8
1	D	153	ASP	2.8
1	D	62	ARG	2.8
1	E	13	ASP	2.8
1	C	293	ARG	2.7
1	C	180	LEU	2.6
1	D	96	PRO	2.6
1	B	312	PHE	2.6
1	C	172	ALA	2.6
1	A	52	LEU	2.6
1	A	54	PHE	2.6
1	D	60	GLY	2.5
1	A	62	ARG	2.5
1	A	154	ASP	2.5
1	D	240	ILE	2.5
1	B	293	ARG	2.5
1	A	55	ASP	2.4
1	B	11	ILE	2.4
1	D	312	PHE	2.4
1	D	97	ASP	2.4
1	C	13	ASP	2.3
1	D	56	PRO	2.3
1	E	11	ILE	2.3
1	E	137	THR	2.3
1	E	226	THR	2.3
1	A	136	ASP	2.3
1	E	10	PRO	2.2
1	B	13	ASP	2.2
1	E	237	ALA	2.2
1	A	56	PRO	2.1
1	D	152	ASN	2.1
1	A	237	ALA	2.1
1	D	226	THR	2.1
1	B	237	ALA	2.1

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Mol	Chain	Res	Type	RSRZ
1	C	56	PRO	2.1
1	B	178	ASP	2.1
1	B	54	PHE	2.0
1	B	152	ASN	2.0
1	B	153	ASP	2.0
1	E	240	ILE	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 carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
3	PLC	C	402	34/42	0.66	0.36	12.91	76,94,109,109	0
3	PLC	B	402	34/42	0.56	0.36	11.97	79,98,113,113	0
3	PLC	B	403	24/42	0.76	0.40	11.53	65,73,88,88	0
2	ACT	C	401	4/4	0.93	0.46	10.50	68,68,68,69	0
3	PLC	E	402	34/42	0.55	0.40	9.97	81,96,112,112	0
3	PLC	D	403	24/42	0.78	0.29	9.74	64,70,82,82	0
3	PLC	E	403	24/42	0.74	0.32	9.28	67,73,81,81	0
3	PLC	A	402	34/42	0.62	0.42	9.24	84,98,111,112	0
3	PLC	D	402	34/42	0.50	0.45	9.01	78,94,111,112	0
3	PLC	C	403	24/42	0.76	0.28	7.75	60,71,80,80	0
3	PLC	A	403	24/42	0.73	0.33	7.36	67,77,82,82	0
2	ACT	A	401	4/4	0.94	0.23	6.63	71,71,71,74	0
2	ACT	A	410	4/4	0.87	0.27	5.87	75,75,76,78	0
2	ACT	D	401	4/4	0.90	0.26	5.85	66,67,67,67	0
2	ACT	D	407	4/4	0.93	0.23	5.17	67,68,68,71	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
6	LMT	D	408	12/35	0.88	0.47	4.74	47,51,56,56	0
6	LMT	C	408	12/35	0.90	0.42	4.30	46,49,53,53	0
6	LMT	A	412	12/35	0.90	0.38	3.99	50,52,61,62	0
6	LMT	B	408	12/35	0.92	0.33	3.24	50,51,57,59	0
2	ACT	B	401	4/4	0.91	0.29	3.19	77,78,78,79	0
2	ACT	E	401	4/4	0.96	0.21	3.06	74,75,75,77	0
5	NA	B	406	1/1	0.59	0.25	1.92	79,79,79,79	0
6	LMT	E	408	12/35	0.94	0.31	1.85	43,47,58,59	0
2	ACT	C	407	4/4	0.89	0.19	1.76	69,69,70,70	0
4	CL	A	406	1/1	0.98	0.20	1.50	73,73,73,73	0
4	CL	A	407	1/1	0.95	0.25	1.13	88,88,88,88	0
2	ACT	E	407	4/4	0.94	0.17	0.80	68,68,68,72	0
2	ACT	B	407	4/4	0.94	0.14	-0.48	65,65,66,66	0
5	NA	E	406	1/1	0.82	0.13	-0.99	76,76,76,76	0
5	NA	A	408	1/1	0.78	0.11	-2.31	78,78,78,78	0
4	CL	B	405	1/1	0.98	0.08	-2.63	63,63,63,63	0
4	CL	D	405	1/1	0.97	0.07	-3.78	52,52,52,52	0
4	CL	E	405	1/1	0.98	0.09	-4.01	62,62,62,62	0
3	PLC	B	404	12/42	0.80	0.35	-	84,85,87,87	0
3	PLC	A	404	12/42	0.83	0.45	-	80,81,84,84	0
3	PLC	E	404	12/42	0.81	0.48	-	81,82,83,83	0
5	NA	D	406	1/1	0.92	0.14	-	86,86,86,86	0
4	CL	A	405	1/1	0.97	0.15	-	62,62,62,62	0
3	PLC	C	404	12/42	0.78	0.47	-	77,78,80,80	0
5	NA	C	406	1/1	0.93	0.18	-	73,73,73,73	0
5	NA	A	409	1/1	0.48	1.05	-	88,88,88,88	0
3	PLC	D	404	12/42	0.80	0.45	-	81,83,84,85	0
6	LMT	A	411	12/35	0.80	0.77	-	64,68,76,76	0
4	CL	C	405	1/1	0.98	0.10	-	61,61,61,61	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.