



Full wwPDB EM Validation Report ⓘ

Jul 16, 2025 – 01:18 AM JST

PDB ID : 8KC7 / pdb_00008kc7
EMDB ID : EMD-37096
Title : Rpd3S histone deacetylase complex
Authors : Dong, S.; Li, H.; Wang, M.; Rasheed, N.; Zou, B.; Gao, X.; Guan, J.; Li, W.;
Zhang, J.; Wang, C.; Zhou, N.; Shi, X.; Li, M.; Zhou, M.; Huang, J.; Li, H.;
Zhang, Y.; Wong, K.H.; Zhang, X.; Chao, W.C.H.; He, J.
Deposited on : 2023-08-06
Resolution : 3.46 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp>
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:

EMDB validation analysis : **FAILED**
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : **FAILED**
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.44

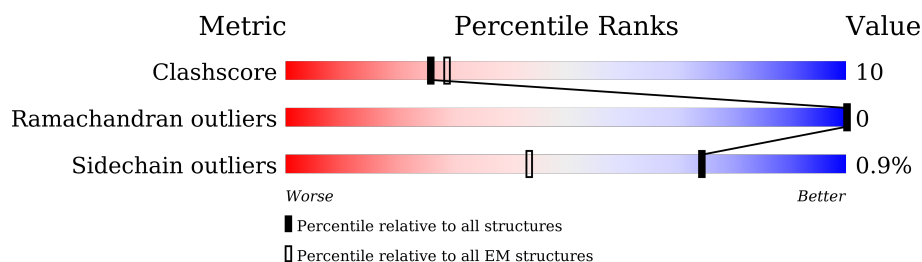
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.46 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	433	76% 18% 6%
2	B	1371	31% 8% 61%
3	D	401	36% 9% 55%
3	F	401	28% 9% 62%
4	E	733	34% 11% 54%
4	G	733	14% 82%

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 14326 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Histone deacetylase RPD3.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	406	Total	C	N	O	S	0	0
			3216	2040	542	608	26		

- Molecule 2 is a protein called Transcriptional regulatory protein SIN3.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	539	Total	C	N	O	S	0	0
			4520	2910	759	837	14		

There are 49 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	166	MET	-	initiating methionine	UNP P22579
B	167	HIS	-	expression tag	UNP P22579
B	168	HIS	-	expression tag	UNP P22579
B	169	HIS	-	expression tag	UNP P22579
B	170	HIS	-	expression tag	UNP P22579
B	171	HIS	-	expression tag	UNP P22579
B	172	HIS	-	expression tag	UNP P22579
B	173	HIS	-	expression tag	UNP P22579
B	174	HIS	-	expression tag	UNP P22579
B	175	PRO	-	expression tag	UNP P22579
B	176	GLN	-	expression tag	UNP P22579
B	177	LEU	-	expression tag	UNP P22579
B	178	ALA	-	expression tag	UNP P22579
B	179	MET	-	expression tag	UNP P22579
B	180	TRP	-	expression tag	UNP P22579
B	181	SER	-	expression tag	UNP P22579
B	182	HIS	-	expression tag	UNP P22579
B	183	PRO	-	expression tag	UNP P22579
B	184	GLN	-	expression tag	UNP P22579
B	185	PHE	-	expression tag	UNP P22579
B	186	GLU	-	expression tag	UNP P22579

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Chain	Residue	Modelled	Actual	Comment	Reference
B	187	LYS	-	expression tag	UNP P22579
B	188	GLY	-	expression tag	UNP P22579
B	189	GLY	-	expression tag	UNP P22579
B	190	GLY	-	expression tag	UNP P22579
B	191	SER	-	expression tag	UNP P22579
B	192	GLY	-	expression tag	UNP P22579
B	193	GLY	-	expression tag	UNP P22579
B	194	GLY	-	expression tag	UNP P22579
B	195	SER	-	expression tag	UNP P22579
B	196	GLY	-	expression tag	UNP P22579
B	197	GLY	-	expression tag	UNP P22579
B	198	GLY	-	expression tag	UNP P22579
B	199	SER	-	expression tag	UNP P22579
B	200	TRP	-	expression tag	UNP P22579
B	201	SER	-	expression tag	UNP P22579
B	202	HIS	-	expression tag	UNP P22579
B	203	PRO	-	expression tag	UNP P22579
B	204	GLN	-	expression tag	UNP P22579
B	205	PHE	-	expression tag	UNP P22579
B	206	GLU	-	expression tag	UNP P22579
B	207	LYS	-	expression tag	UNP P22579
B	208	GLU	-	expression tag	UNP P22579
B	209	ASN	-	expression tag	UNP P22579
B	210	LEU	-	expression tag	UNP P22579
B	211	TYR	-	expression tag	UNP P22579
B	212	PHE	-	expression tag	UNP P22579
B	213	GLN	-	expression tag	UNP P22579
B	214	SER	-	expression tag	UNP P22579

- Molecule 3 is a protein called Chromatin modification-related protein EAF3.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	182	Total	C	N	O	S	0	0
			1474	944	237	284	9		
3	F	152	Total	C	N	O	S	0	0
			1242	803	199	232	8		

- Molecule 4 is a protein called Transcriptional regulatory protein RCO1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	334	Total	C	N	O	S	0	0
			2762	1759	481	505	17		

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Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	135	Total	C	N	O	S	0	0
			1112	717	184	201	10		

There are 98 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	685	MET	-	expression tag	UNP Q04779
E	686	HIS	-	expression tag	UNP Q04779
E	687	HIS	-	expression tag	UNP Q04779
E	688	HIS	-	expression tag	UNP Q04779
E	689	HIS	-	expression tag	UNP Q04779
E	690	HIS	-	expression tag	UNP Q04779
E	691	HIS	-	expression tag	UNP Q04779
E	692	HIS	-	expression tag	UNP Q04779
E	693	HIS	-	expression tag	UNP Q04779
E	694	PRO	-	expression tag	UNP Q04779
E	695	GLN	-	expression tag	UNP Q04779
E	696	LEU	-	expression tag	UNP Q04779
E	697	ALA	-	expression tag	UNP Q04779
E	698	MET	-	expression tag	UNP Q04779
E	699	TRP	-	expression tag	UNP Q04779
E	700	SER	-	expression tag	UNP Q04779
E	701	HIS	-	expression tag	UNP Q04779
E	702	PRO	-	expression tag	UNP Q04779
E	703	GLN	-	expression tag	UNP Q04779
E	704	PHE	-	expression tag	UNP Q04779
E	705	GLU	-	expression tag	UNP Q04779
E	706	LYS	-	expression tag	UNP Q04779
E	707	GLY	-	expression tag	UNP Q04779
E	708	GLY	-	expression tag	UNP Q04779
E	709	GLY	-	expression tag	UNP Q04779
E	710	SER	-	expression tag	UNP Q04779
E	711	GLY	-	expression tag	UNP Q04779
E	712	GLY	-	expression tag	UNP Q04779
E	713	GLY	-	expression tag	UNP Q04779
E	714	SER	-	expression tag	UNP Q04779
E	715	GLY	-	expression tag	UNP Q04779
E	716	GLY	-	expression tag	UNP Q04779
E	717	GLY	-	expression tag	UNP Q04779
E	718	SER	-	expression tag	UNP Q04779
E	719	TRP	-	expression tag	UNP Q04779
E	720	SER	-	expression tag	UNP Q04779

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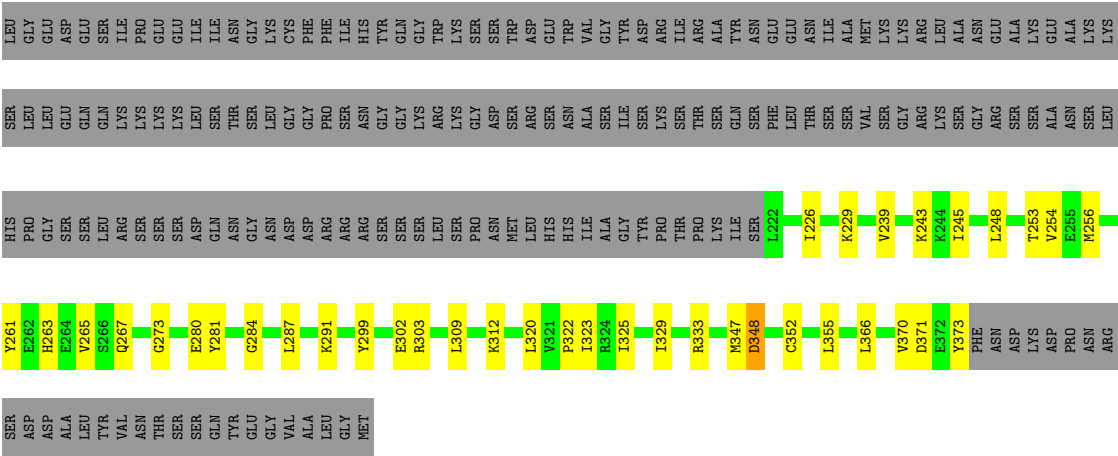
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Chain	Residue	Modelled	Actual	Comment	Reference
E	721	HIS	-	expression tag	UNP Q04779
E	722	PRO	-	expression tag	UNP Q04779
E	723	GLN	-	expression tag	UNP Q04779
E	724	PHE	-	expression tag	UNP Q04779
E	725	GLU	-	expression tag	UNP Q04779
E	726	LYS	-	expression tag	UNP Q04779
E	727	GLU	-	expression tag	UNP Q04779
E	728	ASN	-	expression tag	UNP Q04779
E	729	LEU	-	expression tag	UNP Q04779
E	730	TYR	-	expression tag	UNP Q04779
E	731	PHE	-	expression tag	UNP Q04779
E	732	GLN	-	expression tag	UNP Q04779
E	733	SER	-	expression tag	UNP Q04779
G	685	MET	-	expression tag	UNP Q04779
G	686	HIS	-	expression tag	UNP Q04779
G	687	HIS	-	expression tag	UNP Q04779
G	688	HIS	-	expression tag	UNP Q04779
G	689	HIS	-	expression tag	UNP Q04779
G	690	HIS	-	expression tag	UNP Q04779
G	691	HIS	-	expression tag	UNP Q04779
G	692	HIS	-	expression tag	UNP Q04779
G	693	HIS	-	expression tag	UNP Q04779
G	694	PRO	-	expression tag	UNP Q04779
G	695	GLN	-	expression tag	UNP Q04779
G	696	LEU	-	expression tag	UNP Q04779
G	697	ALA	-	expression tag	UNP Q04779
G	698	MET	-	expression tag	UNP Q04779
G	699	TRP	-	expression tag	UNP Q04779
G	700	SER	-	expression tag	UNP Q04779
G	701	HIS	-	expression tag	UNP Q04779
G	702	PRO	-	expression tag	UNP Q04779
G	703	GLN	-	expression tag	UNP Q04779
G	704	PHE	-	expression tag	UNP Q04779
G	705	GLU	-	expression tag	UNP Q04779
G	706	LYS	-	expression tag	UNP Q04779
G	707	GLY	-	expression tag	UNP Q04779
G	708	GLY	-	expression tag	UNP Q04779
G	709	GLY	-	expression tag	UNP Q04779
G	710	SER	-	expression tag	UNP Q04779
G	711	GLY	-	expression tag	UNP Q04779
G	712	GLY	-	expression tag	UNP Q04779
G	713	GLY	-	expression tag	UNP Q04779

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Chain	Residue	Modelled	Actual	Comment	Reference
G	714	SER	-	expression tag	UNP Q04779
G	715	GLY	-	expression tag	UNP Q04779
G	716	GLY	-	expression tag	UNP Q04779
G	717	GLY	-	expression tag	UNP Q04779
G	718	SER	-	expression tag	UNP Q04779
G	719	TRP	-	expression tag	UNP Q04779
G	720	SER	-	expression tag	UNP Q04779
G	721	HIS	-	expression tag	UNP Q04779
G	722	PRO	-	expression tag	UNP Q04779
G	723	GLN	-	expression tag	UNP Q04779
G	724	PHE	-	expression tag	UNP Q04779
G	725	GLU	-	expression tag	UNP Q04779
G	726	LYS	-	expression tag	UNP Q04779
G	727	GLU	-	expression tag	UNP Q04779
G	728	ASN	-	expression tag	UNP Q04779
G	729	LEU	-	expression tag	UNP Q04779
G	730	TYR	-	expression tag	UNP Q04779
G	731	PHE	-	expression tag	UNP Q04779
G	732	GLN	-	expression tag	UNP Q04779
G	733	SER	-	expression tag	UNP Q04779





4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	287163	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2400	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor

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	0/3296	0.33	0/4456
2	B	0.14	0/4622	0.37	0/6232
3	D	0.13	0/1500	0.35	0/2028
3	F	0.15	0/1264	0.39	0/1709
4	E	0.18	0/2827	0.49	0/3801
4	G	0.14	0/1137	0.40	0/1523
All	All	0.15	0/14646	0.39	0/19749

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	3216	0	3082	55	0
2	B	4520	0	4488	83	0
3	D	1474	0	1497	25	0
3	F	1242	0	1286	29	0
4	E	2762	0	2748	96	0
4	G	1112	0	1100	27	0
All	All	14326	0	14201	284	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 10.

All (284) 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)
4:G:263:CYS:SG	4:G:266:CYS:HB2	1.65	1.35
4:E:263:CYS:SG	4:E:283:HIS:CD2	2.22	1.33
4:E:42:GLN:HB3	4:E:46:TYR:CE1	1.82	1.15
4:E:263:CYS:SG	4:E:283:HIS:NE2	2.21	1.11
4:E:263:CYS:SG	4:E:283:HIS:CE1	2.43	1.11
4:E:263:CYS:SG	4:E:283:HIS:CG	2.44	1.11
4:E:42:GLN:HB2	4:E:46:TYR:CE2	1.87	1.10
4:E:42:GLN:CB	4:E:46:TYR:CZ	2.42	1.03
4:E:42:GLN:HB3	4:E:46:TYR:CD1	1.97	1.00
4:E:42:GLN:HG2	4:E:46:TYR:CZ	1.96	1.00
4:E:42:GLN:HB2	4:E:46:TYR:CD2	1.98	0.99
4:E:42:GLN:CG	4:E:46:TYR:CZ	2.47	0.97
4:G:263:CYS:SG	4:G:266:CYS:CB	2.54	0.95
4:G:303:CYS:HB2	4:G:306:CYS:SG	2.08	0.94
4:E:42:GLN:CB	4:E:46:TYR:CE2	2.53	0.92
4:E:303:CYS:HB2	4:E:306:CYS:SG	2.12	0.90
4:E:42:GLN:HG2	4:E:46:TYR:OH	1.73	0.88
3:F:347:MET:HE1	3:F:355:LEU:HD12	1.56	0.85
2:B:959:GLN:HB2	2:B:970:LYS:HE3	1.62	0.81
2:B:883:LEU:HD23	2:B:890:THR:OG1	1.81	0.81
4:E:42:GLN:CB	4:E:46:TYR:CE1	2.56	0.80
3:D:288:TYR:O	3:D:292:CYS:HB2	1.79	0.80
4:E:263:CYS:SG	4:E:283:HIS:ND1	2.55	0.78
2:B:972:LYS:HB3	2:B:975:LEU:HD23	1.66	0.78
2:B:1302:ARG:HB3	2:B:1315:GLN:HB3	1.69	0.73
1:A:186:ASP:HA	1:A:275:SER:HB3	1.73	0.71
2:B:1138:LEU:HB3	2:B:1303:ILE:HB	1.76	0.67
4:E:42:GLN:CB	4:E:46:TYR:CD2	2.76	0.67
1:A:270:GLN:HE22	1:A:310:GLY:HA3	1.60	0.66
1:A:38:HIS:O	1:A:41:LYS:NZ	2.23	0.65
2:B:956:LYS:NZ	2:B:1316:TYR:O	2.29	0.64
4:E:46:TYR:H	4:E:51:ARG:HH12	1.45	0.64
3:D:347:MET:HG3	4:E:338:LYS:HD2	1.80	0.64
4:E:263:CYS:HB2	4:E:266:CYS:HB2	1.80	0.64
1:A:17:ASP:O	1:A:331:ASN:ND2	2.31	0.62
2:B:965:HIS:HB2	2:B:969:PRO:HG3	1.83	0.61
2:B:1291:ARG:HE	2:B:1322:LEU:HD13	1.65	0.61
4:E:42:GLN:CB	4:E:46:TYR:CD1	2.79	0.61
4:E:391:TYR:HD1	4:E:393:GLN:H	1.48	0.61
4:G:302:HIS:O	4:G:307:LYS:HE3	2.01	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:254:VAL:HG13	3:D:331:LEU:HD22	1.83	0.60
4:E:42:GLN:OE1	4:E:46:TYR:CE2	2.55	0.59
3:F:371:ASP:N	3:F:371:ASP:OD2	2.36	0.59
1:A:44:ARG:NH2	1:A:310:GLY:O	2.35	0.59
4:G:263:CYS:HB2	4:G:266:CYS:SG	2.43	0.59
4:E:399:ASP:OD1	4:E:402:ASN:ND2	2.31	0.58
2:B:813:GLU:HA	4:E:49:LYS:HE2	1.86	0.58
2:B:820:TYR:CE2	4:E:50:ARG:HG2	2.38	0.58
2:B:974:GLN:C	2:B:975:LEU:HG	2.28	0.58
1:A:186:ASP:HB2	1:A:274:ASP:HB2	1.85	0.58
1:A:221:LEU:HD11	1:A:372:VAL:HG22	1.87	0.57
4:E:266:CYS:SG	4:E:283:HIS:ND1	2.77	0.57
1:A:171:ILE:HD11	2:B:778:LEU:HD11	1.86	0.57
2:B:1291:ARG:NH1	2:B:1295:SER:O	2.37	0.57
3:D:235:ASP:OD1	3:D:387:TYR:OH	2.23	0.56
2:B:1284:ILE:HD12	2:B:1284:ILE:H	1.70	0.56
1:A:350:ASP:OD1	1:A:350:ASP:N	2.39	0.56
4:E:44:VAL:HG13	4:E:45:ASN:H	1.71	0.56
2:B:883:LEU:CD2	2:B:890:THR:OG1	2.53	0.56
4:E:318:THR:HG22	4:E:319:LEU:H	1.71	0.56
1:A:194:GLU:HA	1:A:205:THR:HG21	1.88	0.56
4:E:505:TYR:CE2	4:E:507:GLU:HB3	2.40	0.56
4:E:35:ARG:HE	4:E:38:ARG:NH2	2.04	0.55
4:E:42:GLN:CB	4:E:46:TYR:CG	2.90	0.55
4:E:511:LYS:NZ	3:F:280:GLU:OE1	2.40	0.55
3:D:225:PRO:HB3	3:D:367:LEU:HD22	1.88	0.55
2:B:772:ASP:OD1	2:B:772:ASP:N	2.39	0.55
2:B:675:TYR:CZ	2:B:962:LYS:HD3	2.42	0.55
4:E:381:LEU:HB3	4:E:384:ARG:HB2	1.87	0.55
3:F:281:TYR:HA	4:G:335:ILE:HG21	1.87	0.55
4:G:303:CYS:O	4:G:307:LYS:HG3	2.06	0.55
2:B:981:ASP:N	2:B:1155:TYR:OH	2.40	0.54
1:A:345:GLU:OE1	2:B:913:ASN:ND2	2.37	0.54
3:F:329:ILE:HG13	3:F:333:ARG:HH21	1.72	0.54
2:B:977:PHE:HZ	2:B:1149:ARG:HD2	1.71	0.54
2:B:960:THR:HG23	2:B:970:LYS:HE2	1.90	0.54
2:B:1135:ILE:HA	2:B:1306:ASP:HA	1.89	0.54
4:E:321:LYS:O	4:E:325:ASN:ND2	2.41	0.53
1:A:187:VAL:HG22	1:A:274:ASP:HB3	1.91	0.53
4:G:288:ASP:HB3	4:G:348:PRO:HD2	1.90	0.53
1:A:98:LYS:HE3	4:E:293:PRO:HB2	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:E:46:TYR:N	4:E:51:ARG:HH12	2.06	0.53
4:E:443:CYS:SG	4:E:469:HIS:NE2	2.79	0.53
4:G:317:ALA:HB1	4:G:322:ILE:HD11	1.91	0.53
4:E:456:SER:OG	4:E:457:PHE:N	2.41	0.53
3:F:320:LEU:HD11	3:F:325:ILE:HD13	1.91	0.52
4:G:262:PHE:HA	4:G:269:SER:HA	1.91	0.52
4:E:282:PHE:HE2	4:E:303:CYS:SG	2.32	0.52
2:B:979:PHE:HD2	2:B:985:PHE:HE1	1.58	0.52
1:A:179:ARG:NH1	1:A:263:GLN:O	2.43	0.52
4:E:263:CYS:HB3	4:E:266:CYS:SG	2.50	0.52
4:E:372:TYR:OH	4:E:496:ARG:NH2	2.43	0.52
3:F:299:TYR:HB2	3:F:302:GLU:HG2	1.92	0.52
2:B:675:TYR:CE1	2:B:962:LYS:HD3	2.45	0.52
2:B:1028:LYS:NZ	2:B:1030:GLU:O	2.43	0.52
1:A:221:LEU:HD21	1:A:372:VAL:HG13	1.92	0.51
1:A:238:LEU:HD13	1:A:242:ILE:HD13	1.91	0.51
2:B:842:THR:OG1	2:B:843:GLU:N	2.43	0.51
3:F:254:VAL:HB	3:F:323:ILE:HG23	1.92	0.51
2:B:995:PHE:O	2:B:999:THR:OG1	2.23	0.51
1:A:360:MET:HB3	2:B:930:HIS:HB2	1.91	0.51
3:D:302:GLU:OE2	3:D:333:ARG:NH1	2.41	0.51
2:B:1243:ASP:N	2:B:1243:ASP:OD1	2.43	0.51
3:F:248:LEU:HB3	3:F:309:LEU:HD21	1.93	0.50
2:B:964:ILE:HB	2:B:966:TRP:NE1	2.26	0.50
4:E:45:ASN:OD1	4:E:51:ARG:HB3	2.11	0.50
4:E:45:ASN:OD1	4:E:53:ILE:HG22	2.11	0.50
2:B:1154:ILE:HD12	2:B:1249:LEU:HD13	1.92	0.50
3:D:293:LEU:HD13	3:D:322:PRO:HB2	1.92	0.50
3:F:303:ARG:NH1	4:G:287:LEU:O	2.40	0.50
3:F:263:HIS:O	3:F:267:GLN:NE2	2.45	0.50
1:A:352:LYS:NZ	2:B:1176:SER:O	2.39	0.50
1:A:326:THR:O	1:A:330:ASN:ND2	2.45	0.50
2:B:832:GLU:HA	2:B:835:VAL:HG22	1.94	0.50
2:B:967:LEU:O	2:B:968:THR:C	2.54	0.50
3:F:239:VAL:HA	3:F:243:LYS:HA	1.94	0.49
3:F:322:PRO:HA	3:F:325:ILE:HG12	1.94	0.49
2:B:1002:TYR:O	2:B:1007:LYS:NZ	2.44	0.49
1:A:20:ARG:NE	1:A:138:LYS:O	2.45	0.49
4:E:408:ASP:HB3	4:E:415:LEU:HD21	1.94	0.49
2:B:675:TYR:CZ	2:B:713:ASN:HB2	2.47	0.49
2:B:963:LYS:HG2	4:E:421:ASN:HB2	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:F:261:TYR:O	3:F:265:VAL:HG12	2.13	0.49
2:B:1201:GLU:OE1	2:B:1209:ARG:NH2	2.46	0.49
4:E:46:TYR:HB2	4:E:51:ARG:HH12	1.77	0.49
3:D:232:LEU:HD21	3:D:332:LEU:HB3	1.95	0.48
1:A:279:ASP:OD1	1:A:279:ASP:N	2.46	0.48
2:B:978:ASP:HB2	2:B:1311:HIS:ND1	2.27	0.48
2:B:874:GLU:HG2	2:B:875:ARG:HG2	1.94	0.48
4:E:42:GLN:CG	4:E:46:TYR:CE2	2.93	0.48
4:G:303:CYS:O	4:G:307:LYS:N	2.43	0.48
2:B:1024:ILE:HG22	2:B:1026:PHE:H	1.78	0.48
3:F:226:ILE:HG23	3:F:229:LYS:HG3	1.95	0.48
1:A:296:ASN:HB2	1:A:328:LEU:HD13	1.96	0.48
1:A:149:LEU:HB3	1:A:161:CYS:HB3	1.96	0.48
1:A:276:LEU:HD21	1:A:321:THR:HG21	1.96	0.48
2:B:757:ARG:NH1	3:D:379:PRO:O	2.46	0.47
2:B:1291:ARG:NH2	2:B:1296:ASN:OD1	2.46	0.47
2:B:990:CYS:SG	2:B:1212:ARG:NH2	2.87	0.47
1:A:189:HIS:HB2	1:A:209:HIS:CG	2.50	0.47
2:B:879:ILE:O	2:B:883:LEU:HG	2.15	0.47
1:A:72:GLN:HB3	1:A:405:GLU:HA	1.97	0.47
2:B:837:LYS:HE3	2:B:837:LYS:HB3	1.78	0.47
4:E:35:ARG:HE	4:E:38:ARG:HH22	1.62	0.47
3:F:248:LEU:HD13	3:F:312:LYS:HZ3	1.80	0.47
4:E:302:HIS:HB3	4:E:306:CYS:HB2	1.95	0.47
3:F:287:LEU:HD12	4:G:333:VAL:HG21	1.97	0.46
2:B:820:TYR:HE2	4:E:50:ARG:HG2	1.80	0.46
2:B:1259:ASP:OD1	2:B:1259:ASP:N	2.47	0.46
4:G:263:CYS:SG	4:G:266:CYS:SG	3.13	0.46
1:A:226:VAL:HG21	2:B:782:TRP:CD2	2.51	0.46
4:E:303:CYS:O	4:E:307:LYS:N	2.49	0.46
1:A:359:ASN:HD21	2:B:1235:LYS:HD3	1.81	0.46
3:D:262:GLU:O	3:D:266:SER:HB2	2.16	0.46
4:E:321:LYS:HD2	4:E:323:GLU:HB3	1.98	0.46
4:E:42:GLN:HG2	4:E:46:TYR:CE1	2.49	0.46
4:E:509:LEU:HG	3:F:348:ASP:HB3	1.97	0.46
4:E:562:GLN:HE22	4:E:563:LYS:HD2	1.81	0.46
4:E:263:CYS:CB	4:E:266:CYS:SG	3.03	0.46
4:G:347:ASN:O	4:G:349:LYS:NZ	2.39	0.46
4:G:278:CYS:O	4:G:280:LYS:NZ	2.46	0.46
1:A:180:VAL:HB	1:A:203:VAL:HG22	1.97	0.45
1:A:212:GLY:HA3	4:E:456:SER:HB3	1.96	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:809:LYS:O	2:B:813:GLU:HG3	2.16	0.45
1:A:45:ILE:HD13	1:A:146:ALA:HA	1.99	0.45
1:A:89:VAL:HG22	1:A:112:VAL:HG11	1.97	0.45
2:B:676:ILE:HG22	2:B:678:ASN:H	1.81	0.45
2:B:1006:ASP:OD2	2:B:1254:HIS:NE2	2.50	0.45
4:E:545:ASN:HA	4:E:548:LYS:HG2	1.98	0.45
2:B:868:ARG:HD3	2:B:877:PHE:HE2	1.81	0.45
4:E:282:PHE:HE2	4:E:303:CYS:HG	1.60	0.45
2:B:810:ILE:HD11	2:B:919:LEU:HD23	1.98	0.45
3:D:288:TYR:O	3:D:292:CYS:CB	2.56	0.45
4:E:473:LYS:HE3	4:E:491:VAL:HG13	1.99	0.45
2:B:691:LEU:HD12	2:B:697:LEU:HB2	1.99	0.44
2:B:765:MET:HE3	2:B:766:PRO:HD2	1.99	0.44
2:B:1196:LEU:HD23	2:B:1227:SER:HB3	1.99	0.44
2:B:1309:THR:HG23	2:B:1311:HIS:HB2	1.98	0.44
4:E:42:GLN:O	4:E:43:ASN:C	2.59	0.44
3:D:323:ILE:H	3:D:323:ILE:HG13	1.64	0.44
2:B:1220:GLU:HG3	2:B:1223:TRP:H	1.83	0.44
4:E:557:LYS:O	4:E:561:VAL:HG12	2.17	0.44
4:G:542:ILE:HD12	4:G:542:ILE:HA	1.90	0.44
2:B:807:LEU:HD23	2:B:807:LEU:HA	1.89	0.44
2:B:1300:MET:HB3	2:B:1317:ILE:HB	1.98	0.44
3:D:234:ASP:OD1	4:E:496:ARG:NH1	2.50	0.44
2:B:1161:ILE:HD13	2:B:1161:ILE:HA	1.84	0.44
4:G:554:LYS:HA	4:G:554:LYS:HD3	1.79	0.44
3:D:335:ILE:HG21	3:D:363:LEU:HD21	2.00	0.44
4:E:492:TRP:HZ2	4:E:518:GLY:HA3	1.82	0.44
1:A:276:LEU:HD23	1:A:276:LEU:HA	1.89	0.44
2:B:964:ILE:H	2:B:964:ILE:HG12	1.63	0.43
4:G:263:CYS:CB	4:G:266:CYS:SG	3.06	0.43
1:A:269:LEU:HD21	1:A:295:VAL:HG22	2.00	0.43
2:B:661:SER:OG	2:B:662:LEU:N	2.49	0.43
2:B:1317:ILE:HG22	2:B:1319:LEU:H	1.83	0.43
3:D:342:ILE:HD11	3:D:355:LEU:HD23	2.01	0.43
4:E:268:GLN:HB2	4:E:283:HIS:HE1	1.82	0.43
3:D:371:ASP:OD1	3:D:371:ASP:N	2.49	0.43
4:E:458:LYS:HB3	4:E:464:TRP:HB2	2.00	0.43
4:G:270:GLY:HA3	4:G:283:HIS:NE2	2.34	0.43
1:A:175:ARG:HG2	2:B:773:MET:HE2	1.99	0.43
4:E:308:PHE:O	4:E:314:ASN:HB2	2.19	0.43
2:B:1139:PHE:HB3	2:B:1290:VAL:HG21	2.01	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D:258:LEU:HD21	3:D:285:LEU:HD23	2.01	0.43
4:E:263:CYS:HB2	4:E:266:CYS:CB	2.49	0.43
1:A:53:MET:HE1	1:A:58:TYR:HB3	2.00	0.43
4:E:504:LEU:O	4:E:505:TYR:HB3	2.19	0.43
1:A:12:THR:O	1:A:296:ASN:ND2	2.43	0.43
1:A:242:ILE:HG13	1:A:246:THR:HB	2.00	0.43
3:D:255:GLU:OE1	3:D:324:ARG:NE	2.44	0.43
1:A:267:VAL:HB	1:A:305:MET:HB2	2.01	0.42
2:B:981:ASP:HB2	2:B:1159:LEU:HD13	2.01	0.42
4:E:49:LYS:HD2	4:E:49:LYS:HA	1.73	0.42
4:E:259:ASN:ND2	4:E:260:GLU:O	2.52	0.42
2:B:1220:GLU:HB3	2:B:1223:TRP:HD1	1.84	0.42
4:E:397:LYS:HA	4:E:397:LYS:HD3	1.87	0.42
3:F:370:VAL:HA	3:F:373:TYR:HB2	2.01	0.42
4:G:263:CYS:SG	4:G:268:GLN:O	2.65	0.42
4:E:46:TYR:HB2	4:E:51:ARG:NH1	2.34	0.42
4:G:289:PRO:HB2	4:G:291:ILE:HG23	2.01	0.42
3:D:384:ASP:OD1	3:D:384:ASP:N	2.43	0.42
1:A:377:PHE:HA	1:A:380:LEU:HB2	2.02	0.42
4:E:37:LYS:H	4:E:37:LYS:HD2	1.85	0.42
3:F:355:LEU:HD23	3:F:355:LEU:HA	1.93	0.42
2:B:757:ARG:HB3	3:D:380:ASN:HA	2.02	0.42
2:B:763:THR:HG23	2:B:780:ASP:HB2	2.02	0.42
4:E:391:TYR:N	4:E:401:TYR:OH	2.53	0.42
4:E:509:LEU:CD1	3:F:348:ASP:HB3	2.50	0.42
1:A:20:ARG:NH2	1:A:137:GLY:O	2.53	0.42
1:A:376:ILE:HD13	1:A:376:ILE:HA	1.94	0.42
3:D:256:MET:HE2	3:D:256:MET:HB3	1.86	0.42
3:D:295:ASN:HD22	4:E:343:ILE:HG13	1.85	0.42
1:A:141:VAL:HG22	1:A:305:MET:HG2	2.01	0.42
1:A:179:ARG:HH12	1:A:263:GLN:HB2	1.85	0.42
3:F:347:MET:HE2	3:F:352:CYS:HA	2.02	0.42
2:B:666:VAL:HG23	2:B:667:THR:HG23	2.01	0.41
4:E:321:LYS:HG3	4:E:324:SER:H	1.85	0.41
3:F:291:LYS:HD3	4:G:340:LEU:HD22	2.02	0.41
1:A:47:MET:H	1:A:47:MET:HG2	1.72	0.41
2:B:695:ASP:O	4:E:476:LYS:NZ	2.42	0.41
4:E:556:TYR:HD2	3:F:273:GLY:HA2	1.86	0.41
4:E:562:GLN:NE2	4:E:563:LYS:HD2	2.35	0.41
1:A:255:ILE:HD13	1:A:255:ILE:HA	1.88	0.41
1:A:149:LEU:HD13	1:A:162:TYR:H	1.85	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:E:276:ASP:OD1	4:E:276:ASP:N	2.49	0.41
3:F:229:LYS:HD2	4:G:357:ILE:HG12	2.03	0.41
1:A:315:MET:HA	1:A:318:VAL:HG12	2.01	0.41
3:D:273:GLY:O	3:D:276:SER:OG	2.38	0.41
4:E:365:LYS:N	4:E:373:SER:O	2.54	0.41
4:E:393:GLN:HB3	4:E:459:ASN:ND2	2.36	0.41
4:E:509:LEU:CG	3:F:348:ASP:HB3	2.51	0.41
2:B:951:GLU:O	2:B:955:ILE:HG22	2.21	0.41
2:B:977:PHE:HB3	2:B:1312:VAL:O	2.21	0.41
2:B:1289:GLN:O	2:B:1292:SER:OG	2.34	0.41
3:F:284:GLY:HA2	4:G:333:VAL:HG13	2.03	0.41
1:A:67:LYS:HE3	1:A:67:LYS:HB3	1.89	0.41
1:A:74:MET:HB2	1:A:163:LEU:HD11	2.02	0.41
1:A:187:VAL:HG23	1:A:188:HIS:CD2	2.56	0.41
2:B:999:THR:HG22	2:B:1001:ALA:H	1.86	0.41
3:D:236:TRP:O	3:D:240:THR:OG1	2.33	0.41
4:E:33:LYS:N	4:E:34:LYS:HZ3	2.19	0.41
4:E:51:ARG:HG2	4:E:52:LYS:H	1.86	0.41
2:B:664:GLU:OE1	2:B:719:TRP:NE1	2.54	0.41
2:B:1291:ARG:HD2	2:B:1291:ARG:HA	1.91	0.41
1:A:174:LEU:HD21	1:A:203:VAL:HG23	2.02	0.40
4:E:49:LYS:HB3	4:E:50:ARG:H	1.64	0.40
4:E:275:CYS:SG	4:E:276:ASP:N	2.93	0.40
4:G:355:ASN:OD1	4:G:355:ASN:N	2.51	0.40
4:E:51:ARG:HG2	4:E:52:LYS:N	2.36	0.40
4:G:320:LYS:NZ	4:G:321:LYS:O	2.52	0.40
1:A:182:TYR:HD2	1:A:205:THR:HB	1.86	0.40
1:A:258:ILE:HG13	1:A:380:LEU:HD11	2.03	0.40
2:B:687:LYS:HA	4:E:520:ILE:HD11	2.04	0.40
2:B:1194:MET:HG3	2:B:1196:LEU:HD13	2.04	0.40
4:E:42:GLN:CG	4:E:46:TYR:OH	2.53	0.40
4:E:292:ASP:OD1	4:E:292:ASP:N	2.54	0.40
3:F:253:THR:H	3:F:256:MET:HE1	1.87	0.40
2:B:994:THR:HG21	2:B:1212:ARG:HG3	2.04	0.40
4:E:395:ILE:HG23	4:E:401:TYR:HD2	1.85	0.40
1:A:86:LEU:HD23	1:A:86:LEU:HA	1.89	0.40
3:D:375:ASN:OD1	3:D:375:ASN:N	2.54	0.40
4:E:44:VAL:HG13	4:E:45:ASN:N	2.35	0.40
3:F:366:LEU:HD23	3:F:366:LEU:HA	1.94	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 PDB entries followed by that with respect to all EM entries.

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	402/433 (93%)	381 (95%)	21 (5%)	0	100	100
2	B	533/1371 (39%)	505 (95%)	28 (5%)	0	100	100
3	D	180/401 (45%)	174 (97%)	6 (3%)	0	100	100
3	F	150/401 (37%)	140 (93%)	10 (7%)	0	100	100
4	E	326/733 (44%)	286 (88%)	40 (12%)	0	100	100
4	G	129/733 (18%)	121 (94%)	8 (6%)	0	100	100
All	All	1720/4072 (42%)	1607 (93%)	113 (7%)	0	100	100

There are no Ramachandran outliers to report.

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 PDB entries followed by that with respect to all EM entries.

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	343/367 (94%)	342 (100%)	1 (0%)	91	96
2	B	501/1247 (40%)	493 (98%)	8 (2%)	58	76
3	D	171/359 (48%)	171 (100%)	0	100	100
3	F	145/359 (40%)	143 (99%)	2 (1%)	62	79
4	E	318/692 (46%)	314 (99%)	4 (1%)	65	81
4	G	130/692 (19%)	130 (100%)	0	100	100
All	All	1608/3716 (43%)	1593 (99%)	15 (1%)	74	86

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	40	MET
2	B	958	ASP
2	B	960	THR
2	B	963	LYS
2	B	964	ILE
2	B	967	LEU
2	B	970	LYS
2	B	975	LEU
2	B	977	PHE
4	E	41	SER
4	E	44	VAL
4	E	49	LYS
4	E	50	ARG
3	F	245	ILE
3	F	348	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	76	GLN
1	A	270	GLN
1	A	379	ASN
1	A	419	GLN
2	B	663	ASN
2	B	722	ASN
2	B	824	ASN
2	B	848	ASN
2	B	961	ASN
2	B	1165	ASN
2	B	1247	GLN
3	D	295	ASN
3	D	353	GLN
4	E	346	HIS
4	E	422	GLN
4	E	433	ASN
4	E	499	ASN
4	E	519	ASN
4	E	562	GLN
4	G	313	ASN
4	G	325	ASN
4	G	350	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.