Full wwPDB EM Validation Report ⓘ

Jul 15, 2025 – 10:36 PM JST

PDB ID	:	8YG1 / pdb_00008yg1
EMDB ID	:	EMD-39233
Title	:	The Dimer Structure of DSR2 alone
Authors	:	Gao, X.; Zhu, H.; Cui, S.
Deposited on	:	2024-02-26
Resolution	:	3.74 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:

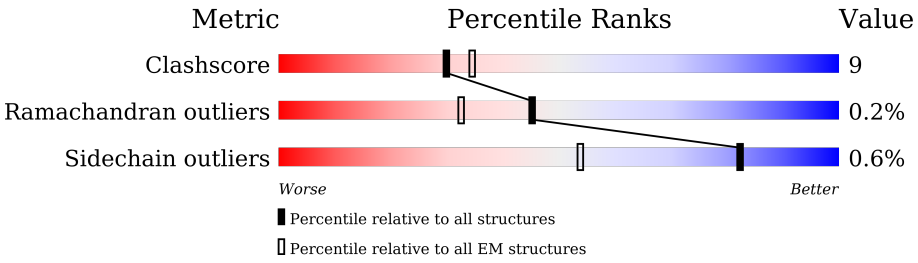
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0rc1
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)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

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.74 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 <=5%

Mol	Chain	Length	Quality of chain
1	A	1005	78% 21% .
1	B	1005	79% 20% .
1	C	1005	21% 6% 73%
1	D	1005	20% 7% 73%

2 Entry composition (i)

There is only 1 type of molecule in this entry. The entry contains 21026 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 SIR2-like domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	995	Total	C	N	O	S	0	0
			8285	5362	1336	1555	32		
1	B	995	Total	C	N	O	S	0	0
			8285	5362	1336	1555	32		
1	C	272	Total	C	N	O	S	0	0
			2220	1432	360	421	7		
1	D	274	Total	C	N	O	S	0	0
			2236	1440	364	425	7		

There are 4 discrepancies between the modelled and reference sequences:

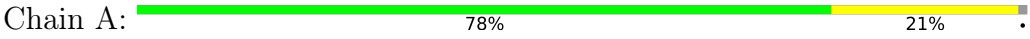
Chain	Residue	Modelled	Actual	Comment	Reference
A	171	ALA	HIS	engineered mutation	UNP D4G637
B	171	ALA	HIS	engineered mutation	UNP D4G637
C	171	ALA	HIS	engineered mutation	UNP D4G637
D	171	ALA	HIS	engineered mutation	UNP D4G637

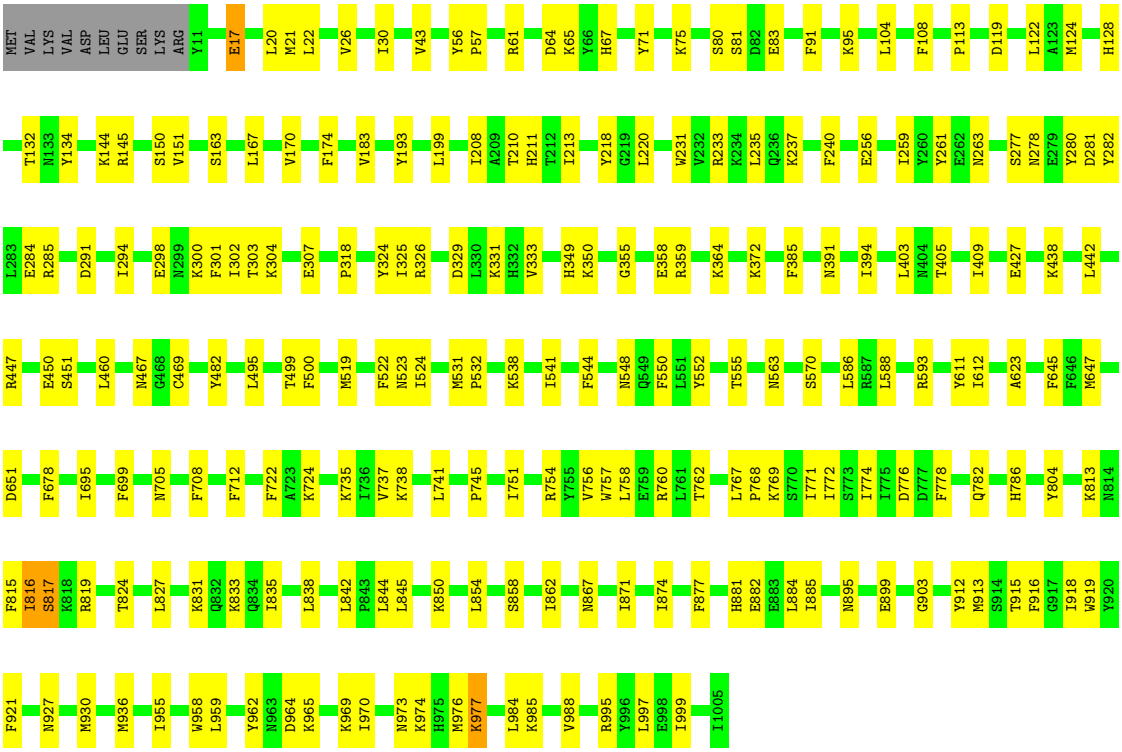
3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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: SIR2-like domain-containing protein

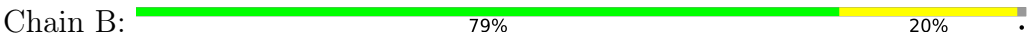
Chain A:

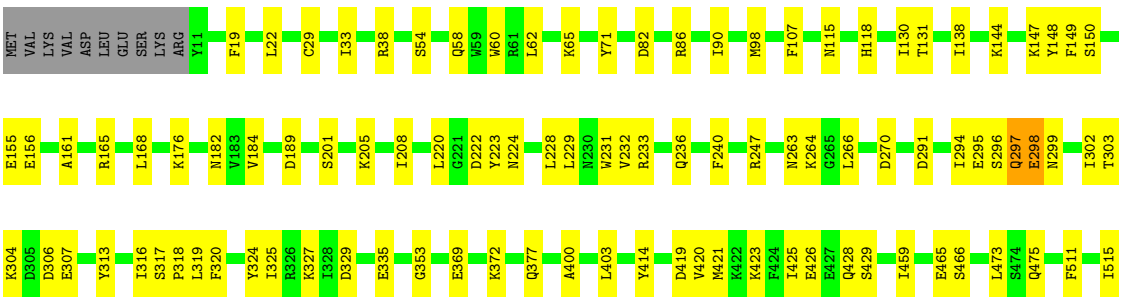


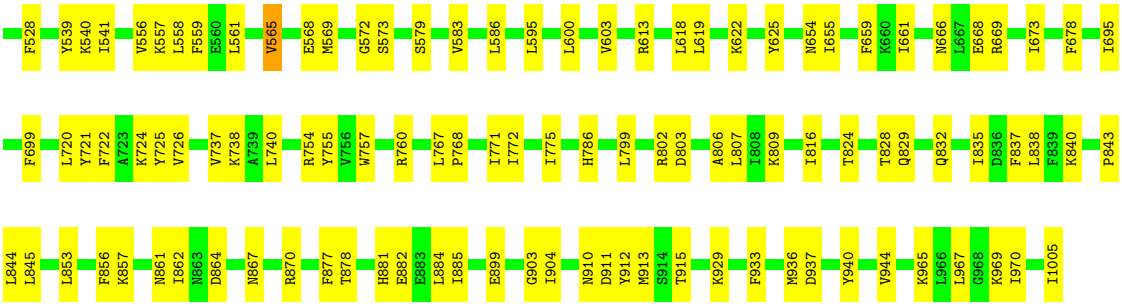


• Molecule 1: SIR2-like domain-containing protein

Chain B:

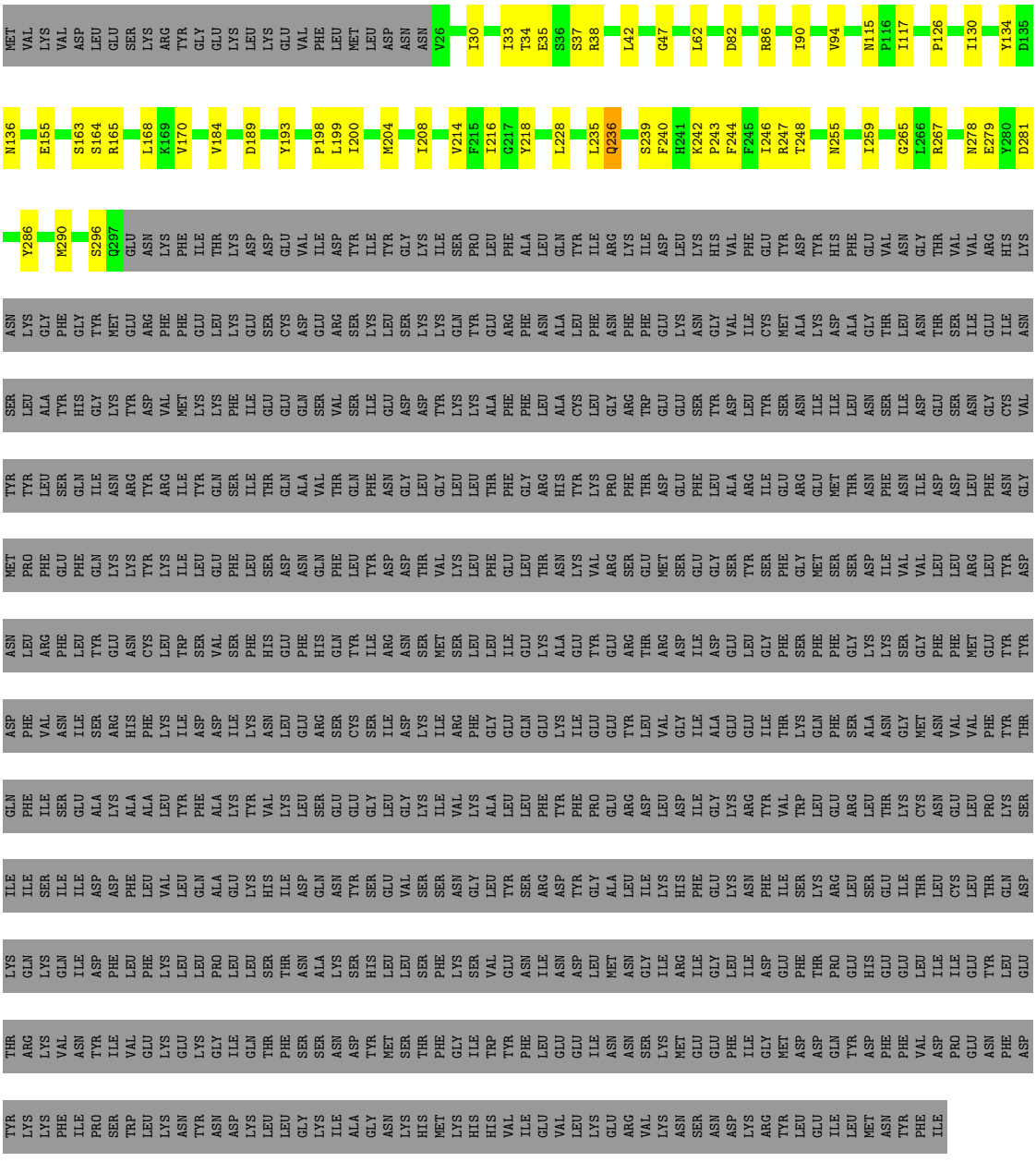






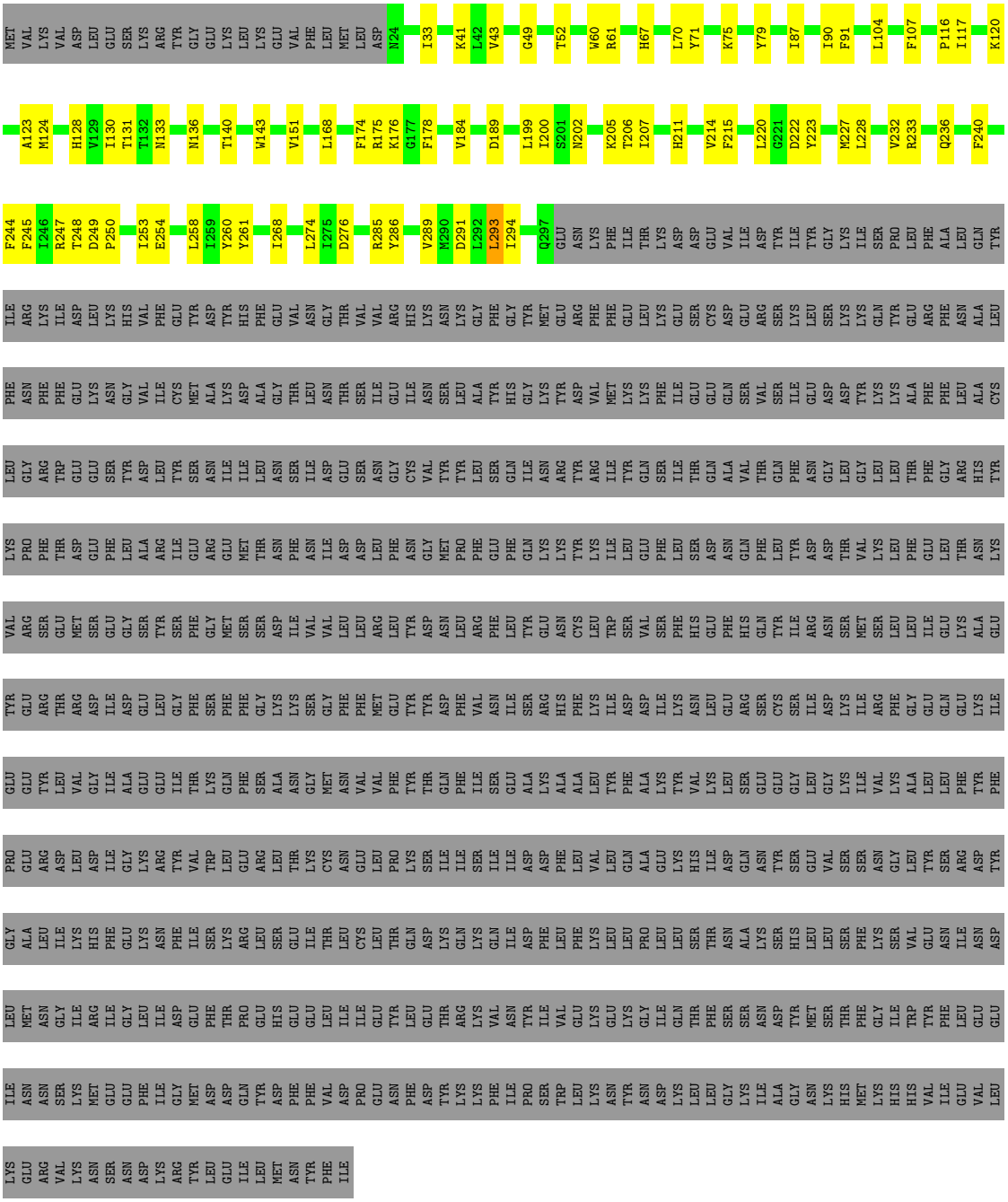
• Molecule 1: SIR2-like domain-containing protein

Chain C:



• Molecule 1: SIR2-like domain-containing protein

Chain D:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	206225	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	66	Depositor
Minimum defocus (nm)	1800	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	0.15	0/8478	0.40	1/11418 (0.0%)
1	B	0.16	0/8478	0.41	2/11418 (0.0%)
1	C	0.14	0/2274	0.40	0/3082
1	D	0.15	0/2290	0.42	0/3104
All	All	0.16	0/21520	0.40	3/29022 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	768	PRO	CA-N-CD	-7.90	100.94	112.00
1	B	565	VAL	N-CA-C	-5.57	107.86	113.20
1	A	113	PRO	CA-N-CD	-5.36	104.50	112.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	297	GLN	Peptide

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	8285	0	8120	149	0
1	B	8285	0	8120	142	0
1	C	2220	0	2173	40	0
1	D	2236	0	2185	54	0
All	All	21026	0	20598	372	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 9.

All (372) 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:842:LEU:O	1:A:850:LYS:NZ	2.16	0.78
1:B:724:LYS:HD3	1:B:760:ARG:HD3	1.66	0.78
1:B:724:LYS:HZ2	1:B:725:TYR:HE2	1.33	0.77
1:B:400:ALA:HB1	1:B:403:LEU:HD11	1.65	0.77
1:A:531:MET:HE3	1:A:532:PRO:HD2	1.67	0.77
1:B:291:ASP:HA	1:B:294:ILE:HG22	1.68	0.74
1:B:465:GLU:HG2	1:B:466:SER:H	1.53	0.73
1:B:291:ASP:O	1:B:295:GLU:HB3	1.89	0.73
1:C:244:PHE:HE2	1:C:267:ARG:HD2	1.55	0.71
1:A:824:THR:HG23	1:A:838:LEU:HD13	1.72	0.71
1:C:278:ASN:ND2	1:C:281:ASP:OD1	2.24	0.71
1:A:936:MET:HE3	1:A:936:MET:HA	1.73	0.70
1:B:303:THR:OG1	1:B:304:LYS:NZ	2.24	0.70
1:A:588:LEU:HD11	1:A:612:ILE:HG12	1.74	0.70
1:C:290:MET:HE3	1:C:290:MET:HA	1.74	0.69
1:A:145:ARG:NH1	1:A:145:ARG:O	2.27	0.68
1:B:824:THR:HG23	1:B:838:LEU:HD13	1.75	0.67
1:C:199:LEU:HD11	1:D:236:GLN:HG2	1.75	0.67
1:B:222:ASP:O	1:B:224:ASN:N	2.27	0.67
1:B:82:ASP:O	1:B:86:ARG:NH1	2.28	0.66
1:D:131:THR:OG1	1:D:133:ASN:OD1	2.13	0.66
1:B:302:ILE:HG23	1:B:307:GLU:HB2	1.76	0.66
1:B:465:GLU:HG2	1:B:466:SER:N	2.10	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:210:THR:O	1:A:211:HIS:ND1	2.28	0.66
1:A:844:LEU:O	1:A:850:LYS:NZ	2.28	0.65
1:B:767:LEU:HB2	1:B:771:ILE:HB	1.77	0.65
1:D:87:ILE:HA	1:D:90:ILE:HD12	1.78	0.65
1:D:249:ASP:O	1:D:285:ARG:NH2	2.29	0.65
1:A:119:ASP:OD2	1:A:144:LYS:NZ	2.27	0.65
1:A:769:LYS:HA	1:A:772:ILE:HG12	1.78	0.65
1:B:565:VAL:HG12	1:B:622:LYS:HE3	1.79	0.65
1:A:17:GLU:HG3	1:A:21:MET:HE1	1.78	0.64
1:A:570:SER:OG	1:B:669:ARG:NH1	2.30	0.64
1:B:229:LEU:HD21	1:B:266:LEU:HD11	1.80	0.64
1:B:558:LEU:HD12	1:B:618:LEU:HD12	1.80	0.64
1:A:885:ILE:HG12	1:A:916:PHE:HE1	1.63	0.63
1:B:150:SER:OG	1:B:165:ARG:O	2.17	0.63
1:B:65:LYS:HZ1	1:B:107:PHE:HD1	1.45	0.63
1:D:184:VAL:HG13	1:D:189:ASP:HB3	1.81	0.62
1:B:38:ARG:NH2	1:B:297:GLN:O	2.32	0.62
1:B:156:GLU:N	1:B:156:GLU:OE1	2.30	0.62
1:C:90:ILE:HD12	1:C:90:ILE:H	1.64	0.61
1:A:767:LEU:HD11	1:A:771:ILE:HB	1.82	0.61
1:B:878:THR:O	1:B:882:GLU:N	2.27	0.61
1:A:827:LEU:HD13	1:A:835:ILE:HG22	1.83	0.61
1:A:256:GLU:N	1:A:256:GLU:OE1	2.33	0.60
1:B:229:LEU:HD12	1:B:264:LYS:HB3	1.83	0.60
1:B:862:ILE:HD11	1:B:885:ILE:HG13	1.83	0.60
1:B:428:GLN:OE1	1:B:429:SER:N	2.33	0.60
1:A:611:TYR:HA	1:B:559:PHE:CZ	2.37	0.60
1:B:856:PHE:CE2	1:B:857:LYS:HG2	2.36	0.60
1:D:205:LYS:HD2	1:D:232:VAL:HG11	1.83	0.60
1:A:151:VAL:HG22	1:A:167:LEU:HD23	1.84	0.60
1:C:163:SER:OG	1:C:164:SER:N	2.33	0.60
1:B:899:GLU:O	1:B:903:GLY:N	2.35	0.59
1:C:184:VAL:HG23	1:C:189:ASP:HB3	1.85	0.59
1:A:915:THR:HA	1:A:918:ILE:HD12	1.85	0.59
1:B:220:LEU:HD21	1:B:247:ARG:HD2	1.84	0.58
1:B:881:HIS:O	1:B:885:ILE:HD12	2.03	0.58
1:A:988:VAL:HG21	1:A:997:LEU:HD13	1.84	0.58
1:B:724:LYS:NZ	1:B:725:TYR:HE2	2.00	0.58
1:D:245:PHE:HB3	1:D:268:ILE:HG22	1.84	0.58
1:A:842:LEU:HD22	1:A:871:ILE:HD12	1.84	0.58
1:C:170:VAL:O	1:C:193:TYR:OH	2.20	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:699:PHE:CE2	1:A:745:PRO:HG3	2.38	0.58
1:B:809:LYS:HE2	1:B:843:PRO:HB2	1.85	0.58
1:A:291:ASP:HA	1:A:294:ILE:HG22	1.85	0.58
1:A:405:THR:HG21	1:A:586:LEU:HD11	1.86	0.58
1:A:758:LEU:O	1:A:762:THR:HG23	2.04	0.57
1:B:19:PHE:HA	1:B:22:LEU:HD12	1.87	0.57
1:C:117:ILE:HD11	1:C:286:TYR:HB3	1.86	0.57
1:A:552:TYR:CZ	1:B:556:VAL:HG13	2.39	0.57
1:A:844:LEU:HD12	1:A:845:LEU:HB2	1.87	0.57
1:B:233:ARG:NH1	1:B:263:ASN:O	2.38	0.57
1:C:204:MET:O	1:C:208:ILE:HG22	2.05	0.57
1:B:421:MET:O	1:B:425:ILE:HG13	2.04	0.57
1:A:56:TYR:CD1	1:A:57:PRO:HD2	2.40	0.56
1:A:854:LEU:O	1:A:858:SER:OG	2.20	0.56
1:C:126:PRO:O	1:C:165:ARG:NH2	2.36	0.56
1:A:899:GLU:O	1:A:903:GLY:N	2.39	0.56
1:B:828:THR:OG1	1:B:829:GLN:N	2.32	0.56
1:D:247:ARG:HD2	1:D:253:ILE:HD12	1.88	0.56
1:A:132:THR:HG1	1:A:218:TYR:HH	1.54	0.56
1:A:548:ASN:HB2	1:A:552:TYR:HE2	1.71	0.56
1:B:270:ASP:OD1	1:B:270:ASP:N	2.35	0.56
1:C:204:MET:HE1	1:C:228:LEU:HD22	1.86	0.56
1:B:569:MET:HE1	1:B:625:TYR:HB3	1.88	0.56
1:A:174:PHE:CE1	1:A:183:VAL:HG11	2.41	0.56
1:D:43:VAL:HG22	1:D:128:HIS:HB2	1.88	0.55
1:A:995:ARG:O	1:A:999:ILE:HG13	2.07	0.55
1:A:394:ILE:HD13	1:A:403:LEU:HD22	1.89	0.55
1:B:565:VAL:O	1:B:569:MET:HG3	2.07	0.55
1:B:297:GLN:HE22	1:B:299:ASN:CG	2.15	0.55
1:A:427:GLU:O	1:A:438:LYS:NZ	2.38	0.55
1:D:67:HIS:CE1	1:D:71:TYR:HD2	2.25	0.55
1:A:43:VAL:HG22	1:A:128:HIS:HB2	1.89	0.54
1:B:414:TYR:OH	1:B:654:ASN:OD1	2.17	0.54
1:C:255:ASN:O	1:C:259:ILE:HG13	2.08	0.54
1:C:90:ILE:O	1:C:94:VAL:HG12	2.08	0.54
1:A:724:LYS:HD2	1:A:760:ARG:HG3	1.89	0.54
1:C:30:ILE:HA	1:C:33:ILE:HD12	1.89	0.54
1:D:168:LEU:HD11	1:D:200:ILE:HD12	1.88	0.54
1:A:913:MET:HA	1:A:916:PHE:HD2	1.72	0.54
1:B:655:ILE:HG21	1:B:722:PHE:CE2	2.43	0.54
1:C:239:SER:OG	1:C:239:SER:O	2.21	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:244:PHE:CE2	1:C:267:ARG:HD2	2.39	0.54
1:D:176:LYS:HB2	1:D:176:LYS:HZ3	1.73	0.54
1:A:95:LYS:HD2	1:A:95:LYS:O	2.08	0.53
1:A:302:ILE:HB	1:A:304:LYS:HG3	1.89	0.53
1:B:561:LEU:HD23	1:B:565:VAL:HB	1.89	0.53
1:A:815:PHE:O	1:A:817:SER:N	2.41	0.53
1:B:296:SER:O	1:B:296:SER:OG	2.21	0.53
1:B:862:ILE:HD13	1:B:884:LEU:HB3	1.90	0.53
1:A:816:ILE:HG23	1:A:845:LEU:H	1.73	0.53
1:A:233:ARG:NH2	1:A:263:ASN:O	2.41	0.53
1:B:720:LEU:HD13	1:B:740:LEU:HD13	1.91	0.53
1:A:776:ASP:HB3	1:A:819:ARG:HH21	1.72	0.53
1:A:134:TYR:HB2	1:A:174:PHE:HE1	1.74	0.53
1:A:324:TYR:HD1	1:A:325:ILE:N	2.07	0.53
1:B:867:ASN:HA	1:B:870:ARG:HG2	1.90	0.53
1:C:37:SER:HB3	1:C:42:LEU:HD22	1.90	0.53
1:C:155:GLU:OE1	1:C:198:PRO:HD2	2.08	0.53
1:B:149:PHE:CE1	1:B:165:ARG:HD3	2.44	0.52
1:B:297:GLN:O	1:B:298:GLU:HB2	2.09	0.52
1:C:216:ILE:HG22	1:C:246:ILE:HG12	1.91	0.52
1:A:552:TYR:CD2	1:B:556:VAL:HG22	2.44	0.52
1:A:359:ARG:O	1:A:359:ARG:HD3	2.10	0.52
1:A:969:LYS:HZ3	1:A:973:ASN:HB3	1.75	0.52
1:B:316:ILE:HG22	1:B:320:PHE:HE1	1.74	0.52
1:B:737:VAL:HG11	1:B:771:ILE:HG23	1.91	0.52
1:D:124:MET:HE2	1:D:124:MET:N	2.24	0.52
1:A:959:LEU:HD22	1:A:962:TYR:HE1	1.75	0.51
1:B:335:GLU:N	1:B:335:GLU:OE1	2.43	0.51
1:A:552:TYR:O	1:A:555:THR:HG22	2.10	0.51
1:A:482:TYR:HD2	1:A:519:MET:HE2	1.76	0.51
1:D:70:LEU:HD21	1:D:91:PHE:HA	1.93	0.51
1:A:17:GLU:HA	1:A:20:LEU:HD12	1.93	0.51
1:A:409:ILE:HG12	1:A:593:ARG:HG3	1.93	0.51
1:D:274:LEU:HD12	1:D:289:VAL:HG12	1.92	0.51
1:B:58:GLN:HE21	1:B:60:TRP:CD1	2.29	0.50
1:A:912:TYR:O	1:A:915:THR:N	2.43	0.50
1:A:927:ASN:HB3	1:A:930:MET:HE3	1.91	0.50
1:B:913:MET:SD	1:B:913:MET:N	2.81	0.50
1:A:824:THR:HG21	1:A:845:LEU:HD21	1.93	0.50
1:A:233:ARG:HH11	1:A:240:PHE:HZ	1.58	0.50
1:A:364:LYS:HZ1	1:A:385:PHE:HD1	1.60	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:974:LYS:O	1:A:977:LYS:HE2	2.11	0.50
1:D:220:LEU:HD21	1:D:261:TYR:CE2	2.46	0.50
1:A:67:HIS:CE1	1:A:71:TYR:HD2	2.29	0.50
1:A:958:TRP:H	1:A:958:TRP:CD1	2.28	0.50
1:B:668:GLU:HG3	1:B:673:ILE:HD12	1.94	0.50
1:B:54:SER:OG	1:B:115:ASN:ND2	2.34	0.50
1:D:220:LEU:HD11	1:D:261:TYR:CZ	2.47	0.50
1:C:247:ARG:HG3	1:C:247:ARG:HH11	1.77	0.50
1:C:35:GLU:OE2	1:C:38:ARG:NH2	2.45	0.49
1:A:318:PRO:HG2	1:A:538:LYS:HD2	1.94	0.49
1:B:231:TRP:CE3	1:B:232:VAL:HG22	2.48	0.49
1:B:511:PHE:O	1:B:515:ILE:HG23	2.12	0.49
1:A:751:ILE:HA	1:A:754:ARG:HD2	1.94	0.49
1:A:64:ASP:OD1	1:A:65:LYS:N	2.45	0.49
1:A:921:PHE:HE2	1:A:970:ILE:HG13	1.78	0.49
1:B:740:LEU:HD21	1:B:757:TRP:HB3	1.94	0.49
1:B:837:PHE:HA	1:B:840:LYS:HE2	1.95	0.49
1:A:969:LYS:O	1:A:969:LYS:NZ	2.36	0.49
1:B:232:VAL:HG11	1:B:240:PHE:CZ	2.48	0.49
1:A:220:LEU:HD22	1:A:261:TYR:HE2	1.77	0.48
1:B:835:ILE:HB	1:B:857:LYS:NZ	2.29	0.48
1:B:724:LYS:HD3	1:B:760:ARG:CD	2.40	0.48
1:B:899:GLU:HB3	1:B:904:ILE:O	2.14	0.48
1:B:835:ILE:HA	1:B:838:LEU:HD12	1.95	0.48
1:C:236:GLN:NE2	1:D:199:LEU:HD21	2.29	0.48
1:A:916:PHE:HA	1:A:919:TRP:CE3	2.48	0.48
1:D:253:ILE:HD13	1:D:268:ILE:HD12	1.95	0.48
1:A:349:HIS:C	1:A:350:LYS:HD3	2.38	0.48
1:A:623:ALA:HB2	1:A:645:PHE:HB3	1.95	0.48
1:A:867:ASN:O	1:A:871:ILE:HG12	2.14	0.48
1:A:973:ASN:OD1	1:A:976:MET:HG3	2.14	0.48
1:B:459:ILE:HD12	1:B:475:GLN:HG2	1.96	0.48
1:C:214:VAL:HG22	1:C:244:PHE:HB2	1.95	0.48
1:B:738:LYS:HB2	1:B:738:LYS:HE3	1.62	0.47
1:D:151:VAL:HG21	1:D:175:ARG:HH21	1.79	0.47
1:A:831:LYS:O	1:A:833:LYS:N	2.47	0.47
1:B:473:LEU:HD22	1:B:600:LEU:HD21	1.95	0.47
1:B:937:ASP:OD2	1:B:940:TYR:N	2.45	0.47
1:A:737:VAL:HG11	1:A:771:ILE:HG23	1.96	0.47
1:B:661:ILE:HD11	1:B:721:TYR:CG	2.49	0.47
1:A:277:SER:OG	1:A:278:ASN:N	2.44	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:248:THR:HG21	1:C:286:TYR:CZ	2.49	0.47
1:A:324:TYR:CE2	1:A:593:ARG:HD3	2.50	0.47
1:D:60:TRP:CZ3	1:D:61:ARG:HG3	2.50	0.47
1:D:248:THR:HG21	1:D:286:TYR:CD1	2.49	0.47
1:A:913:MET:HA	1:A:916:PHE:CD2	2.49	0.47
1:A:885:ILE:HG12	1:A:916:PHE:CE1	2.47	0.47
1:B:299:ASN:HB2	1:B:353:GLY:HA3	1.97	0.47
1:C:199:LEU:HD11	1:D:236:GLN:HE21	1.80	0.47
1:C:248:THR:HG21	1:C:286:TYR:CE1	2.50	0.47
1:B:967:LEU:O	1:B:970:ILE:HG22	2.15	0.46
1:D:222:ASP:OD1	1:D:223:TYR:N	2.49	0.46
1:B:568:GLU:OE2	1:B:573:SER:OG	2.32	0.46
1:B:772:ILE:O	1:B:775:ILE:HG22	2.15	0.46
1:D:202:ASN:O	1:D:206:THR:HG22	2.15	0.46
1:D:215:PHE:N	1:D:244:PHE:O	2.42	0.46
1:D:258:LEU:HD12	1:D:268:ILE:HD11	1.97	0.46
1:A:75:LYS:HE2	1:A:75:LYS:HB2	1.73	0.46
1:C:117:ILE:CD1	1:C:286:TYR:HB3	2.44	0.46
1:A:67:HIS:O	1:A:67:HIS:ND1	2.48	0.46
1:A:301:PHE:HA	1:A:307:GLU:OE1	2.15	0.46
1:A:695:ILE:HG12	1:A:712:PHE:HE2	1.81	0.46
1:B:115:ASN:HD21	1:B:118:HIS:CE1	2.34	0.46
1:D:214:VAL:HG22	1:D:244:PHE:HB2	1.97	0.46
1:B:149:PHE:HE1	1:B:165:ARG:HD3	1.79	0.46
1:D:250:PRO:HA	1:D:285:ARG:NH1	2.30	0.46
1:A:80:SER:OG	1:A:81:SER:N	2.49	0.46
1:A:442:LEU:HB3	1:A:451:SER:HB3	1.97	0.46
1:A:678:PHE:HZ	1:A:722:PHE:HE1	1.64	0.46
1:B:845:LEU:HD23	1:B:853:LEU:HD21	1.97	0.46
1:A:958:TRP:CD1	1:A:958:TRP:N	2.83	0.46
1:B:130:ILE:HG23	1:B:168:LEU:HB3	1.98	0.46
1:B:306:ASP:HA	1:B:377:GLN:NE2	2.31	0.46
1:A:563:ASN:HD22	1:A:563:ASN:HA	1.62	0.45
1:A:985:LYS:HD3	1:B:1005:ILE:HG22	1.98	0.45
1:B:201:SER:O	1:B:205:LYS:HG2	2.17	0.45
1:B:655:ILE:HG21	1:B:722:PHE:HE2	1.79	0.45
1:D:116:PRO:C	1:D:120:LYS:HE2	2.41	0.45
1:B:844:LEU:HD12	1:B:845:LEU:HB2	1.98	0.45
1:B:832:GLN:HA	1:B:835:ILE:HD11	1.99	0.45
1:D:117:ILE:HA	1:D:120:LYS:HE2	1.98	0.45
1:A:281:ASP:HB3	1:A:284:GLU:HB2	1.98	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:182:ASN:OD1	1:B:182:ASN:N	2.50	0.45
1:B:803:ASP:O	1:B:806:ALA:HB3	2.17	0.45
1:C:242:LYS:NZ	1:C:265:GLY:HA2	2.32	0.45
1:A:104:LEU:O	1:A:108:PHE:HB2	2.16	0.45
1:D:222:ASP:OD1	1:D:222:ASP:C	2.60	0.45
1:B:62:LEU:HD12	1:B:62:LEU:HA	1.80	0.45
1:B:423:LYS:HD2	1:B:423:LYS:O	2.16	0.45
1:A:282:TYR:HD1	1:A:285:ARG:HH12	1.64	0.45
1:A:442:LEU:HD23	1:A:442:LEU:HA	1.84	0.45
1:A:955:ILE:HB	1:A:958:TRP:NE1	2.32	0.45
1:D:220:LEU:HD21	1:D:261:TYR:HE2	1.82	0.44
1:A:91:PHE:CE1	1:A:95:LYS:HG3	2.52	0.44
1:A:220:LEU:HD23	1:A:220:LEU:HA	1.77	0.44
1:A:298:GLU:CD	1:A:300:LYS:HG2	2.43	0.44
1:A:531:MET:HE3	1:A:532:PRO:CD	2.44	0.44
1:B:147:LYS:HD3	1:B:147:LYS:HA	1.87	0.44
1:C:34:THR:HG21	1:C:296:SER:HB2	1.99	0.44
1:C:235:LEU:HD12	1:C:235:LEU:O	2.18	0.44
1:C:247:ARG:HG3	1:C:247:ARG:NH1	2.31	0.44
1:B:809:LYS:HZ3	1:B:843:PRO:HD2	1.82	0.44
1:A:237:LYS:HB3	1:A:237:LYS:NZ	2.33	0.44
1:A:326:ARG:HB2	1:A:329:ASP:HB3	2.00	0.44
1:A:964:ASP:OD1	1:A:965:LYS:N	2.51	0.44
1:A:372:LYS:HD3	1:A:372:LYS:N	2.33	0.44
1:A:756:VAL:HG12	1:A:757:TRP:HD1	1.82	0.44
1:A:815:PHE:HE2	1:A:844:LEU:HD22	1.82	0.44
1:B:755:TYR:CE2	1:B:807:LEU:HD11	2.53	0.44
1:A:850:LYS:HG2	1:A:854:LEU:HD23	1.99	0.44
1:A:877:PHE:HE2	1:A:882:GLU:HG3	1.83	0.44
1:B:678:PHE:HE2	1:B:725:TYR:HD1	1.66	0.44
1:B:754:ARG:HE	1:B:754:ARG:HB2	1.67	0.44
1:D:49:GLY:O	1:D:52:THR:HG22	2.18	0.44
1:A:532:PRO:HG3	1:B:148:TYR:CE1	2.53	0.44
1:B:318:PRO:O	1:B:539:TYR:OH	2.18	0.44
1:B:595:LEU:HB3	1:B:603:VAL:HG12	2.00	0.44
1:D:41:LYS:HG3	1:D:211:HIS:CD2	2.53	0.44
1:A:333:VAL:HG22	1:A:541:ILE:HD11	1.99	0.43
1:A:735:LYS:HD3	1:A:735:LYS:N	2.33	0.43
1:B:98:MET:HE2	1:B:98:MET:HB2	1.83	0.43
1:B:231:TRP:CZ3	1:B:232:VAL:HG22	2.52	0.43
1:B:965:LYS:O	1:B:969:LYS:HG2	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:528:PHE:HZ	1:B:540:LYS:HA	1.82	0.43
1:A:61:ARG:HA	1:A:64:ASP:OD2	2.18	0.43
1:A:170:VAL:HG13	1:A:193:TYR:OH	2.18	0.43
1:B:324:TYR:O	1:B:325:ILE:HD13	2.18	0.43
1:C:240:PHE:CE2	1:C:243:PRO:HD3	2.53	0.43
1:B:557:LYS:HE2	1:B:557:LYS:HB2	1.82	0.43
1:A:495:LEU:HB3	1:A:499:THR:OG1	2.19	0.43
1:A:973:ASN:OD1	1:A:973:ASN:C	2.60	0.43
1:A:26:VAL:O	1:A:30:ILE:HG12	2.18	0.43
1:B:666:ASN:OD1	1:B:666:ASN:C	2.62	0.43
1:C:82:ASP:O	1:C:86:ARG:HG3	2.19	0.43
1:D:61:ARG:HB3	1:D:107:PHE:HZ	1.83	0.43
1:B:329:ASP:OD1	1:B:541:ILE:HD12	2.18	0.43
1:D:128:HIS:CD2	1:D:207:ILE:HD11	2.54	0.43
1:A:895:ASN:O	1:A:899:GLU:HG3	2.17	0.43
1:B:569:MET:SD	1:B:622:LYS:HE2	2.58	0.43
1:B:579:SER:O	1:B:583:VAL:HG23	2.19	0.43
1:B:877:PHE:HD2	1:B:885:ILE:HD13	1.84	0.43
1:A:231:TRP:HD1	1:A:235:LEU:HD22	1.84	0.43
1:D:33:ILE:HG21	1:D:293:LEU:HD21	2.01	0.43
1:A:122:LEU:HD23	1:A:122:LEU:HA	1.85	0.43
1:A:544:PHE:HB2	1:A:550:PHE:HB3	2.00	0.43
1:B:176:LYS:HE2	1:B:176:LYS:HB2	1.60	0.43
1:B:772:ILE:HD13	1:B:772:ILE:HA	1.87	0.43
1:B:910:ASN:O	1:B:912:TYR:N	2.52	0.43
1:C:279:GLU:N	1:C:279:GLU:OE1	2.51	0.43
1:A:150:SER:HB3	1:A:163:SER:HB3	1.99	0.42
1:B:131:THR:HG21	1:B:138:ILE:HD13	2.00	0.42
1:D:130:ILE:HD11	1:D:207:ILE:HG21	2.01	0.42
1:D:140:THR:HA	1:D:143:TRP:CE3	2.54	0.42
1:D:276:ASP:OD2	1:D:276:ASP:N	2.52	0.42
1:A:331:LYS:HB3	1:A:331:LYS:HE3	1.82	0.42
1:A:442:LEU:HD22	1:A:447:ARG:HB2	2.00	0.42
1:A:782:GLN:HG2	1:A:786:HIS:CE1	2.54	0.42
1:A:208:ILE:HG12	1:A:213:ILE:HG13	2.01	0.42
1:A:647:MET:HG3	1:A:651:ASP:HB2	2.01	0.42
1:B:319:LEU:HD13	1:B:325:ILE:HG13	2.01	0.42
1:B:802:ARG:CZ	1:B:840:LYS:HG2	2.49	0.42
1:A:199:LEU:HD21	1:B:236:GLN:NE2	2.35	0.42
1:A:499:THR:HG22	1:A:500:PHE:CE1	2.54	0.42
1:A:874:ILE:HD13	1:A:881:HIS:CE1	2.54	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:799:LEU:HB3	1:B:803:ASP:CG	2.44	0.42
1:D:104:LEU:HD23	1:D:104:LEU:HA	1.84	0.42
1:D:233:ARG:HG3	1:D:240:PHE:CE1	2.53	0.42
1:A:467:ASN:O	1:A:469:CYS:N	2.40	0.42
1:A:813:LYS:HD3	1:A:813:LYS:HA	1.89	0.42
1:A:816:ILE:O	1:A:817:SER:HB3	2.20	0.42
1:B:313:TYR:CE1	1:B:317:SER:HB3	2.54	0.42
1:B:613:ARG:HA	1:B:659:PHE:CE1	2.54	0.42
1:B:861:ASN:HD21	1:B:864:ASP:HB2	1.85	0.42
1:D:67:HIS:NE2	1:D:75:LYS:HB2	2.33	0.42
1:D:174:PHE:CD1	1:D:178:PHE:HD1	2.37	0.42
1:A:999:ILE:HG13	1:A:999:ILE:H	1.67	0.42
1:B:71:TYR:OH	1:D:254:GLU:OE1	2.28	0.42
1:B:619:LEU:O	1:B:622:LYS:HB2	2.19	0.42
1:C:62:LEU:HD12	1:C:62:LEU:HA	1.77	0.42
1:C:115:ASN:OD1	1:C:117:ILE:HB	2.18	0.42
1:B:29:CYS:O	1:B:33:ILE:HG12	2.20	0.42
1:B:755:TYR:CD2	1:B:807:LEU:HD11	2.55	0.42
1:D:120:LYS:O	1:D:124:MET:HE3	2.20	0.42
1:A:778:PHE:HE2	1:A:804:TYR:CE1	2.38	0.42
1:B:327:LYS:C	1:B:329:ASP:H	2.28	0.42
1:B:929:LYS:O	1:B:933:PHE:N	2.52	0.42
1:D:248:THR:HG21	1:D:286:TYR:HD1	1.85	0.42
1:A:738:LYS:NZ	1:A:774:ILE:HG12	2.35	0.41
1:B:755:TYR:CE2	1:B:803:ASP:HB3	2.56	0.41
1:A:355:GLY:O	1:A:358:GLU:HB2	2.20	0.41
1:A:862:ILE:HB	1:A:884:LEU:HD22	2.02	0.41
1:B:90:ILE:HG12	1:D:260:TYR:CD2	2.55	0.41
1:B:115:ASN:ND2	1:B:118:HIS:CE1	2.89	0.41
1:B:419:ASP:OD1	1:B:420:VAL:HG23	2.20	0.41
1:A:80:SER:HB3	1:A:83:GLU:HB2	2.03	0.41
1:A:482:TYR:O	1:A:482:TYR:HD1	2.03	0.41
1:D:291:ASP:HA	1:D:294:ILE:HD12	2.02	0.41
1:A:984:LEU:HD23	1:A:984:LEU:HA	1.88	0.41
1:B:228:LEU:O	1:B:232:VAL:HG23	2.20	0.41
1:B:936:MET:SD	1:B:936:MET:N	2.94	0.41
1:B:568:GLU:O	1:B:572:GLY:N	2.44	0.41
1:C:130:ILE:HD12	1:C:168:LEU:HB3	2.03	0.41
1:A:741:LEU:HD22	1:A:778:PHE:CD2	2.56	0.41
1:B:369:GLU:OE2	1:B:372:LYS:NZ	2.54	0.41
1:B:940:TYR:O	1:B:944:VAL:HG23	2.20	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:117:ILE:HD12	1:D:117:ILE:H	1.86	0.41
1:A:302:ILE:HG22	1:A:303:THR:H	1.86	0.41
1:A:768:PRO:O	1:A:772:ILE:HG12	2.21	0.41
1:B:911:ASP:O	1:B:915:THR:HG23	2.20	0.41
1:C:168:LEU:HD11	1:C:200:ILE:HG23	2.03	0.41
1:A:460:LEU:HD21	1:B:144:LYS:HG2	2.03	0.41
1:A:524:ILE:HD12	1:A:524:ILE:HA	1.94	0.41
1:A:134:TYR:HB2	1:A:174:PHE:CE1	2.55	0.40
1:B:155:GLU:CD	1:B:155:GLU:H	2.28	0.40
1:B:695:ILE:HG23	1:B:699:PHE:CD2	2.56	0.40
1:D:227:MET:SD	1:D:228:LEU:HD12	2.62	0.40
1:A:705:ASN:HB3	1:A:708:PHE:HB3	2.04	0.40
1:B:184:VAL:HG23	1:B:189:ASP:HB3	2.03	0.40
1:A:22:LEU:HD23	1:A:22:LEU:HA	1.88	0.40
1:A:256:GLU:HA	1:A:259:ILE:HD12	2.03	0.40
1:A:522:PHE:HD2	1:A:523:ASN:N	2.18	0.40
1:B:655:ILE:O	1:B:659:PHE:HB2	2.22	0.40
1:B:208:ILE:HD13	1:B:228:LEU:HD11	2.03	0.40
1:C:47:GLY:HA3	1:C:218:TYR:CD1	2.56	0.40
1:D:75:LYS:HD3	1:D:79:TYR:CZ	2.57	0.40
1:D:123:ALA:C	1:D:124:MET:HE2	2.45	0.40

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	993/1005 (99%)	926 (93%)	65 (6%)	2 (0%)	44 72
1	B	993/1005 (99%)	926 (93%)	63 (6%)	4 (0%)	30 62
1	C	270/1005 (27%)	259 (96%)	11 (4%)	0	100 100
1	D	272/1005 (27%)	260 (96%)	12 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	2528/4020 (63%)	2371 (94%)	151 (6%)	6 (0%)	45 72

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	816	ILE
1	B	223	TYR
1	B	298	GLU
1	B	816	ILE
1	A	817	SER
1	B	161	ALA

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	912/922 (99%)	906 (99%)	6 (1%)	81 88
1	B	912/922 (99%)	908 (100%)	4 (0%)	89 93
1	C	244/922 (26%)	241 (99%)	3 (1%)	67 79
1	D	246/922 (27%)	244 (99%)	2 (1%)	79 85
All	All	2314/3688 (63%)	2299 (99%)	15 (1%)	82 90

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

Mol	Chain	Res	Type
1	A	17	GLU
1	A	124	MET
1	A	280	TYR
1	A	391	ASN
1	A	450	GLU
1	A	977	LYS
1	B	426	GLU
1	B	586	LEU
1	B	726	VAL

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Mol	Chain	Res	Type
1	B	786	HIS
1	C	134	TYR
1	C	136	ASN
1	C	236	GLN
1	D	136	ASN
1	D	293	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	549	GLN
1	A	563	ASN
1	A	765	ASN
1	A	829	GLN
1	A	863	ASN
1	B	115	ASN
1	B	236	GLN
1	B	297	GLN
1	B	349	HIS
1	B	536	GLN
1	B	658	HIS
1	B	782	GLN
1	B	978	HIS
1	D	93	ASN
1	D	160	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 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.