



## wwPDB EM Map/Model Validation Report ⓘ

Apr 10, 2016 – 01:42 PM BST

PDB ID : 3J0I  
EMDB ID: : EMD-5331  
Title : Fitting of the phiKZ gp29PR structure into the cryo-EM density map of the phiKZ polysheath  
Authors : Aksyuk, A.A.; Fokine, A.; Kurochkina, L.P.; Mesyanzhinov, V.V.; Rossmann, M.G.  
Deposited on : 2011-08-16  
Resolution : 19.00 Å(reported)  
Based on PDB ID : 3SPE

This is a wwPDB EM Map/Model Validation Report for a publicly released PDB/EMDB entry.  
For rigid body fitted models, validation errors reported here could stem from errors in the original structure(s) used in the fitting.

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/EMValidationReportHelp>

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MolProbity : 4.02b-467  
Mogul : unknown  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk27241

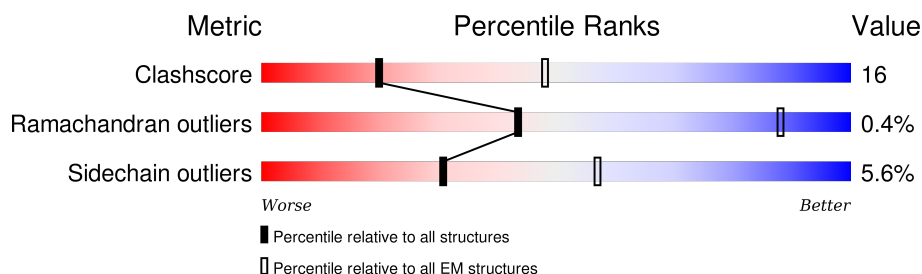
# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 19.00 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	114402	924
Ramachandran outliers	111179	726
Sidechain outliers	111093	686

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

Mol	Chain	Length	Quality of chain
1	A	295	58% 24% • 15%
1	B	295	61% 22% • 15%
1	C	295	58% 24% • 15%
1	D	295	60% 23% • 15%
1	E	295	58% 24% • 15%
1	F	295	58% 24% • 15%

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 11646 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.

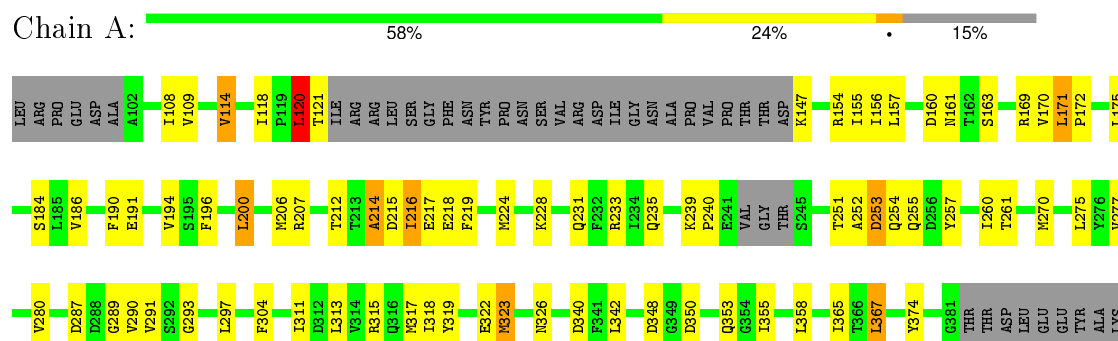
- Molecule 1 is a protein called PHIKZ029.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	252	Total	C	N	O	S	0	0
			1941	1234	309	393	5		
1	B	252	Total	C	N	O	S	0	0
			1941	1234	309	393	5		
1	C	252	Total	C	N	O	S	0	0
			1941	1234	309	393	5		
1	D	252	Total	C	N	O	S	0	0
			1941	1234	309	393	5		
1	E	252	Total	C	N	O	S	0	0
			1941	1234	309	393	5		
1	F	252	Total	C	N	O	S	0	0
			1941	1234	309	393	5		

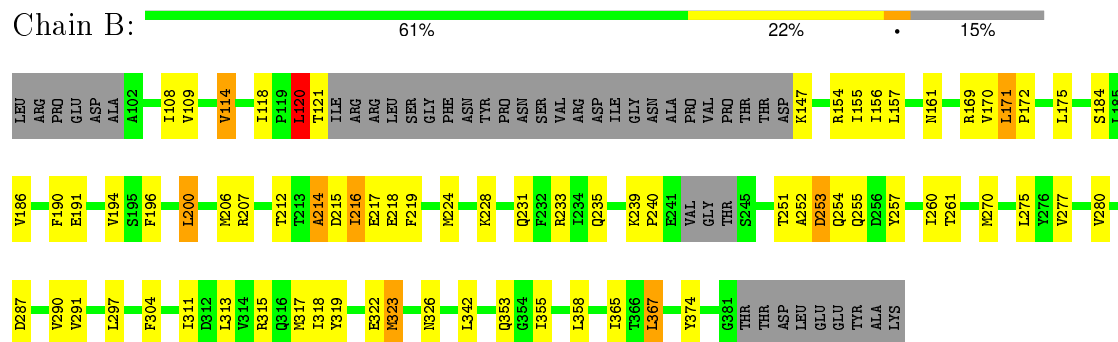
### 3 Residue-property plots

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. 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.

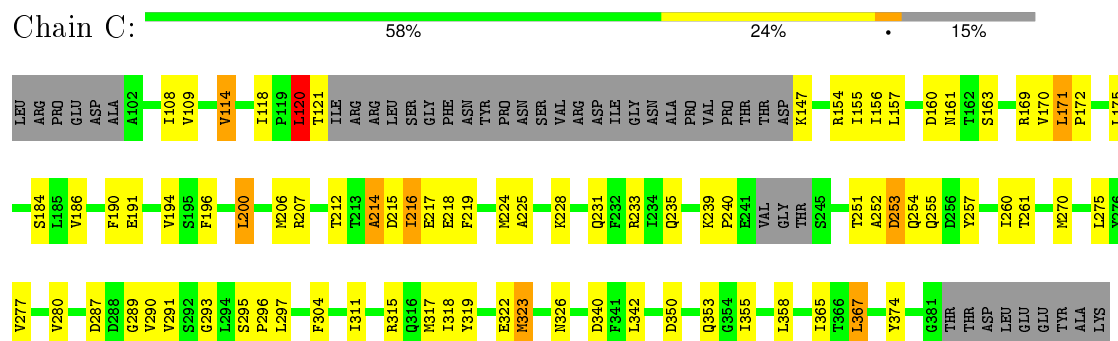
#### • Molecule 1: PHIKZ029



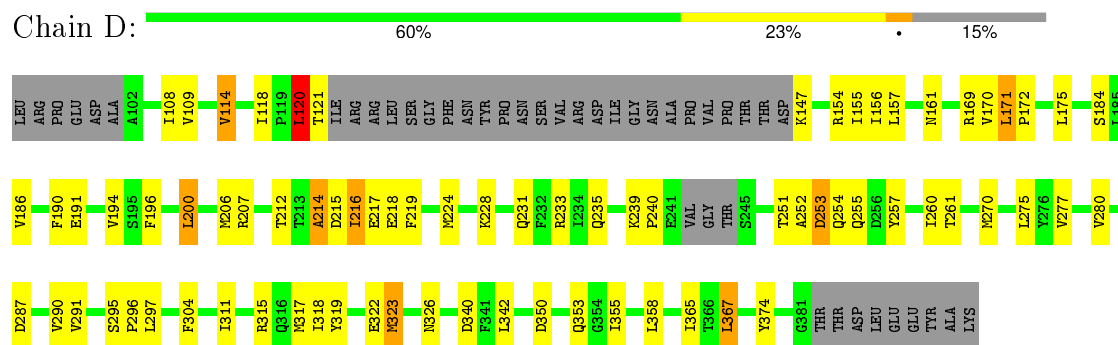
#### • Molecule 1: PHIKZ029



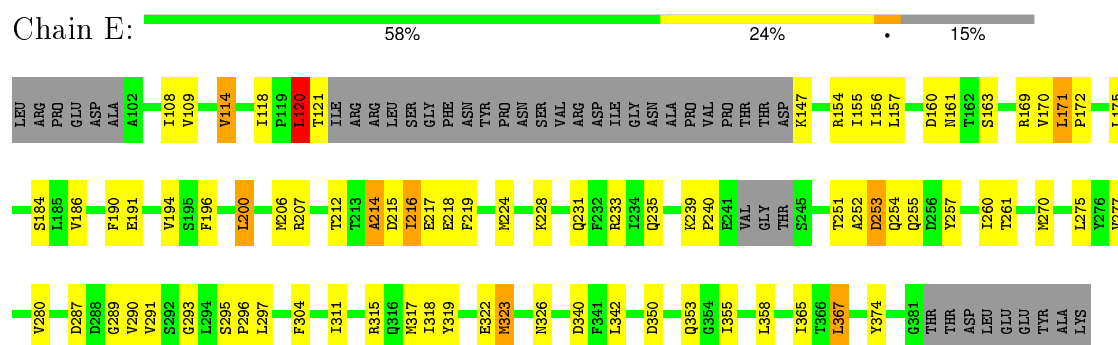
#### • Molecule 1: PHIKZ029



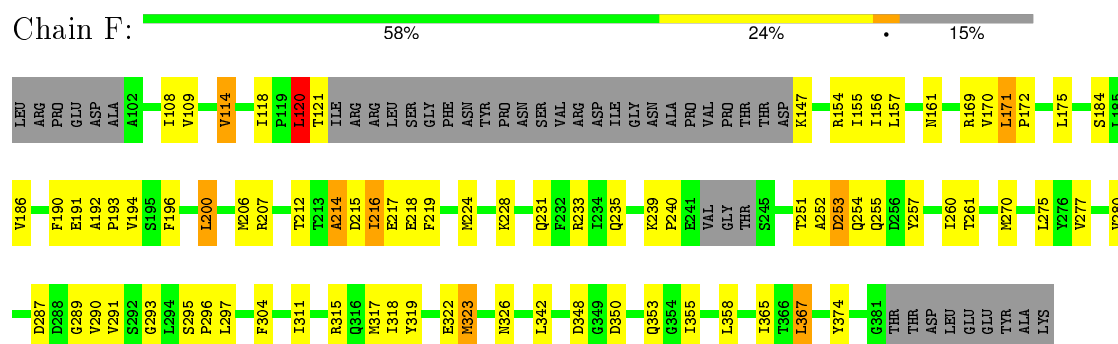
#### • Molecule 1: PHIKZ029



• Molecule 1: PHIKZ029



• Molecule 1: PHIKZ029



## 4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	Depositor
Number of images	Not provided	Depositor
Resolution determination method	Not provided	Depositor
CTF correction method	Not provided	Depositor
Microscope	FEI/PHILIPS CM200FEG	Depositor
Voltage (kV)	200	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	Not provided	Depositor
Minimum defocus (nm)	Not provided	Depositor
Maximum defocus (nm)	Not provided	Depositor
Magnification	Not provided	Depositor
Image detector	Not provided	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	$\# Z  > 2$	RMSZ	$\# Z  > 2$
1	A	0.60	4/1978 (0.2%)	0.78	8/2689 (0.3%)
1	B	0.60	4/1978 (0.2%)	0.78	8/2689 (0.3%)
1	C	0.60	4/1978 (0.2%)	0.78	8/2689 (0.3%)
1	D	0.60	4/1978 (0.2%)	0.78	8/2689 (0.3%)
1	E	0.60	4/1978 (0.2%)	0.78	8/2689 (0.3%)
1	F	0.60	4/1978 (0.2%)	0.78	8/2689 (0.3%)
All	All	0.60	24/11868 (0.2%)	0.78	48/16134 (0.3%)

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	270	MET	CG-SD	6.48	1.98	1.81
1	F	270	MET	CG-SD	6.48	1.98	1.81
1	A	270	MET	CG-SD	6.48	1.98	1.81
1	D	270	MET	CG-SD	6.48	1.98	1.81
1	E	270	MET	CG-SD	6.47	1.98	1.81
1	B	270	MET	CG-SD	6.46	1.98	1.81
1	A	323	MET	CG-SD	6.05	1.96	1.81
1	D	323	MET	CG-SD	6.05	1.96	1.81
1	B	323	MET	CG-SD	6.05	1.96	1.81
1	E	323	MET	CG-SD	6.05	1.96	1.81
1	C	323	MET	CG-SD	6.04	1.96	1.81
1	F	323	MET	CG-SD	6.04	1.96	1.81
1	C	317	MET	CG-SD	5.74	1.96	1.81
1	F	317	MET	CG-SD	5.74	1.96	1.81
1	E	317	MET	CG-SD	5.73	1.96	1.81
1	A	317	MET	CG-SD	5.72	1.96	1.81
1	D	317	MET	CG-SD	5.72	1.96	1.81
1	B	317	MET	CG-SD	5.72	1.96	1.81
1	E	206	MET	CG-SD	5.12	1.94	1.81
1	C	206	MET	CG-SD	5.10	1.94	1.81
1	F	206	MET	CG-SD	5.10	1.94	1.81
1	A	206	MET	CG-SD	5.10	1.94	1.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	206	MET	CG-SD	5.10	1.94	1.81
1	B	206	MET	CG-SD	5.09	1.94	1.81

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	291	VAL	N-CA-CB	-8.53	92.74	111.50
1	E	291	VAL	N-CA-CB	-8.53	92.75	111.50
1	F	291	VAL	N-CA-CB	-8.53	92.74	111.50
1	A	291	VAL	N-CA-CB	-8.52	92.76	111.50
1	D	291	VAL	N-CA-CB	-8.52	92.76	111.50
1	B	291	VAL	N-CA-CB	-8.49	92.83	111.50
1	B	215	ASP	N-CA-C	7.80	132.06	111.00
1	C	215	ASP	N-CA-C	7.80	132.06	111.00
1	F	215	ASP	N-CA-C	7.80	132.06	111.00
1	E	215	ASP	N-CA-C	7.79	132.05	111.00
1	A	215	ASP	N-CA-C	7.79	132.04	111.00
1	D	215	ASP	N-CA-C	7.79	132.04	111.00
1	F	290	VAL	N-CA-C	7.41	131.02	111.00
1	C	290	VAL	N-CA-C	7.40	130.99	111.00
1	A	290	VAL	N-CA-C	7.40	130.98	111.00
1	D	290	VAL	N-CA-C	7.40	130.98	111.00
1	E	290	VAL	N-CA-C	7.40	130.98	111.00
1	B	290	VAL	N-CA-C	7.39	130.94	111.00
1	A	291	VAL	N-CA-C	-6.66	93.03	111.00
1	D	291	VAL	N-CA-C	-6.66	93.03	111.00
1	B	291	VAL	N-CA-C	-6.65	93.04	111.00
1	C	291	VAL	N-CA-C	-6.65	93.04	111.00
1	F	291	VAL	N-CA-C	-6.65	93.04	111.00
1	E	291	VAL	N-CA-C	-6.65	93.04	111.00
1	B	214	ALA	CB-CA-C	6.42	119.73	110.10
1	E	214	ALA	CB-CA-C	6.42	119.73	110.10
1	A	214	ALA	CB-CA-C	6.41	119.71	110.10
1	D	214	ALA	CB-CA-C	6.41	119.71	110.10
1	C	214	ALA	CB-CA-C	6.39	119.69	110.10
1	F	214	ALA	CB-CA-C	6.39	119.69	110.10
1	B	215	ASP	N-CA-CB	-6.21	99.42	110.60
1	C	215	ASP	N-CA-CB	-6.19	99.46	110.60
1	F	215	ASP	N-CA-CB	-6.19	99.46	110.60
1	A	215	ASP	N-CA-CB	-6.19	99.46	110.60
1	D	215	ASP	N-CA-CB	-6.19	99.46	110.60
1	E	215	ASP	N-CA-CB	-6.18	99.47	110.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	120	LEU	CA-CB-CG	-5.47	102.73	115.30
1	A	120	LEU	CA-CB-CG	-5.46	102.73	115.30
1	D	120	LEU	CA-CB-CG	-5.46	102.73	115.30
1	B	120	LEU	CA-CB-CG	-5.46	102.75	115.30
1	C	120	LEU	CA-CB-CG	-5.45	102.77	115.30
1	F	120	LEU	CA-CB-CG	-5.45	102.77	115.30
1	C	120	LEU	CB-CG-CD2	-5.36	101.89	111.00
1	F	120	LEU	CB-CG-CD2	-5.36	101.89	111.00
1	E	120	LEU	CB-CG-CD2	-5.35	101.91	111.00
1	A	120	LEU	CB-CG-CD2	-5.34	101.92	111.00
1	D	120	LEU	CB-CG-CD2	-5.34	101.92	111.00
1	B	120	LEU	CB-CG-CD2	-5.34	101.92	111.00

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	1941	0	1885	63	0
1	B	1941	0	1885	59	0
1	C	1941	0	1885	62	0
1	D	1941	0	1885	60	0
1	E	1941	0	1885	63	0
1	F	1941	0	1885	64	0
All	All	11646	0	11310	371	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 16.

All (371) 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:F:120:LEU:HD22	1:F:120:LEU:O	1.48	1.14
1:C:120:LEU:HD22	1:C:120:LEU:O	1.48	1.14

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:120:LEU:HD22	1:E:120:LEU:O	1.48	1.14
1:D:120:LEU:O	1:D:120:LEU:HD22	1.48	1.13
1:A:120:LEU:HD22	1:A:120:LEU:O	1.48	1.13
1:B:120:LEU:HD22	1:B:120:LEU:O	1.48	1.11
1:D:118:ILE:O	1:D:147:LYS:HB3	1.78	0.84
1:F:118:ILE:O	1:F:147:LYS:HB3	1.78	0.84
1:A:118:ILE:O	1:A:147:LYS:HB3	1.78	0.84
1:E:118:ILE:O	1:E:147:LYS:HB3	1.78	0.83
1:C:118:ILE:O	1:C:147:LYS:HB3	1.78	0.82
1:B:118:ILE:O	1:B:147:LYS:HB3	1.78	0.82
1:F:120:LEU:CD2	1:F:120:LEU:O	2.30	0.80
1:B:120:LEU:CD2	1:B:120:LEU:O	2.30	0.79
1:C:120:LEU:O	1:C:120:LEU:CD2	2.30	0.78
1:D:120:LEU:O	1:D:120:LEU:CD2	2.30	0.78
1:A:120:LEU:O	1:A:120:LEU:CD2	2.30	0.78
1:B:216:ILE:HG12	1:B:217:GLU:H	1.49	0.78
1:E:120:LEU:O	1:E:120:LEU:CD2	2.30	0.77
1:D:216:ILE:HG12	1:D:217:GLU:H	1.49	0.76
1:E:216:ILE:HG12	1:E:217:GLU:H	1.49	0.76
1:D:251:THR:HG22	1:D:255:GLN:H	1.51	0.76
1:F:216:ILE:HG12	1:F:217:GLU:H	1.49	0.76
1:C:216:ILE:HG12	1:C:217:GLU:H	1.49	0.76
1:E:251:THR:HG22	1:E:255:GLN:H	1.51	0.75
1:F:251:THR:HG22	1:F:255:GLN:H	1.51	0.75
1:A:216:ILE:HG12	1:A:217:GLU:H	1.49	0.75
1:C:251:THR:HG22	1:C:255:GLN:H	1.51	0.75
1:A:251:THR:HG22	1:A:255:GLN:H	1.51	0.74
1:D:120:LEU:C	1:D:120:LEU:CD2	2.55	0.74
1:B:251:THR:HG22	1:B:255:GLN:H	1.51	0.74
1:E:120:LEU:C	1:E:120:LEU:CD2	2.55	0.73
1:C:120:LEU:C	1:C:120:LEU:CD2	2.55	0.73
1:B:120:LEU:C	1:B:120:LEU:CD2	2.55	0.71
1:B:207:ARG:HD2	1:B:235:GLN:HE21	1.56	0.70
1:F:207:ARG:HD2	1:F:235:GLN:HE21	1.56	0.70
1:E:207:ARG:HD2	1:E:235:GLN:HE21	1.56	0.70
1:A:207:ARG:HD2	1:A:235:GLN:HE21	1.56	0.70
1:F:120:LEU:CD2	1:F:120:LEU:C	2.55	0.70
1:D:260:ILE:HB	1:D:277:VAL:HG22	1.74	0.70
1:D:207:ARG:HD2	1:D:235:GLN:HE21	1.56	0.70
1:C:207:ARG:HD2	1:C:235:GLN:HE21	1.56	0.69
1:C:260:ILE:HB	1:C:277:VAL:HG22	1.74	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:260:ILE:HB	1:E:277:VAL:HG22	1.74	0.69
1:B:260:ILE:HB	1:B:277:VAL:HG22	1.74	0.69
1:B:171:LEU:HD13	1:B:172:PRO:HD2	1.76	0.68
1:E:171:LEU:HD13	1:E:172:PRO:HD2	1.75	0.68
1:F:260:ILE:HB	1:F:277:VAL:HG22	1.74	0.68
1:B:175:LEU:HB3	1:B:184:SER:HB3	1.75	0.68
1:A:260:ILE:HB	1:A:277:VAL:HG22	1.74	0.68
1:A:175:LEU:HB3	1:A:184:SER:HB3	1.75	0.68
1:A:171:LEU:HD13	1:A:172:PRO:HD2	1.75	0.68
1:F:171:LEU:HD13	1:F:172:PRO:HD2	1.75	0.68
1:C:171:LEU:HD13	1:C:172:PRO:HD2	1.75	0.67
1:C:175:LEU:HB3	1:C:184:SER:HB3	1.75	0.67
1:D:175:LEU:HB3	1:D:184:SER:HB3	1.75	0.67
1:D:171:LEU:HD13	1:D:172:PRO:HD2	1.75	0.67
1:A:120:LEU:C	1:A:120:LEU:CD2	2.55	0.67
1:E:175:LEU:HB3	1:E:184:SER:HB3	1.75	0.67
1:B:108:ILE:HG12	1:B:191:GLU:HG3	1.78	0.66
1:F:175:LEU:HB3	1:F:184:SER:HB3	1.75	0.66
1:A:108:ILE:HG12	1:A:191:GLU:HG3	1.78	0.66
1:D:200:LEU:HD12	1:D:200:LEU:C	2.17	0.65
1:C:108:ILE:HG12	1:C:191:GLU:HG3	1.78	0.65
1:E:200:LEU:C	1:E:200:LEU:HD12	2.17	0.65
1:A:200:LEU:C	1:A:200:LEU:HD12	2.17	0.65
1:F:108:ILE:HG12	1:F:191:GLU:HG3	1.78	0.65
1:B:200:LEU:C	1:B:200:LEU:HD12	2.17	0.65
1:C:200:LEU:C	1:C:200:LEU:HD12	2.17	0.65
1:F:200:LEU:C	1:F:200:LEU:HD12	2.17	0.65
1:D:108:ILE:HG12	1:D:191:GLU:HG3	1.78	0.64
1:C:216:ILE:HG12	1:C:217:GLU:N	2.12	0.64
1:E:108:ILE:HG12	1:E:191:GLU:HG3	1.78	0.64
1:F:216:ILE:HG12	1:F:217:GLU:N	2.12	0.64
1:E:216:ILE:HG12	1:E:217:GLU:N	2.12	0.64
1:D:216:ILE:HG12	1:D:217:GLU:N	2.12	0.63
1:D:251:THR:CG2	1:D:255:GLN:H	2.12	0.62
1:B:217:GLU:OE1	1:B:217:GLU:HA	1.99	0.62
1:C:217:GLU:OE1	1:C:217:GLU:HA	1.99	0.62
1:A:216:ILE:HG12	1:A:217:GLU:N	2.12	0.62
1:A:251:THR:CG2	1:A:255:GLN:H	2.12	0.62
1:E:251:THR:CG2	1:E:255:GLN:H	2.12	0.62
1:E:217:GLU:OE1	1:E:217:GLU:HA	1.99	0.62
1:C:251:THR:CG2	1:C:255:GLN:H	2.12	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:251:THR:CG2	1:B:255:GLN:H	2.12	0.62
1:F:217:GLU:HA	1:F:217:GLU:OE1	1.99	0.61
1:F:239:LYS:HB3	1:F:240:PRO:HA	1.82	0.61
1:E:239:LYS:HB3	1:E:240:PRO:HA	1.82	0.61
1:B:216:ILE:HG12	1:B:217:GLU:N	2.12	0.61
1:F:251:THR:CG2	1:F:255:GLN:H	2.12	0.61
1:F:120:LEU:HD21	1:F:353:GLN:HG2	1.83	0.61
1:C:239:LYS:HB3	1:C:240:PRO:HA	1.82	0.61
1:A:120:LEU:HD21	1:A:353:GLN:HG2	1.83	0.61
1:B:120:LEU:HD21	1:B:353:GLN:HG2	1.83	0.61
1:B:239:LYS:HB3	1:B:240:PRO:HA	1.82	0.61
1:A:217:GLU:HA	1:A:217:GLU:OE1	1.99	0.61
1:D:217:GLU:HA	1:D:217:GLU:OE1	1.99	0.60
1:D:239:LYS:HB3	1:D:240:PRO:HA	1.82	0.60
1:A:114:VAL:HG22	1:A:184:SER:HB3	1.84	0.60
1:C:120:LEU:HD21	1:C:353:GLN:HG2	1.83	0.60
1:E:120:LEU:HD21	1:E:353:GLN:HG2	1.83	0.60
1:E:114:VAL:HG22	1:E:184:SER:HB3	1.84	0.60
1:F:114:VAL:HG22	1:F:184:SER:HB3	1.84	0.60
1:B:287:ASP:HB3	1:B:297:LEU:HB3	1.84	0.59
1:B:114:VAL:HG22	1:B:184:SER:HB3	1.84	0.59
1:D:287:ASP:HB3	1:D:297:LEU:HB3	1.84	0.59
1:E:287:ASP:HB3	1:E:297:LEU:HB3	1.84	0.59
1:A:239:LYS:HB3	1:A:240:PRO:HA	1.82	0.59
1:C:287:ASP:HB3	1:C:297:LEU:HB3	1.84	0.59
1:C:120:LEU:C	1:C:120:LEU:HD22	2.12	0.59
1:D:120:LEU:HD21	1:D:353:GLN:HG2	1.83	0.59
1:D:114:VAL:HG22	1:D:184:SER:HB3	1.84	0.59
1:C:114:VAL:HG22	1:C:184:SER:HB3	1.84	0.58
1:F:287:ASP:HB3	1:F:297:LEU:HB3	1.84	0.58
1:A:287:ASP:HB3	1:A:297:LEU:HB3	1.84	0.58
1:F:311:ILE:HG22	1:F:315:ARG:HD2	1.86	0.57
1:E:311:ILE:HG22	1:E:315:ARG:HD2	1.86	0.57
1:C:311:ILE:HG22	1:C:315:ARG:HD2	1.86	0.56
1:F:207:ARG:HH11	1:F:235:GLN:NE2	2.04	0.56
1:E:207:ARG:HH11	1:E:235:GLN:NE2	2.04	0.56
1:F:212:THR:HG22	1:F:214:ALA:N	2.20	0.56
1:C:212:THR:HG22	1:C:214:ALA:N	2.20	0.56
1:E:212:THR:HG22	1:E:214:ALA:N	2.21	0.56
1:D:212:THR:HG22	1:D:214:ALA:N	2.20	0.56
1:B:207:ARG:HH11	1:B:235:GLN:NE2	2.03	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:207:ARG:HH11	1:C:235:GLN:NE2	2.04	0.56
1:A:212:THR:HG22	1:A:214:ALA:N	2.20	0.56
1:A:207:ARG:HH11	1:A:235:GLN:NE2	2.03	0.56
1:D:207:ARG:HH11	1:D:235:GLN:NE2	2.03	0.56
1:A:311:ILE:HG22	1:A:315:ARG:HD2	1.86	0.56
1:B:311:ILE:HG22	1:B:315:ARG:HD2	1.86	0.56
1:B:190:PHE:CD1	1:B:304:PHE:CZ	2.94	0.55
1:B:212:THR:HG22	1:B:214:ALA:N	2.20	0.55
1:F:190:PHE:CD1	1:F:304:PHE:CZ	2.94	0.55
1:D:120:LEU:C	1:D:120:LEU:HD22	2.12	0.55
1:E:190:PHE:CD1	1:E:304:PHE:CZ	2.94	0.55
1:D:311:ILE:HG22	1:D:315:ARG:HD2	1.86	0.55
1:C:190:PHE:CD1	1:C:304:PHE:CZ	2.94	0.55
1:A:190:PHE:CD1	1:A:304:PHE:CZ	2.94	0.55
1:F:233:ARG:HG2	1:F:257:TYR:CD2	2.43	0.54
1:D:233:ARG:HG2	1:D:257:TYR:CD2	2.43	0.54
1:D:190:PHE:CD1	1:D:304:PHE:CZ	2.94	0.54
1:D:114:VAL:CG2	1:D:175:LEU:HD23	2.38	0.53
1:F:114:VAL:CG2	1:F:175:LEU:HD23	2.38	0.53
1:F:120:LEU:C	1:F:120:LEU:HD22	2.12	0.53
1:C:114:VAL:CG2	1:C:175:LEU:HD23	2.38	0.53
1:E:233:ARG:HG2	1:E:257:TYR:CD2	2.43	0.53
1:B:114:VAL:CG2	1:B:175:LEU:HD23	2.39	0.53
1:A:233:ARG:HG2	1:A:257:TYR:CD2	2.43	0.53
1:B:207:ARG:CD	1:B:235:GLN:HE21	2.22	0.53
1:B:233:ARG:HG2	1:B:257:TYR:CD2	2.43	0.53
1:C:233:ARG:HG2	1:C:257:TYR:CD2	2.43	0.53
1:A:207:ARG:CD	1:A:235:GLN:HE21	2.22	0.53
1:C:207:ARG:CD	1:C:235:GLN:HE21	2.22	0.53
1:E:114:VAL:CG2	1:E:175:LEU:HD23	2.39	0.53
1:F:207:ARG:CD	1:F:235:GLN:HE21	2.22	0.53
1:A:114:VAL:CG2	1:A:175:LEU:HD23	2.38	0.53
1:E:120:LEU:HD22	1:E:120:LEU:C	2.12	0.52
1:C:216:ILE:CG1	1:C:217:GLU:N	2.73	0.52
1:B:154:ARG:HB3	1:B:358:LEU:HB2	1.92	0.52
1:E:154:ARG:HB3	1:E:358:LEU:HB2	1.92	0.52
1:A:154:ARG:HB3	1:A:358:LEU:HB2	1.92	0.52
1:C:154:ARG:HB3	1:C:358:LEU:HB2	1.91	0.52
1:B:218:GLU:OE1	1:B:218:GLU:HA	2.10	0.52
1:F:154:ARG:HB3	1:F:358:LEU:HB2	1.91	0.52
1:D:216:ILE:CG1	1:D:217:GLU:N	2.73	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:216:ILE:CG1	1:A:217:GLU:N	2.73	0.52
1:E:200:LEU:HD12	1:E:200:LEU:O	2.10	0.52
1:E:350:ASP:N	1:E:350:ASP:OD1	2.30	0.52
1:D:154:ARG:HB3	1:D:358:LEU:HB2	1.92	0.52
1:F:216:ILE:CG1	1:F:217:GLU:N	2.73	0.52
1:D:207:ARG:CD	1:D:235:GLN:HE21	2.22	0.52
1:C:200:LEU:O	1:C:200:LEU:HD12	2.10	0.52
1:A:218:GLU:HA	1:A:218:GLU:OE1	2.10	0.52
1:B:216:ILE:CG1	1:B:217:GLU:N	2.73	0.51
1:C:218:GLU:OE1	1:C:218:GLU:HA	2.10	0.51
1:E:216:ILE:CG1	1:E:217:GLU:N	2.73	0.51
1:E:207:ARG:CD	1:E:235:GLN:HE21	2.22	0.51
1:D:200:LEU:HD12	1:D:200:LEU:O	2.10	0.51
1:F:200:LEU:HD12	1:F:200:LEU:O	2.10	0.51
1:B:200:LEU:O	1:B:200:LEU:HD12	2.10	0.51
1:D:218:GLU:HA	1:D:218:GLU:OE1	2.10	0.51
1:F:239:LYS:HG3	1:F:374:TYR:CE2	2.46	0.51
1:E:156:ILE:HD11	1:E:186:VAL:HG13	1.93	0.51
1:A:200:LEU:O	1:A:200:LEU:HD12	2.10	0.51
1:B:239:LYS:HG3	1:B:374:TYR:CE2	2.46	0.51
1:E:218:GLU:OE1	1:E:218:GLU:HA	2.10	0.51
1:F:218:GLU:HA	1:F:218:GLU:OE1	2.10	0.51
1:F:156:ILE:HD11	1:F:186:VAL:HG13	1.93	0.51
1:A:120:LEU:CD2	1:A:353:GLN:HG2	2.41	0.50
1:C:120:LEU:CD2	1:C:353:GLN:HG2	2.41	0.50
1:E:120:LEU:CD2	1:E:353:GLN:HG2	2.41	0.50
1:A:239:LYS:HG3	1:A:374:TYR:CE2	2.46	0.50
1:C:239:LYS:HG3	1:C:374:TYR:CE2	2.46	0.50
1:D:156:ILE:HD11	1:D:186:VAL:HG13	1.93	0.50
1:D:239:LYS:HG3	1:D:374:TYR:CE2	2.46	0.50
1:E:239:LYS:HG3	1:E:374:TYR:CE2	2.46	0.50
1:B:156:ILE:HD11	1:B:186:VAL:HG13	1.93	0.50
1:C:156:ILE:HD11	1:C:186:VAL:HG13	1.93	0.50
1:E:280:VAL:HG12	1:E:280:VAL:O	2.12	0.50
1:B:280:VAL:HG12	1:B:280:VAL:O	2.12	0.50
1:D:120:LEU:CD2	1:D:353:GLN:HG2	2.41	0.49
1:A:156:ILE:HD11	1:A:186:VAL:HG13	1.93	0.49
1:A:342:LEU:HB3	1:A:367:LEU:HD23	1.95	0.49
1:B:120:LEU:CD2	1:B:353:GLN:HG2	2.41	0.49
1:F:342:LEU:HB3	1:F:367:LEU:HD23	1.95	0.49
1:D:342:LEU:HB3	1:D:367:LEU:HD23	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:342:LEU:HB3	1:E:367:LEU:HD23	1.95	0.49
1:A:280:VAL:HG12	1:A:280:VAL:O	2.12	0.49
1:F:120:LEU:CD2	1:F:353:GLN:HG2	2.41	0.49
1:E:157:LEU:HG	1:E:365:ILE:CD1	2.43	0.49
1:A:157:LEU:HG	1:A:365:ILE:CD1	2.43	0.49
1:E:114:VAL:HG13	1:E:184:SER:HA	1.95	0.49
1:F:280:VAL:HG12	1:F:280:VAL:O	2.12	0.49
1:F:157:LEU:HG	1:F:365:ILE:CD1	2.43	0.49
1:B:157:LEU:HG	1:B:365:ILE:CD1	2.43	0.49
1:E:114:VAL:HG22	1:E:184:SER:CB	2.43	0.49
1:D:280:VAL:HG12	1:D:280:VAL:O	2.12	0.49
1:A:114:VAL:HG22	1:A:184:SER:CB	2.43	0.49
1:A:114:VAL:HG13	1:A:184:SER:HA	1.95	0.49
1:D:114:VAL:HG22	1:D:184:SER:CB	2.43	0.49
1:B:342:LEU:HB3	1:B:367:LEU:HD23	1.95	0.49
1:C:342:LEU:HB3	1:C:367:LEU:HD23	1.95	0.49
1:F:261:THR:O	1:F:277:VAL:HG23	2.13	0.48
1:B:261:THR:O	1:B:277:VAL:HG23	2.13	0.48
1:B:114:VAL:HG22	1:B:184:SER:CB	2.43	0.48
1:C:280:VAL:HG12	1:C:280:VAL:O	2.12	0.48
1:A:261:THR:O	1:A:277:VAL:HG23	2.13	0.48
1:D:261:THR:O	1:D:277:VAL:HG23	2.13	0.48
1:B:219:PHE:HB2	1:B:231:GLN:NE2	2.29	0.48
1:F:114:VAL:HG22	1:F:184:SER:CB	2.43	0.48
1:C:261:THR:O	1:C:277:VAL:HG23	2.13	0.48
1:D:157:LEU:HG	1:D:365:ILE:CD1	2.43	0.48
1:C:157:LEU:HG	1:C:365:ILE:CD1	2.43	0.48
1:E:261:THR:O	1:E:277:VAL:HG23	2.13	0.48
1:E:219:PHE:HB2	1:E:231:GLN:NE2	2.29	0.48
1:A:219:PHE:HB2	1:A:231:GLN:NE2	2.29	0.48
1:D:114:VAL:HG13	1:D:184:SER:HA	1.95	0.48
1:C:114:VAL:HG22	1:C:184:SER:CB	2.43	0.47
1:F:114:VAL:HG13	1:F:184:SER:HA	1.95	0.47
1:D:219:PHE:HB2	1:D:231:GLN:NE2	2.29	0.47
1:C:219:PHE:HB2	1:C:231:GLN:NE2	2.29	0.47
1:F:219:PHE:HB2	1:F:231:GLN:NE2	2.29	0.47
1:F:350:ASP:N	1:F:350:ASP:OD1	2.30	0.47
1:B:114:VAL:HG13	1:B:184:SER:HA	1.95	0.47
1:B:109:VAL:HG21	1:B:190:PHE:CZ	2.50	0.47
1:C:114:VAL:HG13	1:C:184:SER:HA	1.95	0.47
1:E:109:VAL:HG21	1:E:190:PHE:CZ	2.50	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:319:TYR:O	1:D:323:MET:HG2	2.15	0.47
1:B:319:TYR:O	1:B:323:MET:HG2	2.15	0.47
1:F:109:VAL:HG21	1:F:190:PHE:CZ	2.50	0.46
1:D:251:THR:HG22	1:D:255:GLN:N	2.25	0.46
1:C:109:VAL:HG21	1:C:190:PHE:CZ	2.50	0.46
1:D:109:VAL:HG21	1:D:190:PHE:CZ	2.50	0.46
1:C:319:TYR:O	1:C:323:MET:HG2	2.15	0.46
1:E:120:LEU:HD23	1:E:120:LEU:HA	1.18	0.46
1:A:109:VAL:HG21	1:A:190:PHE:CZ	2.50	0.46
1:A:319:TYR:O	1:A:323:MET:HG2	2.15	0.46
1:E:251:THR:HG22	1:E:255:GLN:N	2.25	0.46
1:C:170:VAL:O	1:C:171:LEU:HD22	2.16	0.46
1:D:212:THR:C	1:D:214:ALA:H	2.19	0.46
1:B:212:THR:C	1:B:214:ALA:H	2.19	0.46
1:E:319:TYR:O	1:E:323:MET:HG2	2.15	0.46
1:E:170:VAL:O	1:E:171:LEU:HD22	2.16	0.46
1:E:212:THR:C	1:E:214:ALA:H	2.19	0.46
1:B:155:ILE:HG13	1:B:367:LEU:HD22	1.98	0.46
1:F:318:ILE:HG23	1:F:355:ILE:HD11	1.98	0.46
1:D:318:ILE:HG23	1:D:355:ILE:HD11	1.98	0.46
1:B:170:VAL:O	1:B:171:LEU:HD22	2.16	0.46
1:F:212:THR:C	1:F:214:ALA:H	2.19	0.46
1:F:170:VAL:O	1:F:171:LEU:HD22	2.16	0.46
1:E:318:ILE:HG23	1:E:355:ILE:HD11	1.98	0.46
1:A:212:THR:C	1:A:214:ALA:H	2.19	0.45
1:D:170:VAL:O	1:D:171:LEU:HD22	2.16	0.45
1:C:155:ILE:HG13	1:C:367:LEU:HD22	1.98	0.45
1:C:318:ILE:CG2	1:C:355:ILE:HD11	2.46	0.45
1:A:318:ILE:HG23	1:A:355:ILE:HD11	1.98	0.45
1:C:212:THR:C	1:C:214:ALA:H	2.19	0.45
1:A:155:ILE:HG13	1:A:367:LEU:HD22	1.98	0.45
1:B:318:ILE:CG2	1:B:355:ILE:HD11	2.46	0.45
1:F:319:TYR:O	1:F:323:MET:HG2	2.16	0.45
1:A:313:LEU:HA	1:A:313:LEU:HD12	1.87	0.45
1:E:318:ILE:CG2	1:E:355:ILE:HD11	2.46	0.45
1:C:318:ILE:HG23	1:C:355:ILE:HD11	1.98	0.45
1:A:170:VAL:O	1:A:171:LEU:HD22	2.16	0.45
1:F:318:ILE:CG2	1:F:355:ILE:HD11	2.46	0.45
1:B:318:ILE:HG23	1:B:355:ILE:HD11	1.98	0.45
1:D:318:ILE:CG2	1:D:355:ILE:HD11	2.46	0.45
1:A:318:ILE:CG2	1:A:355:ILE:HD11	2.46	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:224:MET:O	1:E:228:LYS:N	2.50	0.45
1:C:251:THR:HG22	1:C:255:GLN:N	2.25	0.44
1:F:155:ILE:HG13	1:F:367:LEU:HD22	1.98	0.44
1:E:155:ILE:HG13	1:E:367:LEU:HD22	1.98	0.44
1:A:120:LEU:HD23	1:A:120:LEU:HA	1.18	0.44
1:C:224:MET:O	1:C:228:LYS:N	2.50	0.44
1:D:155:ILE:HG13	1:D:367:LEU:HD22	1.98	0.44
1:F:253:ASP:O	1:F:254:GLN:HB2	2.18	0.44
1:F:252:ALA:C	1:F:254:GLN:H	2.21	0.44
1:A:252:ALA:C	1:A:254:GLN:H	2.21	0.44
1:A:253:ASP:O	1:A:254:GLN:HB2	2.18	0.44
1:D:252:ALA:C	1:D:254:GLN:H	2.21	0.44
1:E:160:ASP:OD1	1:E:163:SER:OG	2.27	0.44
1:E:253:ASP:O	1:E:254:GLN:HB2	2.18	0.43
1:D:224:MET:O	1:D:228:LYS:N	2.50	0.43
1:C:252:ALA:C	1:C:254:GLN:H	2.21	0.43
1:A:224:MET:O	1:A:228:LYS:N	2.50	0.43
1:F:120:LEU:HA	1:F:120:LEU:HD23	1.18	0.43
1:E:252:ALA:C	1:E:254:GLN:H	2.21	0.43
1:C:160:ASP:OD1	1:C:163:SER:OG	2.27	0.43
1:C:350:ASP:N	1:C:350:ASP:OD1	2.30	0.43
1:E:200:LEU:C	1:E:200:LEU:CD1	2.87	0.43
1:B:120:LEU:HA	1:B:120:LEU:HD23	1.18	0.43
1:D:253:ASP:O	1:D:254:GLN:HB2	2.18	0.43
1:C:253:ASP:O	1:C:254:GLN:HB2	2.18	0.43
1:F:224:MET:O	1:F:228:LYS:N	2.50	0.43
1:D:120:LEU:HD23	1:D:120:LEU:HA	1.18	0.43
1:B:120:LEU:C	1:B:120:LEU:HD23	2.27	0.43
1:B:253:ASP:O	1:B:254:GLN:HB2	2.18	0.43
1:B:252:ALA:C	1:B:254:GLN:H	2.21	0.43
1:F:251:THR:HG22	1:F:255:GLN:N	2.25	0.43
1:B:251:THR:HG22	1:B:255:GLN:N	2.25	0.43
1:B:224:MET:O	1:B:228:LYS:N	2.50	0.42
1:F:114:VAL:HG23	1:F:175:LEU:HD23	2.01	0.42
1:B:313:LEU:HD12	1:B:313:LEU:HA	1.87	0.42
1:F:289:GLY:O	1:F:293:GLY:N	2.48	0.42
1:F:200:LEU:CD1	1:F:200:LEU:C	2.87	0.42
1:C:171:LEU:CD1	1:C:172:PRO:HD2	2.48	0.42
1:A:114:VAL:HG23	1:A:175:LEU:HD23	2.01	0.42
1:E:114:VAL:HG23	1:E:175:LEU:HD23	2.01	0.42
1:F:280:VAL:O	1:F:280:VAL:CG1	2.68	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:114:VAL:HG23	1:C:175:LEU:HD23	2.01	0.41
1:B:280:VAL:CG1	1:B:280:VAL:O	2.68	0.41
1:A:280:VAL:O	1:A:280:VAL:CG1	2.68	0.41
1:A:200:LEU:CD1	1:A:200:LEU:C	2.87	0.41
1:D:194:VAL:HG12	1:D:196:PHE:H	1.85	0.41
1:E:280:VAL:CG1	1:E:280:VAL:O	2.68	0.41
1:B:194:VAL:HG12	1:B:196:PHE:H	1.86	0.41
1:C:194:VAL:HG12	1:C:196:PHE:H	1.85	0.41
1:A:251:THR:HG22	1:A:255:GLN:N	2.25	0.41
1:D:280:VAL:O	1:D:280:VAL:CG1	2.68	0.41
1:F:194:VAL:HG12	1:F:196:PHE:H	1.85	0.41
1:B:171:LEU:CD1	1:B:172:PRO:HD2	2.48	0.41
1:B:114:VAL:HG23	1:B:175:LEU:HD23	2.01	0.41
1:A:194:VAL:HG12	1:A:196:PHE:H	1.85	0.41
1:E:194:VAL:HG12	1:E:196:PHE:H	1.86	0.41
1:A:171:LEU:CD1	1:A:172:PRO:HD2	2.48	0.41
1:B:200:LEU:C	1:B:200:LEU:CD1	2.87	0.41
1:C:280:VAL:CG1	1:C:280:VAL:O	2.68	0.41
1:D:295:SER:O	1:D:296:PRO:C	2.59	0.41
1:A:160:ASP:OD1	1:A:163:SER:OG	2.27	0.41
1:C:289:GLY:O	1:C:293:GLY:N	2.48	0.41
1:F:171:LEU:CD1	1:F:172:PRO:HD2	2.48	0.41
1:D:114:VAL:HG23	1:D:175:LEU:HD23	2.01	0.41
1:D:340:ASP:OD1	1:D:340:ASP:C	2.60	0.41
1:A:340:ASP:OD1	1:A:340:ASP:C	2.60	0.41
1:F:295:SER:O	1:F:296:PRO:C	2.59	0.41
1:C:295:SER:O	1:C:296:PRO:C	2.59	0.40
1:F:192:ALA:HA	1:F:193:PRO:HD2	1.97	0.40
1:D:239:LYS:HE2	1:D:374:TYR:CE1	2.57	0.40
1:A:239:LYS:HE2	1:A:374:TYR:CE1	2.57	0.40
1:E:289:GLY:O	1:E:293:GLY:N	2.48	0.40
1:E:295:SER:O	1:E:296:PRO:C	2.59	0.40
1:F:239:LYS:HE2	1:F:374:TYR:CE1	2.57	0.40
1:A:289:GLY:O	1:A:293:GLY:N	2.48	0.40
1:D:350:ASP:OD1	1:D:350:ASP:N	2.30	0.40
1:E:340:ASP:C	1:E:340:ASP:OD1	2.60	0.40
1:A:348:ASP:HB2	1:A:350:ASP:OD1	2.22	0.40
1:E:171:LEU:CD1	1:E:172:PRO:HD2	2.48	0.40
1:F:348:ASP:HB2	1:F:350:ASP:OD1	2.22	0.40
1:C:224:MET:O	1:C:225:ALA:C	2.60	0.40
1:C:340:ASP:OD1	1:C:340:ASP:C	2.60	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	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	39	80
1	B	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	39	80
1	C	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	39	80
1	D	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	39	80
1	E	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	39	80
1	F	246/295 (83%)	226 (92%)	19 (8%)	1 (0%)	39	80
All	All	1476/1770 (83%)	1356 (92%)	114 (8%)	6 (0%)	43	80

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	253	ASP
1	B	253	ASP
1	C	253	ASP
1	D	253	ASP
1	E	253	ASP
1	F	253	ASP

### 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	213/250 (85%)	201 (94%)	12 (6%)	26	62
1	B	213/250 (85%)	201 (94%)	12 (6%)	26	62
1	C	213/250 (85%)	201 (94%)	12 (6%)	26	62
1	D	213/250 (85%)	201 (94%)	12 (6%)	26	62
1	E	213/250 (85%)	201 (94%)	12 (6%)	26	62
1	F	213/250 (85%)	201 (94%)	12 (6%)	26	62
All	All	1278/1500 (85%)	1206 (94%)	72 (6%)	31	62

All (72) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	114	VAL
1	A	120	LEU
1	A	121	THR
1	A	161	ASN
1	A	169	ARG
1	A	171	LEU
1	A	200	LEU
1	A	216	ILE
1	A	275	LEU
1	A	322	GLU
1	A	326	ASN
1	A	367	LEU
1	B	114	VAL
1	B	120	LEU
1	B	121	THR
1	B	161	ASN
1	B	169	ARG
1	B	171	LEU
1	B	200	LEU
1	B	216	ILE
1	B	275	LEU
1	B	322	GLU
1	B	326	ASN
1	B	367	LEU
1	C	114	VAL
1	C	120	LEU
1	C	121	THR
1	C	161	ASN
1	C	169	ARG
1	C	171	LEU

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Mol	Chain	Res	Type
1	C	200	LEU
1	C	216	ILE
1	C	275	LEU
1	C	322	GLU
1	C	326	ASN
1	C	367	LEU
1	D	114	VAL
1	D	120	LEU
1	D	121	THR
1	D	161	ASN
1	D	169	ARG
1	D	171	LEU
1	D	200	LEU
1	D	216	ILE
1	D	275	LEU
1	D	322	GLU
1	D	326	ASN
1	D	367	LEU
1	E	114	VAL
1	E	120	LEU
1	E	121	THR
1	E	161	ASN
1	E	169	ARG
1	E	171	LEU
1	E	200	LEU
1	E	216	ILE
1	E	275	LEU
1	E	322	GLU
1	E	326	ASN
1	E	367	LEU
1	F	114	VAL
1	F	120	LEU
1	F	121	THR
1	F	161	ASN
1	F	169	ARG
1	F	171	LEU
1	F	200	LEU
1	F	216	ILE
1	F	275	LEU
1	F	322	GLU
1	F	326	ASN
1	F	367	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	235	GLN
1	A	254	GLN
1	A	308	HIS
1	B	235	GLN
1	B	254	GLN
1	B	308	HIS
1	C	235	GLN
1	C	254	GLN
1	C	308	HIS
1	D	235	GLN
1	D	254	GLN
1	D	308	HIS
1	E	235	GLN
1	E	254	GLN
1	E	308	HIS
1	F	235	GLN
1	F	254	GLN
1	F	308	HIS

### 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 carbohydrates 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 ⓘ

There are no chain breaks in this entry.