



# Full wwPDB X-ray Structure Validation Report ⓘ

May 21, 2020 – 08:04 pm BST

PDB ID : 5Y3D  
Title : Structural insight into the interaction between RNA polymerase and VPg for norovirus replication  
Authors : Kim, K.H.; Lee, J.-H.; Seok, J.H.  
Deposited on : 2017-07-28  
Resolution : 3.14 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

<https://www.wwpdb.org/validation/2017/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  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

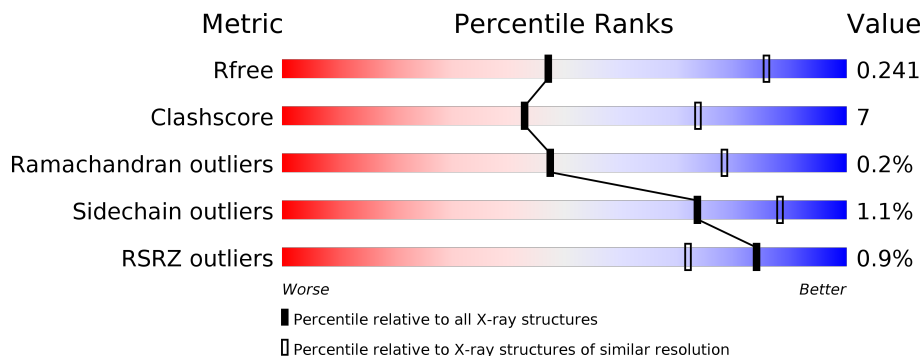
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.14 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))
$R_{free}$	130704	1626 (3.18-3.10)
Clashscore	141614	1735 (3.18-3.10)
Ramachandran outliers	138981	1677 (3.18-3.10)
Sidechain outliers	138945	1677 (3.18-3.10)
RSRZ outliers	127900	1588 (3.18-3.10)

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 respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	517	 75% 17% 7%
1	B	517	 77% 15% 7%
1	C	517	 71% 21% 7%
1	D	517	 75% 18% 7%
1	E	517	 77% 16% 7%
1	F	517	 78% 15% 7%

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Mol	Chain	Length	Quality of chain
2	G	35	 89% 6% 6%
2	H	35	 80% 11% 9%

## 2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 23161 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 RNA-dependent RNA polymerase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	479	3792	2397	666	705	24	0	0	0
1	B	479	3797	2402	663	707	25	0	0	0
1	C	480	3804	2406	669	704	25	0	0	0
1	D	479	3800	2403	668	705	24	0	0	0
1	E	483	3815	2412	670	709	24	0	0	0
1	F	481	3811	2410	669	707	25	0	0	0

There are 66 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	510	ALA	-	expression tag	UNP Q80J95
A	511	ALA	-	expression tag	UNP Q80J95
A	512	ALA	-	expression tag	UNP Q80J95
A	513	LEU	-	expression tag	UNP Q80J95
A	514	GLU	-	expression tag	UNP Q80J95
A	515	HIS	-	expression tag	UNP Q80J95
A	516	HIS	-	expression tag	UNP Q80J95
A	517	HIS	-	expression tag	UNP Q80J95
A	518	HIS	-	expression tag	UNP Q80J95
A	519	HIS	-	expression tag	UNP Q80J95
A	520	HIS	-	expression tag	UNP Q80J95
B	510	ALA	-	expression tag	UNP Q80J95
B	511	ALA	-	expression tag	UNP Q80J95
B	512	ALA	-	expression tag	UNP Q80J95
B	513	LEU	-	expression tag	UNP Q80J95
B	514	GLU	-	expression tag	UNP Q80J95
B	515	HIS	-	expression tag	UNP Q80J95

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Chain	Residue	Modelled	Actual	Comment	Reference
B	516	HIS	-	expression tag	UNP Q80J95
B	517	HIS	-	expression tag	UNP Q80J95
B	518	HIS	-	expression tag	UNP Q80J95
B	519	HIS	-	expression tag	UNP Q80J95
B	520	HIS	-	expression tag	UNP Q80J95
C	510	ALA	-	expression tag	UNP Q80J95
C	511	ALA	-	expression tag	UNP Q80J95
C	512	ALA	-	expression tag	UNP Q80J95
C	513	LEU	-	expression tag	UNP Q80J95
C	514	GLU	-	expression tag	UNP Q80J95
C	515	HIS	-	expression tag	UNP Q80J95
C	516	HIS	-	expression tag	UNP Q80J95
C	517	HIS	-	expression tag	UNP Q80J95
C	518	HIS	-	expression tag	UNP Q80J95
C	519	HIS	-	expression tag	UNP Q80J95
C	520	HIS	-	expression tag	UNP Q80J95
D	510	ALA	-	expression tag	UNP Q80J95
D	511	ALA	-	expression tag	UNP Q80J95
D	512	ALA	-	expression tag	UNP Q80J95
D	513	LEU	-	expression tag	UNP Q80J95
D	514	GLU	-	expression tag	UNP Q80J95
D	515	HIS	-	expression tag	UNP Q80J95
D	516	HIS	-	expression tag	UNP Q80J95
D	517	HIS	-	expression tag	UNP Q80J95
D	518	HIS	-	expression tag	UNP Q80J95
D	519	HIS	-	expression tag	UNP Q80J95
D	520	HIS	-	expression tag	UNP Q80J95
E	510	ALA	-	expression tag	UNP Q80J95
E	511	ALA	-	expression tag	UNP Q80J95
E	512	ALA	-	expression tag	UNP Q80J95
E	513	LEU	-	expression tag	UNP Q80J95
E	514	GLU	-	expression tag	UNP Q80J95
E	515	HIS	-	expression tag	UNP Q80J95
E	516	HIS	-	expression tag	UNP Q80J95
E	517	HIS	-	expression tag	UNP Q80J95
E	518	HIS	-	expression tag	UNP Q80J95
E	519	HIS	-	expression tag	UNP Q80J95
E	520	HIS	-	expression tag	UNP Q80J95
F	510	ALA	-	expression tag	UNP Q80J95
F	511	ALA	-	expression tag	UNP Q80J95
F	512	ALA	-	expression tag	UNP Q80J95
F	513	LEU	-	expression tag	UNP Q80J95

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Chain	Residue	Modelled	Actual	Comment	Reference
F	514	GLU	-	expression tag	UNP Q80J95
F	515	HIS	-	expression tag	UNP Q80J95
F	516	HIS	-	expression tag	UNP Q80J95
F	517	HIS	-	expression tag	UNP Q80J95
F	518	HIS	-	expression tag	UNP Q80J95
F	519	HIS	-	expression tag	UNP Q80J95
F	520	HIS	-	expression tag	UNP Q80J95

- Molecule 2 is a protein called viral protein genome-linked (VPg).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	G	33	164	98	33	33	0	0	0
2	H	32	160	96	32	32	0	0	0

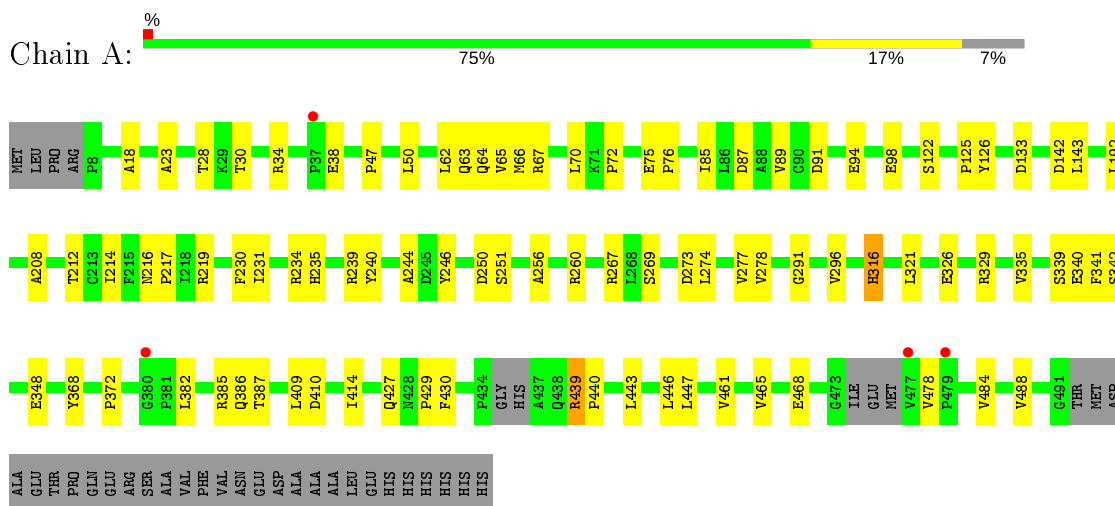
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	2	Total	O	0	0
			2	2		
3	B	2	Total	O	0	0
			2	2		
3	C	2	Total	O	0	0
			2	2		
3	D	4	Total	O	0	0
			4	4		
3	E	6	Total	O	0	0
			6	6		
3	F	2	Total	O	0	0
			2	2		

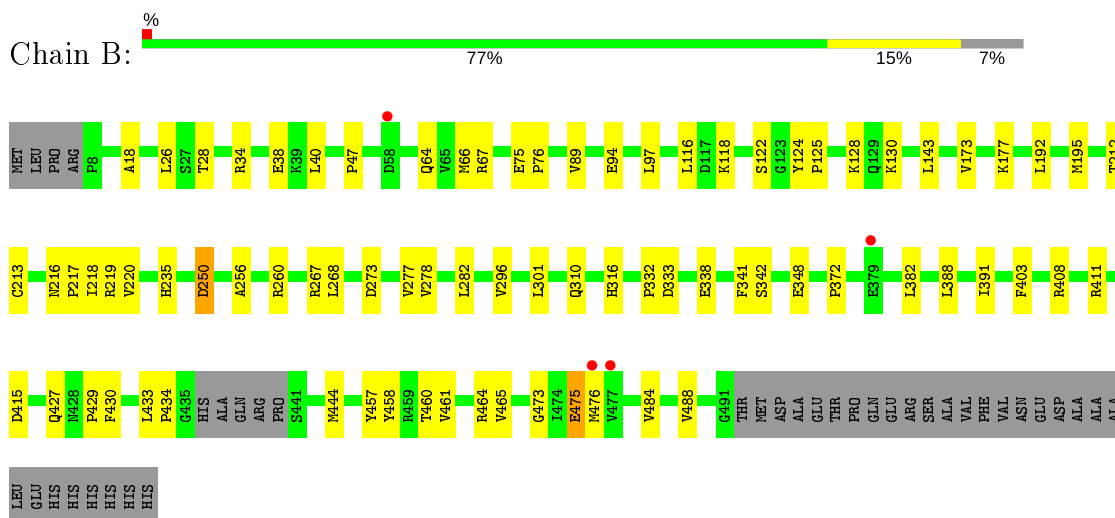
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes 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: RNA-dependent RNA polymerase

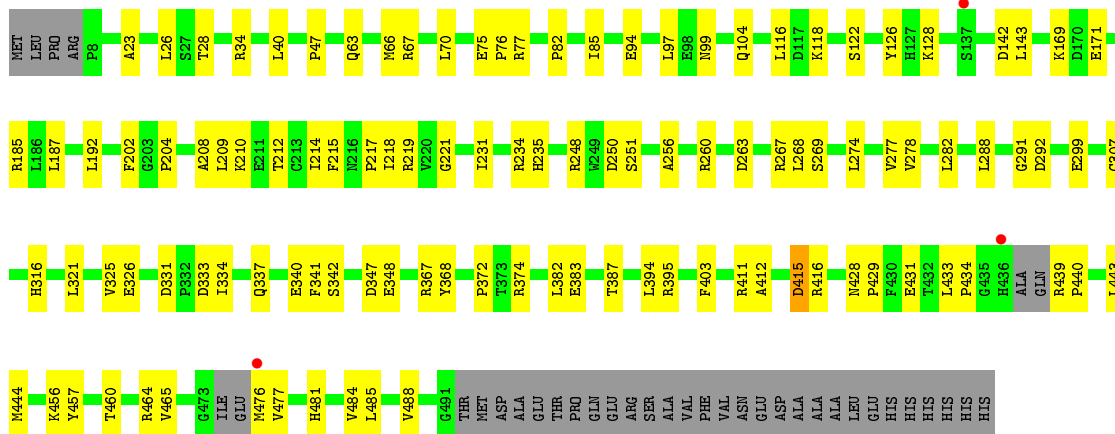


- Molecule 1: RNA-dependent RNA polymerase

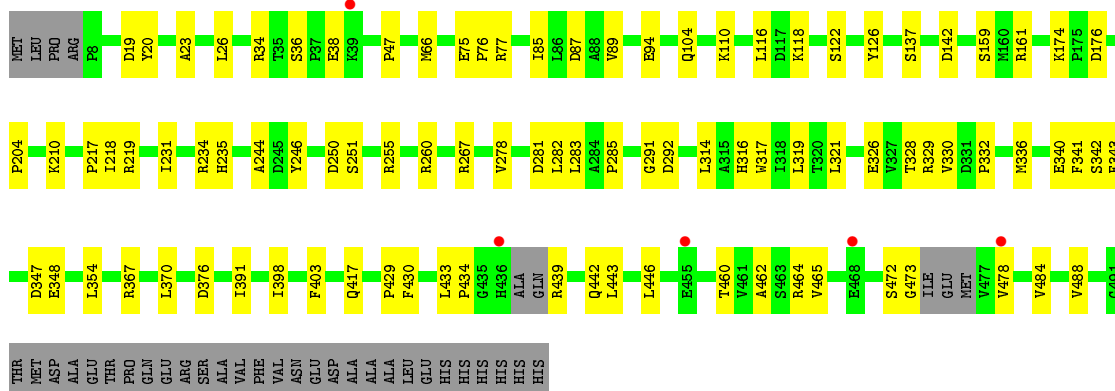
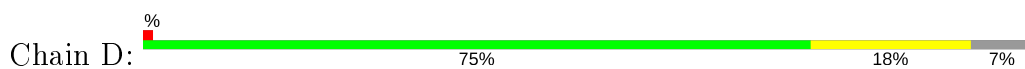


- Molecule 1: RNA-dependent RNA polymerase

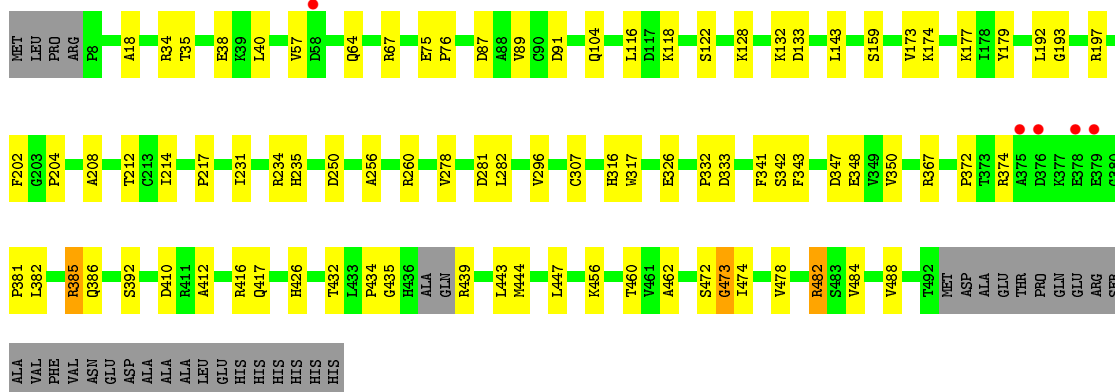
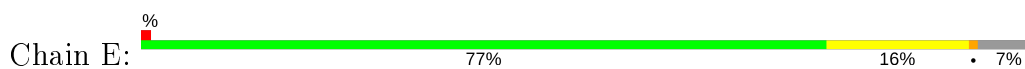




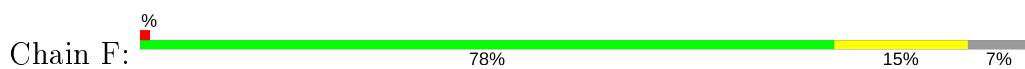
• Molecule 1: RNA-dependent RNA polymerase



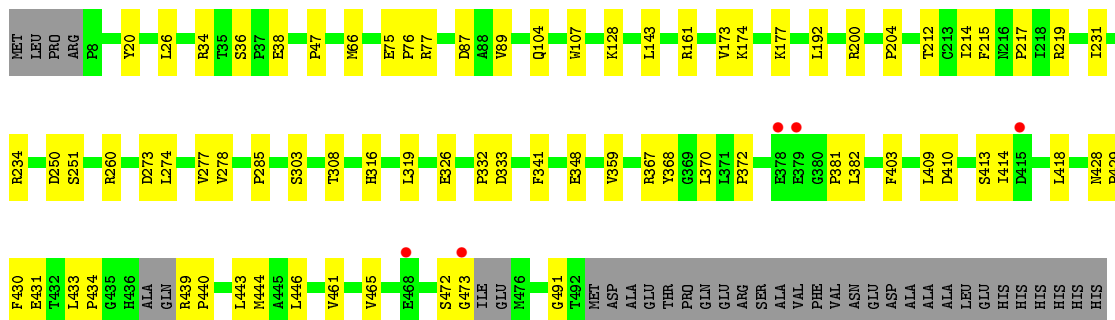
• Molecule 1: RNA-dependent RNA polymerase



• Molecule 1: RNA-dependent RNA polymerase

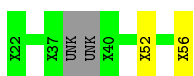






- Molecule 2: viral protein genome-linked (VPg)

Chain G: 89% 6% 6%



- Molecule 2: viral protein genome-linked (VPg)

Chain H: 80% 11% 9%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	109.17Å 159.73Å 121.70Å 90.00° 97.24° 90.00°	Depositor
Resolution (Å)	47.23 – 3.14 47.24 – 3.14	Depositor EDS
% Data completeness (in resolution range)	96.3 (47.23-3.14) 96.3 (47.24-3.14)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.55 (at 3.12Å)	Xtrriage
Refinement program	PHENIX 1.12_2829	Depositor
R, $R_{free}$	0.203 , 0.241 0.203 , 0.241	Depositor DCC
$R_{free}$ test set	3518 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	54.5	Xtrriage
Anisotropy	0.486	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 46.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.41$ , $\langle L^2 \rangle = 0.23$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.89	EDS
Total number of atoms	23161	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	54.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.28% 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, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 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	0.27	0/3883	0.44	1/5258 (0.0%)
1	B	0.27	0/3889	0.43	0/5267
1	C	0.27	0/3897	0.44	0/5277
1	D	0.27	0/3893	0.43	0/5272
1	E	0.27	0/3908	0.43	0/5295
1	F	0.27	0/3904	0.44	0/5287
All	All	0.27	0/23374	0.43	1/31656 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	125	PRO	N-CA-CB	5.52	109.92	103.30

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	3792	0	3737	56	0
1	B	3797	0	3753	47	0
1	C	3804	0	3758	73	0
1	D	3800	0	3753	55	1
1	E	3815	0	3757	50	0
1	F	3811	0	3763	43	1

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	G	164	0	37	1	0
2	H	160	0	37	2	0
3	A	2	0	0	0	0
3	B	2	0	0	1	0
3	C	2	0	0	1	0
3	D	4	0	0	2	0
3	E	6	0	0	2	0
3	F	2	0	0	0	0
All	All	23161	0	22595	313	1

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 7.

All (313) 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:B:235:HIS:HE2	1:B:342:SER:HG	1.18	0.92
1:E:235:HIS:HE2	1:E:342:SER:HG	1.11	0.90
1:D:235:HIS:HE2	1:D:342:SER:HG	1.19	0.84
1:C:235:HIS:HE2	1:C:342:SER:HG	1.27	0.79
1:C:219:ARG:HD3	1:C:231:ILE:HD13	1.70	0.73
1:A:235:HIS:HE2	1:A:342:SER:HG	1.28	0.73
1:E:128:LYS:HD3	1:E:132:LYS:HD2	1.70	0.72
1:D:234:ARG:NH1	1:D:340:GLU:OE2	2.21	0.72
1:F:303:SER:HA	1:F:308:THR:HG21	1.72	0.71
1:F:326:GLU:OE2	1:F:367:ARG:NH1	2.24	0.70
1:D:87:ASP:OD2	1:D:260:ARG:NH2	2.25	0.70
1:F:215:PHE:HA	1:F:234:ARG:HH12	1.56	0.69
1:C:214:ILE:O	1:C:234:ARG:NH2	2.25	0.69
1:C:443:LEU:HD23	1:C:465:VAL:HG13	1.73	0.69
1:E:417:GLN:O	1:E:439:ARG:NH2	2.24	0.69
1:B:94:GLU:OE1	1:B:267:ARG:NH1	2.26	0.68
1:D:234:ARG:NH2	1:F:403:PHE:O	2.26	0.68
1:F:87:ASP:OD1	1:F:260:ARG:NH2	2.27	0.68
1:A:216:ASN:O	1:A:219:ARG:NH1	2.28	0.67
1:C:326:GLU:OE1	1:C:367:ARG:NH1	2.27	0.67
1:A:386:GLN:HB2	1:D:329:ARG:HB3	1.75	0.67
1:E:116:LEU:O	1:E:118:LYS:NZ	2.28	0.66
1:D:316:HIS:NE2	1:D:348:GLU:OE1	2.27	0.66
1:F:143:LEU:HG	1:F:192:LEU:HD22	1.78	0.66
1:D:116:LEU:O	1:D:118:LYS:NZ	2.29	0.66

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:316:HIS:NE2	1:F:348:GLU:OE1	2.28	0.65
1:A:234:ARG:NH2	1:B:403:PHE:O	2.30	0.65
1:A:385:ARG:HG3	1:D:330:VAL:HG12	1.77	0.64
1:E:87:ASP:OD1	1:E:260:ARG:NH2	2.27	0.64
1:D:161:ARG:NH2	1:D:285:PRO:O	2.30	0.64
1:E:316:HIS:NE2	1:E:348:GLU:OE1	2.29	0.64
1:C:215:PHE:HA	1:C:234:ARG:HH22	1.63	0.64
1:E:347:ASP:OD1	3:E:601:HOH:O	2.16	0.63
1:C:403:PHE:O	1:E:234:ARG:NH2	2.23	0.63
1:F:217:PRO:HB3	1:F:341:PHE:HB2	1.79	0.63
1:E:447:LEU:HD21	1:E:478:VAL:HG13	1.82	0.62
1:D:217:PRO:HB3	1:D:341:PHE:HB2	1.81	0.62
1:D:47:PRO:HG2	1:D:429:PRO:HB3	1.82	0.62
1:D:439:ARG:NH2	1:D:442:GLN:OE1	2.33	0.62
1:A:335:VAL:O	1:A:339:SER:OG	2.12	0.62
1:B:64:GLN:OE1	1:B:67:ARG:NH1	2.33	0.62
1:C:77:ARG:HE	1:C:299:GLU:HB3	1.66	0.61
1:A:98:GLU:OE1	1:C:456:LYS:NZ	2.34	0.61
1:E:197:ARG:NH2	1:E:281:ASP:OD2	2.33	0.61
1:B:415:ASP:OD1	1:B:457:TYR:OH	2.19	0.61
1:A:372:PRO:HB2	1:A:382:LEU:HD11	1.83	0.60
1:E:372:PRO:HB2	1:E:382:LEU:HD21	1.82	0.60
1:E:316:HIS:CE1	1:E:348:GLU:HB3	2.37	0.60
1:B:218:ILE:HG22	1:B:220:VAL:HG12	1.84	0.60
1:B:316:HIS:CE1	1:B:348:GLU:HB3	2.37	0.59
1:C:331:ASP:HB2	1:C:334:ILE:HD13	1.83	0.59
1:F:443:LEU:HD23	1:F:465:VAL:HG13	1.84	0.59
1:B:316:HIS:NE2	1:B:348:GLU:OE1	2.33	0.59
1:A:214:ILE:O	1:A:234:ARG:NH1	2.36	0.59
1:C:316:HIS:NE2	1:C:348:GLU:OE1	2.36	0.59
1:F:414:ILE:HG23	1:F:446:LEU:HD12	1.84	0.59
1:A:443:LEU:HD13	1:A:465:VAL:HG13	1.84	0.59
1:A:387:THR:HG22	1:D:329:ARG:HB2	1.85	0.59
1:C:347:ASP:OD1	3:C:601:HOH:O	2.17	0.59
1:C:169:LYS:HD3	1:C:187:LEU:HD11	1.84	0.58
1:A:239:ARG:NH1	1:A:240:TYR:OH	2.37	0.58
1:C:116:LEU:O	1:C:118:LYS:NZ	2.36	0.58
1:B:213:CYS:O	1:B:219:ARG:NH1	2.37	0.58
1:B:388:LEU:HD12	1:B:391:ILE:HD12	1.86	0.58
1:E:326:GLU:OE1	1:E:367:ARG:NH1	2.36	0.57
2:H:23:UNK:O	2:H:25:UNK:N	2.37	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:408:ARG:NH2	3:B:601:HOH:O	2.37	0.57
1:A:34:ARG:HG3	1:A:430:PHE:HA	1.87	0.57
1:B:47:PRO:HG2	1:B:429:PRO:HB3	1.87	0.57
1:C:75:GLU:HG3	1:C:76:PRO:HD2	1.85	0.57
1:B:338:GLU:OE2	1:D:367:ARG:NH2	2.38	0.56
1:D:34:ARG:HG3	1:D:430:PHE:HA	1.86	0.56
1:B:216:ASN:O	1:B:219:ARG:NH1	2.38	0.56
1:C:415:ASP:OD1	1:C:457:TYR:OH	2.22	0.56
1:F:214:ILE:O	1:F:234:ARG:NH1	2.38	0.56
1:C:63:GLN:NE2	1:C:292:ASP:OD2	2.38	0.56
1:C:481:HIS:HE2	1:C:485:LEU:HD22	1.68	0.56
1:A:85:ILE:O	1:A:89:VAL:HG13	2.06	0.56
1:B:116:LEU:O	1:B:118:LYS:NZ	2.38	0.56
1:B:411:ARG:NH1	1:E:91:ASP:OD2	2.30	0.56
2:H:52:UNK:O	2:H:56:UNK:N	2.40	0.55
1:A:414:ILE:HG23	1:A:446:LEU:HD12	1.86	0.55
1:D:94:GLU:OE1	1:D:267:ARG:NH1	2.40	0.55
1:E:34:ARG:HD2	1:E:40:LEU:HD21	1.87	0.55
1:D:77:ARG:NH1	1:D:251:SER:O	2.36	0.55
1:B:34:ARG:NH1	1:B:38:GLU:O	2.40	0.55
1:A:28:THR:O	1:A:427:GLN:NE2	2.39	0.55
1:B:372:PRO:HB2	1:B:382:LEU:HD21	1.89	0.55
1:C:433:LEU:HD12	1:C:434:PRO:HD2	1.89	0.55
1:E:214:ILE:HA	1:E:231:ILE:HD11	1.89	0.54
1:D:403:PHE:O	1:F:234:ARG:NH2	2.41	0.54
1:E:217:PRO:HB3	1:E:341:PHE:HB2	1.89	0.54
1:A:75:GLU:HG3	1:A:76:PRO:HD2	1.90	0.54
1:D:316:HIS:CE1	1:D:348:GLU:HB3	2.42	0.54
1:E:143:LEU:HG	1:E:192:LEU:HD22	1.90	0.54
1:C:143:LEU:HG	1:C:192:LEU:HD22	1.90	0.53
1:E:64:GLN:OE1	1:E:67:ARG:NH1	2.42	0.53
1:F:174:LYS:HE2	1:F:177:LYS:HE3	1.90	0.53
1:A:34:ARG:NH1	1:A:38:GLU:O	2.41	0.53
1:B:34:ARG:HG3	1:B:430:PHE:HA	1.89	0.53
1:F:34:ARG:NH1	1:F:36:SER:O	2.41	0.53
1:B:217:PRO:HB3	1:B:341:PHE:HB2	1.90	0.53
1:D:326:GLU:OE1	1:D:367:ARG:NH1	2.21	0.53
1:E:34:ARG:NH1	1:E:38:GLU:O	2.42	0.53
1:A:447:LEU:HD21	1:A:478:VAL:HG13	1.91	0.53
1:C:394:LEU:O	1:C:395:ARG:HG2	2.09	0.53
1:F:359:VAL:HA	1:F:381:PRO:HB3	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:143:LEU:HG	1:A:192:LEU:HD22	1.91	0.53
1:D:484:VAL:O	1:D:488:VAL:HG13	2.10	0.52
1:E:462:ALA:HB1	1:E:478:VAL:HG11	1.90	0.52
1:E:75:GLU:HG3	1:E:76:PRO:HD2	1.92	0.52
1:B:484:VAL:O	1:B:488:VAL:HG13	2.10	0.52
1:C:94:GLU:OE1	1:C:267:ARG:NH1	2.41	0.52
1:C:484:VAL:O	1:C:488:VAL:HG13	2.09	0.52
1:D:235:HIS:NE2	1:D:342:SER:OG	2.24	0.52
1:F:319:LEU:HD13	1:F:370:LEU:HD11	1.91	0.52
1:A:234:ARG:HD3	1:A:340:GLU:OE2	2.09	0.52
1:A:273:ASP:O	1:A:277:VAL:HG23	2.09	0.52
1:D:472:SER:OG	1:D:473:GLY:N	2.43	0.52
1:E:484:VAL:O	1:E:488:VAL:HG13	2.09	0.52
1:D:328:THR:HG21	1:D:354:LEU:HD13	1.92	0.51
1:B:75:GLU:HG3	1:B:76:PRO:HD2	1.92	0.51
1:D:319:LEU:HD13	1:D:370:LEU:HD11	1.92	0.51
1:B:433:LEU:HD12	1:B:434:PRO:HD2	1.90	0.51
1:F:107:TRP:O	1:F:200:ARG:NH1	2.44	0.51
1:F:472:SER:OG	1:F:473:GLY:N	2.42	0.51
1:C:99:ASN:OD1	1:E:482:ARG:NH1	2.44	0.51
1:F:439:ARG:N	1:F:440:PRO:HD3	2.26	0.51
1:A:230:PHE:O	1:A:234:ARG:HG2	2.10	0.51
1:D:26:LEU:HD11	1:D:66:MET:HE3	1.93	0.51
1:E:385:ARG:NE	1:E:386:GLN:H	2.09	0.51
1:E:174:LYS:HE2	1:E:177:LYS:HE3	1.92	0.51
1:F:75:GLU:HG3	1:F:76:PRO:HD2	1.92	0.51
1:C:47:PRO:HG2	1:C:429:PRO:HB3	1.93	0.51
1:E:374:ARG:NH1	1:E:381:PRO:O	2.39	0.51
1:F:47:PRO:HG2	1:F:429:PRO:HB3	1.93	0.51
1:E:89:VAL:HG22	1:E:332:PRO:HB3	1.93	0.50
1:F:34:ARG:HG3	1:F:430:PHE:HA	1.93	0.50
1:D:255:ARG:NH1	1:D:283:LEU:O	2.44	0.50
1:A:231:ILE:O	1:A:234:ARG:HG3	2.11	0.50
1:C:439:ARG:HB2	1:C:443:LEU:HD13	1.93	0.50
1:C:82:PRO:HB2	1:C:85:ILE:HD13	1.93	0.50
1:F:173:VAL:HB	1:F:177:LYS:HD2	1.94	0.50
1:F:34:ARG:NH1	1:F:38:GLU:O	2.45	0.50
1:A:217:PRO:HB3	1:A:341:PHE:HB2	1.93	0.50
1:E:159:SER:OG	1:E:281:ASP:OD1	2.22	0.50
1:F:273:ASP:O	1:F:277:VAL:HG23	2.12	0.50
1:B:28:THR:O	1:B:427:GLN:NE2	2.44	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:392:SER:O	3:E:601:HOH:O	2.19	0.50
1:B:143:LEU:HG	1:B:192:LEU:HD22	1.94	0.49
1:B:475:GLU:OE1	1:B:476:MET:N	2.45	0.49
1:F:219:ARG:HD2	1:F:231:ILE:HD13	1.94	0.49
1:B:173:VAL:HB	1:B:177:LYS:HD2	1.94	0.49
1:C:209:LEU:HD12	1:C:218:ILE:HB	1.93	0.49
1:A:94:GLU:OE2	1:A:267:ARG:HD2	2.11	0.49
1:B:220:VAL:HG11	1:B:310:GLN:HG3	1.95	0.49
1:A:64:GLN:OE1	1:A:67:ARG:NH1	2.46	0.49
1:A:91:ASP:OD2	1:C:411:ARG:NH1	2.43	0.49
1:C:217:PRO:HB3	1:C:341:PHE:HB2	1.95	0.49
1:E:472:SER:OG	1:E:473:GLY:N	2.46	0.49
1:C:34:ARG:HH11	1:C:40:LEU:HD22	1.78	0.48
1:D:462:ALA:HA	1:D:465:VAL:HG12	1.94	0.48
1:C:326:GLU:OE2	1:C:368:TYR:OH	2.25	0.48
1:B:26:LEU:HD11	1:B:66:MET:HE3	1.95	0.48
1:F:89:VAL:HG12	1:F:332:PRO:HB3	1.95	0.48
1:B:130:LYS:NZ	1:B:195:MET:SD	2.78	0.48
1:D:219:ARG:HD2	1:D:231:ILE:HD13	1.94	0.48
1:D:85:ILE:O	1:D:89:VAL:HG13	2.14	0.48
1:A:133:ASP:HB2	1:A:143:LEU:HD22	1.96	0.48
1:B:34:ARG:HD2	1:B:40:LEU:HD11	1.96	0.48
1:D:126:TYR:CZ	1:D:142:ASP:HB3	2.48	0.48
1:A:484:VAL:O	1:A:488:VAL:HG22	2.14	0.47
1:B:128:LYS:HD3	1:B:143:LEU:HD13	1.96	0.47
1:C:34:ARG:HD3	1:C:40:LEU:HD21	1.95	0.47
1:B:130:LYS:HE2	1:B:192:LEU:HD13	1.96	0.47
1:C:321:LEU:O	1:C:325:VAL:HG12	2.14	0.47
1:E:173:VAL:HB	1:E:177:LYS:HD2	1.96	0.47
1:C:171:GLU:OE2	1:C:185:ARG:NE	2.47	0.47
1:F:161:ARG:NH2	1:F:285:PRO:O	2.41	0.47
1:F:326:GLU:OE1	1:F:368:TYR:OH	2.19	0.47
1:C:219:ARG:NH2	1:C:340:GLU:OE2	2.47	0.47
1:E:202:PHE:HB2	1:E:307:CYS:SG	2.53	0.47
1:F:316:HIS:CE1	1:F:348:GLU:HB3	2.50	0.47
1:B:256:ALA:O	1:B:260:ARG:HG2	2.15	0.47
1:A:329:ARG:HB2	1:C:387:THR:HG21	1.97	0.47
1:F:428:ASN:HB3	1:F:431:GLU:HG3	1.97	0.47
1:C:77:ARG:HE	1:C:299:GLU:CB	2.27	0.47
1:D:347:ASP:OD1	3:D:601:HOH:O	2.21	0.46
1:C:316:HIS:CE1	1:C:348:GLU:HB3	2.50	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:174:LYS:HE2	1:D:176:ASP:HB3	1.97	0.46
1:C:26:LEU:HD11	1:C:66:MET:HE3	1.97	0.46
1:B:461:VAL:O	1:B:465:VAL:HG22	2.15	0.46
1:B:333:ASP:OD1	1:B:333:ASP:N	2.49	0.46
1:C:94:GLU:OE2	1:C:267:ARG:HD2	2.17	0.46
1:A:18:ALA:HB2	1:A:296:VAL:HG23	1.97	0.45
1:D:278:VAL:O	1:D:282:LEU:HG	2.16	0.45
1:F:128:LYS:HD3	1:F:143:LEU:HD13	1.98	0.45
1:E:35:THR:HG21	1:E:439:ARG:NH1	2.31	0.45
1:A:23:ALA:HB3	1:A:291:GLY:HA2	1.98	0.45
1:A:410:ASP:O	1:A:414:ILE:HG13	2.15	0.45
1:E:439:ARG:O	1:E:443:LEU:HB2	2.17	0.45
1:C:104:GLN:HB2	1:C:204:PRO:HB3	1.98	0.45
1:B:273:ASP:O	1:B:277:VAL:HG23	2.16	0.45
1:E:104:GLN:HB2	1:E:204:PRO:HB3	1.98	0.45
1:C:210:LYS:HE3	1:C:210:LYS:HB2	1.79	0.45
1:C:278:VAL:O	1:C:282:LEU:HG	2.17	0.45
1:C:66:MET:O	1:C:70:LEU:HD23	2.17	0.45
1:D:23:ALA:HB3	1:D:291:GLY:HA2	1.99	0.45
1:F:409:LEU:HG	1:F:413:SER:HB2	1.99	0.45
1:C:128:LYS:HD3	1:C:143:LEU:HD13	1.99	0.44
1:D:417:GLN:HB3	1:D:446:LEU:HD21	1.98	0.44
1:D:75:GLU:HG3	1:D:76:PRO:HD2	1.99	0.44
1:F:410:ASP:O	1:F:414:ILE:HG12	2.16	0.44
1:A:461:VAL:O	1:A:465:VAL:HG23	2.18	0.44
1:B:124:TYR:HA	1:B:125:PRO:HA	1.79	0.44
1:C:126:TYR:CZ	1:C:142:ASP:HB3	2.52	0.44
1:D:391:ILE:HB	1:D:398:ILE:HD12	1.98	0.44
1:C:208:ALA:O	1:C:212:THR:HG22	2.18	0.44
1:E:256:ALA:O	1:E:260:ARG:HG2	2.18	0.44
1:C:202:PHE:HB2	1:C:307:CYS:SG	2.57	0.44
1:E:133:ASP:HB2	1:E:143:LEU:HD22	2.00	0.44
1:A:66:MET:O	1:A:70:LEU:HD13	2.18	0.44
1:B:212:THR:OG1	1:B:212:THR:O	2.33	0.44
1:C:169:LYS:HD3	1:C:187:LEU:HD21	2.00	0.44
1:D:460:THR:O	1:D:464:ARG:HG3	2.18	0.44
1:F:372:PRO:HB2	1:F:382:LEU:HD11	1.98	0.44
1:A:212:THR:O	1:A:212:THR:OG1	2.33	0.44
1:A:256:ALA:O	1:A:260:ARG:HG2	2.18	0.44
1:C:372:PRO:HB2	1:C:382:LEU:HD11	2.00	0.44
1:F:77:ARG:NH1	1:F:251:SER:O	2.51	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:62:LEU:HA	1:A:65:VAL:HG12	2.00	0.43
1:A:63:GLN:O	1:A:67:ARG:HG3	2.18	0.43
1:C:439:ARG:O	1:C:443:LEU:HD13	2.18	0.43
1:C:476:MET:HG2	1:C:477:VAL:H	1.84	0.43
1:F:212:THR:OG1	1:F:212:THR:O	2.34	0.43
1:D:36:SER:HB3	1:D:38:GLU:HG2	1.99	0.43
1:E:193:GLY:O	1:E:197:ARG:HG3	2.18	0.43
1:E:412:ALA:O	1:E:416:ARG:HG3	2.19	0.43
1:F:104:GLN:HB2	1:F:204:PRO:HB3	2.01	0.43
1:C:210:LYS:HE2	1:C:221:GLY:HA3	2.00	0.43
1:C:412:ALA:O	1:C:416:ARG:HG3	2.18	0.43
1:C:428:ASN:HB3	1:C:431:GLU:HG3	2.00	0.43
1:D:218:ILE:HD11	1:D:314:LEU:HD13	2.01	0.43
1:A:244:ALA:HB3	1:A:246:TYR:CE2	2.53	0.42
1:C:256:ALA:O	1:C:260:ARG:HG2	2.19	0.42
1:C:374:ARG:NH1	1:C:383:GLU:OE2	2.52	0.42
1:F:414:ILE:O	1:F:418:LEU:HD13	2.18	0.42
1:A:208:ALA:O	1:A:212:THR:HG22	2.19	0.42
1:E:341:PHE:CE1	1:E:350:VAL:HG13	2.54	0.42
1:F:274:LEU:O	1:F:278:VAL:HG23	2.20	0.42
1:A:316:HIS:NE2	1:A:348:GLU:HB3	2.34	0.42
1:C:23:ALA:HB3	1:C:291:GLY:HA2	2.00	0.42
1:D:210:LYS:HB2	1:D:210:LYS:HE3	1.81	0.42
1:D:159:SER:OG	1:D:281:ASP:OD1	2.23	0.42
1:D:462:ALA:HB1	1:D:478:VAL:HG11	2.00	0.42
1:E:432:THR:O	1:E:434:PRO:HD3	2.19	0.42
1:B:460:THR:O	1:B:464:ARG:HG3	2.19	0.42
1:C:248:ARG:HB3	1:C:251:SER:OG	2.20	0.42
1:D:104:GLN:HB2	1:D:204:PRO:HB3	2.01	0.42
1:D:433:LEU:HD12	1:D:434:PRO:HD2	2.00	0.42
1:D:321:LEU:HA	1:D:321:LEU:HD23	1.83	0.42
1:A:72:PRO:HB2	1:A:251:SER:HB3	2.02	0.42
1:D:443:LEU:HD22	1:D:465:VAL:HG23	2.01	0.42
1:C:263:ASP:HB3	1:C:267:ARG:NH2	2.34	0.41
1:A:321:LEU:HD23	1:A:321:LEU:HA	1.82	0.41
1:C:334:ILE:HA	1:C:337:GLN:HG2	2.01	0.41
1:E:410:ASP:OD1	1:E:410:ASP:N	2.53	0.41
2:G:52:UNK:O	2:G:56:UNK:N	2.53	0.41
1:F:433:LEU:HD12	1:F:434:PRO:HD2	2.02	0.41
1:F:26:LEU:HD11	1:F:66:MET:HE3	2.01	0.41
1:A:126:TYR:CZ	1:A:142:ASP:HB3	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:274:LEU:O	1:A:278:VAL:HG23	2.21	0.41
1:A:30:THR:HB	1:A:50:LEU:HD21	2.02	0.41
1:C:63:GLN:O	1:C:67:ARG:HG3	2.20	0.41
1:B:250:ASP:OD2	1:B:301:LEU:HD23	2.20	0.41
1:B:38:GLU:HG2	1:B:38:GLU:H	1.66	0.41
1:C:70:LEU:HD11	1:C:288:LEU:HD23	2.03	0.41
1:C:321:LEU:HA	1:C:321:LEU:HD23	1.82	0.41
1:C:97:LEU:HB3	1:C:268:LEU:HD21	2.02	0.41
1:C:333:ASP:N	1:C:333:ASP:OD1	2.50	0.41
1:C:460:THR:O	1:C:464:ARG:HG3	2.20	0.41
1:D:317:TRP:HA	1:D:343:PHE:CE2	2.55	0.41
1:A:410:ASP:N	1:A:410:ASP:OD1	2.54	0.41
1:D:244:ALA:HB3	1:D:246:TYR:CE2	2.56	0.41
1:E:18:ALA:HB2	1:E:296:VAL:HG23	2.02	0.41
1:C:481:HIS:NE2	1:C:485:LEU:HD22	2.35	0.41
1:D:348:GLU:O	3:D:601:HOH:O	2.22	0.41
1:A:326:GLU:OE2	1:A:368:TYR:OH	2.30	0.41
1:A:94:GLU:OE1	1:A:267:ARG:NH1	2.54	0.41
1:A:47:PRO:HG2	1:A:429:PRO:HB3	2.03	0.41
1:E:278:VAL:O	1:E:282:LEU:HG	2.21	0.41
1:B:278:VAL:O	1:B:282:LEU:HG	2.21	0.41
1:B:89:VAL:HG22	1:B:332:PRO:HB3	2.03	0.41
1:D:38:GLU:HG2	1:D:38:GLU:H	1.68	0.41
1:B:18:ALA:HB2	1:B:296:VAL:HG23	2.01	0.40
1:B:458:TYR:CE1	1:B:484:VAL:HG11	2.55	0.40
1:C:274:LEU:O	1:C:277:VAL:HG22	2.22	0.40
1:C:333:ASP:OD1	1:C:334:ILE:HD12	2.21	0.40
1:E:456:LYS:O	1:E:460:THR:HG23	2.21	0.40
1:E:57:VAL:HG11	1:E:179:TYR:HA	2.03	0.40
1:D:332:PRO:O	1:D:336:MET:HG3	2.22	0.40
1:A:28:THR:OG1	1:A:28:THR:O	2.39	0.40
1:A:409:LEU:HA	1:A:409:LEU:HD12	1.92	0.40
1:B:97:LEU:HB3	1:B:268:LEU:HD21	2.02	0.40
1:D:19:ASP:OD1	1:D:20:TYR:N	2.49	0.40
1:A:439:ARG:NH1	1:A:468:GLU:OE2	2.55	0.40
1:C:28:THR:O	1:C:28:THR:OG1	2.40	0.40
1:A:87:ASP:OD2	1:C:411:ARG:HD2	2.21	0.40
1:D:110:LYS:NZ	1:D:137:SER:HB3	2.37	0.40
1:E:317:TRP:HA	1:E:343:PHE:CE2	2.57	0.40
1:E:385:ARG:HD2	1:E:385:ARG:HA	1.78	0.40
1:F:461:VAL:O	1:F:465:VAL:HG23	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:208:ALA:O	1:E:212:THR:HG22	2.21	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:292:ASP:OD1	1:F:20:TYR:OH[1_455]	2.16	0.04

## 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 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	473/517 (92%)	463 (98%)	9 (2%)	1 (0%)	47	78
1	B	475/517 (92%)	463 (98%)	11 (2%)	1 (0%)	47	78
1	C	474/517 (92%)	461 (97%)	12 (2%)	1 (0%)	47	78
1	D	473/517 (92%)	462 (98%)	11 (2%)	0	100	100
1	E	479/517 (93%)	465 (97%)	11 (2%)	3 (1%)	25	59
1	F	475/517 (92%)	463 (98%)	11 (2%)	1 (0%)	47	78
All	All	2849/3102 (92%)	2777 (98%)	65 (2%)	7 (0%)	47	78

All (7) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	473	GLY
1	E	473	GLY
1	F	491	GLY
1	A	440	PRO
1	E	474	ILE
1	C	440	PRO
1	E	435	GLY

### 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 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	405/440 (92%)	400 (99%)	5 (1%)	71	87
1	B	408/440 (93%)	404 (99%)	4 (1%)	76	89
1	C	408/440 (93%)	403 (99%)	5 (1%)	71	87
1	D	408/440 (93%)	405 (99%)	3 (1%)	84	93
1	E	407/440 (92%)	400 (98%)	7 (2%)	60	82
1	F	409/440 (93%)	406 (99%)	3 (1%)	84	93
All	All	2445/2640 (93%)	2418 (99%)	27 (1%)	73	88

All (27) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	SER
1	A	250	ASP
1	A	269	SER
1	A	316	HIS
1	A	439	ARG
1	B	122	SER
1	B	250	ASP
1	B	444	MET
1	B	475	GLU
1	C	122	SER
1	C	250	ASP
1	C	269	SER
1	C	415	ASP
1	C	444	MET
1	D	122	SER
1	D	250	ASP
1	D	376	ASP
1	E	122	SER
1	E	250	ASP
1	E	333	ASP
1	E	385	ARG
1	E	426	HIS

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Mol	Chain	Res	Type
1	E	444	MET
1	E	482	ARG
1	F	250	ASP
1	F	333	ASP
1	F	444	MET

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	471	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 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 [i](#)

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	479/517 (92%)	-0.27	4 (0%) 86 74	21, 47, 91, 133	0
1	B	479/517 (92%)	-0.26	4 (0%) 86 74	23, 46, 79, 151	0
1	C	480/517 (92%)	-0.13	3 (0%) 89 80	26, 54, 93, 137	0
1	D	479/517 (92%)	-0.21	5 (1%) 82 70	23, 49, 92, 162	0
1	E	483/517 (93%)	-0.21	5 (1%) 82 70	24, 52, 100, 160	0
1	F	481/517 (93%)	-0.12	5 (1%) 82 70	24, 54, 95, 122	0
2	G	0/35	-	-	-	-
2	H	0/35	-	-	-	-
All	All	2881/3172 (90%)	-0.20	26 (0%) 84 72	21, 51, 94, 162	0

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	476	MET	4.4
1	B	476	MET	3.4
1	B	58	ASP	3.1
1	B	477	VAL	2.7
1	A	477	VAL	2.6
1	C	436	HIS	2.6
1	D	478	VAL	2.5
1	F	378	GLU	2.5
1	E	378	GLU	2.5
1	A	37	PRO	2.4
1	D	436	HIS	2.4
1	D	39	LYS	2.3
1	E	58	ASP	2.3
1	A	479	PRO	2.3
1	E	375	ALA	2.2
1	E	379	GLU	2.2
1	F	415	ASP	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	380	GLY	2.2
1	E	376	ASP	2.2
1	D	468	GLU	2.2
1	D	455	GLU	2.2
1	F	379	GLU	2.1
1	C	137	SER	2.1
1	B	379	GLU	2.0
1	F	473	GLY	2.0
1	F	468	GLU	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 [\(i\)](#)

There are no ligands in this entry.

## 6.5 Other polymers [\(i\)](#)

There are no such residues in this entry.