



Full wwPDB/EMDatabank EM Map/Model Validation Report ⓘ

Oct 2, 2019 – 02:14 PM EDT

PDB ID : 6SGZ
EMDB ID: : EMD-10191
Title : Structure of protomer 2 of the ESX-3 core complex
Authors : Famelis, N.; Rivera-Calzada, A.; Llorca, O.; Geibel, S.
Deposited on : 2019-08-05
Resolution : 3.90 Å(reported)

This is a Full wwPDB/EMDatabank EM Map/Model Validation Report
for a publicly released PDB/EMDB 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.

MolProbity : 4.02b-467
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : 2.4

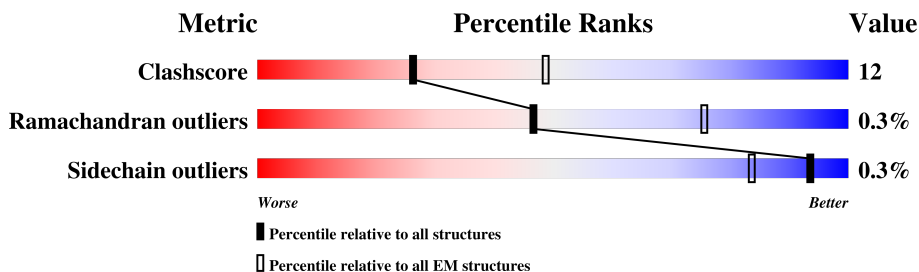
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.90 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	136327	1886
Ramachandran outliers	132723	1663
Sidechain outliers	132532	1531

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 ≥ 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	E	467	69% 25% 7%
1	H	467	73% 21% 5%
2	I	59	78% 22%
3	J	343	62% 33% . .
4	D	286	56% 27% . 16%

2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 11177 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 ESX-3 secretion system protein EccD3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	E	435	Total	C	N	O	S	0	0
			3120	2030	538	543	9		
1	H	442	Total	C	N	O	S	0	0
			3168	2063	548	549	8		

- Molecule 2 is a protein called ESX-3 secretion system ATPase EccB3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	I	59	Total	C	N	O	S	0	0
			461	297	87	74	3		

- Molecule 3 is a protein called ESX-3 secretion system protein EccC3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	J	328	Total	C	N	O	S	0	0
			2603	1624	488	486	5		

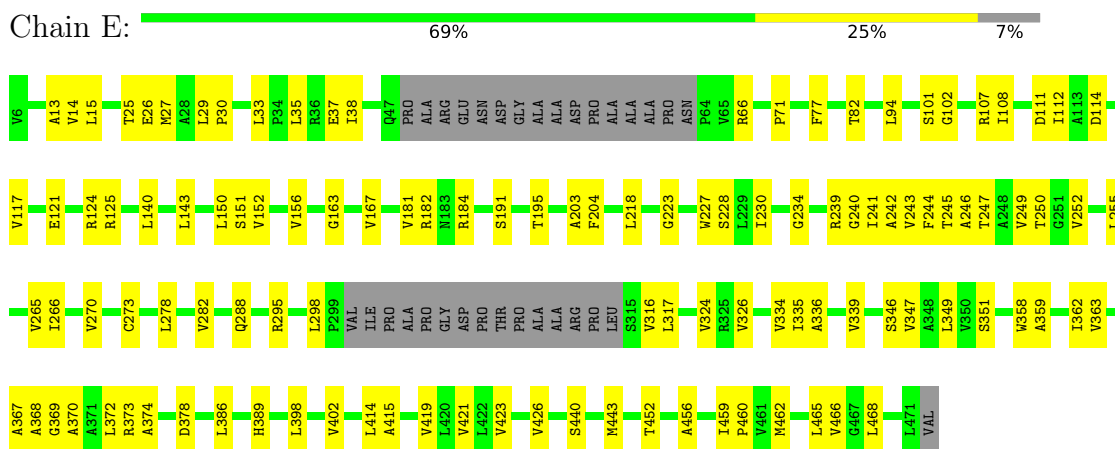
- Molecule 4 is a protein called ESX-3 secretion system protein EccE3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	241	Total	C	N	O	S	0	0
			1825	1157	336	328	4		

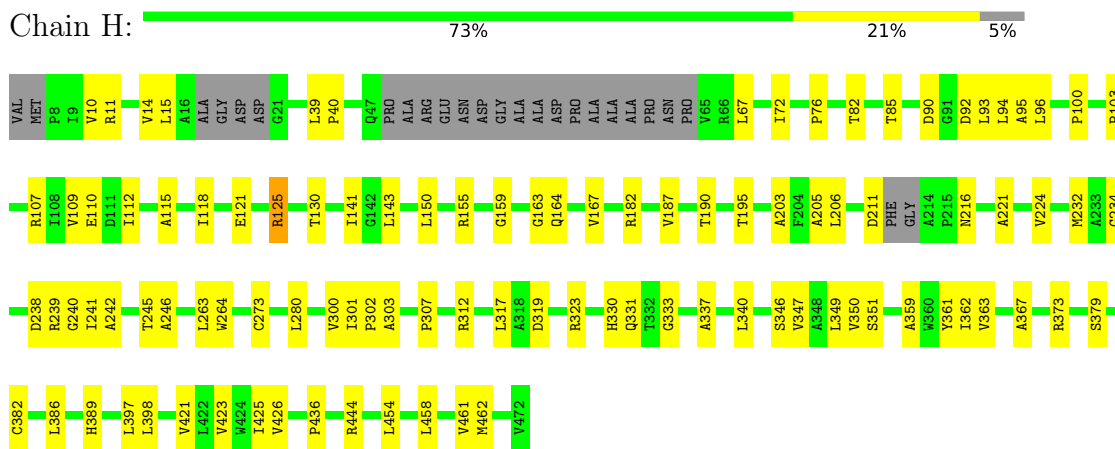
3 Residue-property plots [i](#)

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. 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.

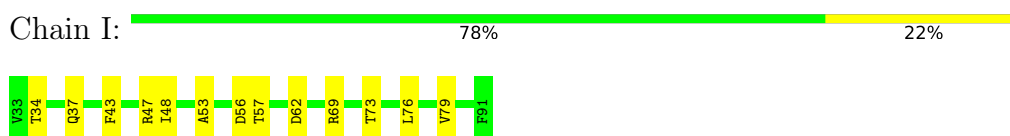
- Molecule 1: ESX-3 secretion system protein EccD3



- Molecule 1: ESX-3 secretion system protein EccD3

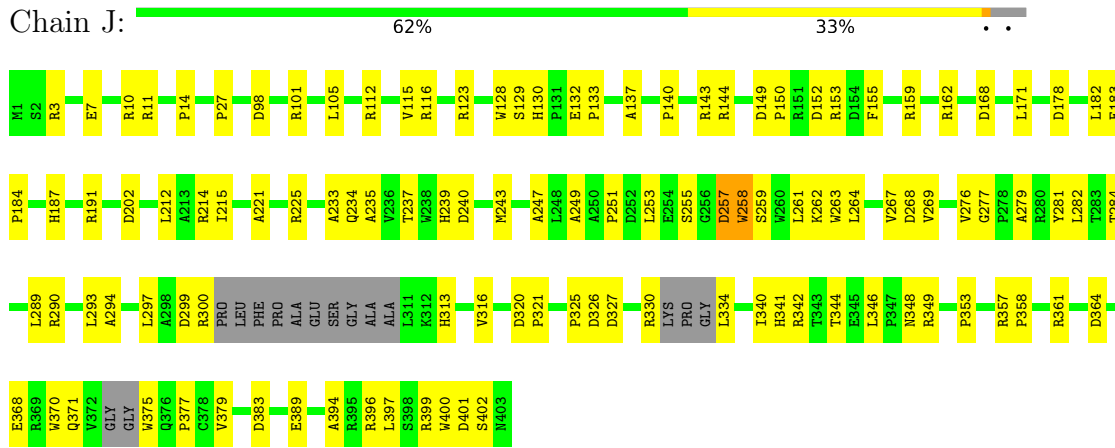


- Molecule 2: ESX-3 secretion system ATPase EccB3



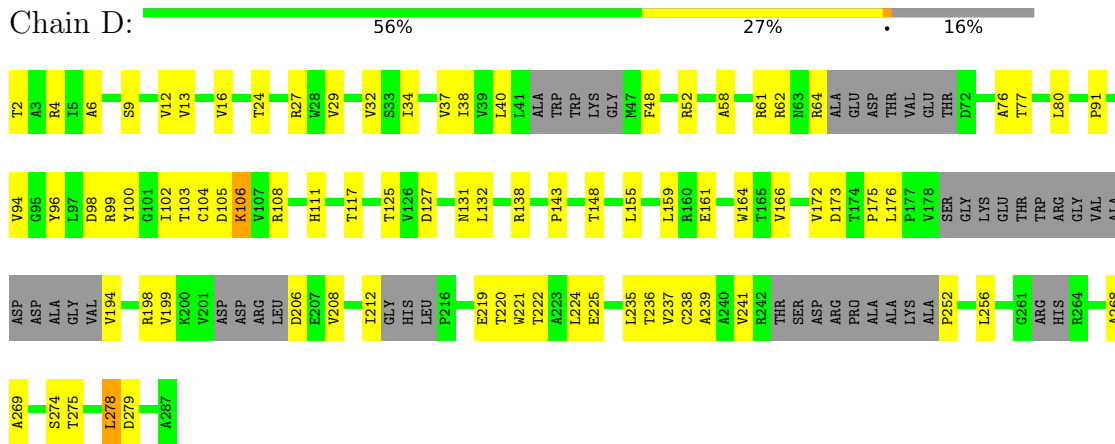
- Molecule 3: ESX-3 secretion system protein EccC3

Chain J:



- Molecule 4: ESX-3 secretion system protein EccE3

Chain D:



4 Experimental information

Property	Value	Source
Reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	160062	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 ($e^-/\text{\AA}^2$)	50.0	Depositor
Minimum defocus (nm)	1600	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	75000	Depositor
Image detector	FEI FALCON III (4k 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 >2	RMSZ	# Z >2
1	E	0.26	0/3179	0.45	1/4365 (0.0%)
1	H	0.26	0/3229	0.42	0/4438
2	I	0.25	0/469	0.39	0/634
3	J	0.26	0/2660	0.48	0/3632
4	D	0.25	0/1852	0.48	1/2529 (0.0%)
All	All	0.26	0/11389	0.45	2/15598 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	278	LEU	CA-CB-CG	5.22	127.32	115.30
1	E	378	ASP	CB-CG-OD1	5.07	122.86	118.30

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	E	3120	0	3304	82	0
1	H	3168	0	3367	68	0
2	I	461	0	487	10	0
3	J	2603	0	2576	84	0
4	D	1825	0	1896	58	0
All	All	11177	0	11630	276	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 12.

All (276) 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:E:252:VAL:O	1:E:255:LEU:HB3	1.82	0.78
1:E:421:VAL:HG11	1:H:143:LEU:HD22	1.70	0.74
1:E:143:LEU:HD22	1:H:421:VAL:HG11	1.70	0.73
3:J:348:ASN:O	3:J:349:ARG:NH1	2.23	0.72
1:H:280:LEU:HD22	1:H:458:LEU:HD23	1.72	0.72
1:H:379:SER:HG	1:H:382:CYS:HG	1.30	0.72
3:J:128:TRP:O	3:J:144:ARG:NH2	2.23	0.71
4:D:77:THR:HG22	4:D:125:THR:HG22	1.70	0.71
3:J:258:TRP:HB3	3:J:261:LEU:HD12	1.74	0.70
1:H:436:PRO:O	1:H:444:ARG:NH2	2.24	0.69
3:J:214:ARG:NH2	3:J:326:ASP:OD1	2.26	0.69
1:E:182:ARG:NH1	1:E:234:GLY:O	2.26	0.68
4:D:61:ARG:O	4:D:64:ARG:NH1	2.27	0.68
1:H:110:GLU:OE2	4:D:138:ARG:NH2	2.25	0.68
3:J:212:LEU:HD13	3:J:215:ILE:HD11	1.75	0.67
4:D:106:LYS:HD3	4:D:225:GLU:HG3	1.77	0.67
1:E:249:VAL:HG21	1:E:334:VAL:HG23	1.78	0.66
1:H:112:ILE:HD12	1:H:115:ALA:HB2	1.78	0.65
4:D:108:ARG:HH21	4:D:278:LEU:HD23	1.62	0.65
3:J:129:SER:O	3:J:130:HIS:ND1	2.30	0.64
4:D:77:THR:HG23	4:D:275:THR:HG22	1.80	0.63
3:J:257:ASP:O	3:J:259:SER:N	2.32	0.63
1:E:241:ILE:O	1:E:244:PHE:HB2	1.99	0.62
3:J:269:VAL:HG12	3:J:281:TYR:CZ	2.34	0.62
3:J:249:ALA:HB2	3:J:289:LEU:HD22	1.82	0.62
3:J:214:ARG:HB3	3:J:357:ARG:HG3	1.83	0.61
1:E:108:ILE:HD11	1:H:317:LEU:HB3	1.83	0.61
1:H:300:VAL:HG13	1:H:312:ARG:HH11	1.65	0.61
1:H:245:THR:HG23	1:H:333:GLY:HA3	1.82	0.61
3:J:368:GLU:HG2	3:J:377:PRO:HA	1.82	0.61
1:E:150:LEU:HD13	1:H:398:LEU:HD11	1.81	0.60
4:D:76:ALA:HB3	4:D:148:THR:HG21	1.84	0.60
3:J:258:TRP:O	3:J:261:LEU:HB2	2.01	0.60
3:J:137:ALA:O	3:J:396:ARG:NH2	2.35	0.60
1:H:155:ARG:HD2	1:H:159:GLY:HA3	1.82	0.60
1:H:67:LEU:HB3	1:H:96:LEU:HD11	1.82	0.60
4:D:105:ASP:OD2	4:D:127:ASP:N	2.34	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:224:LEU:HG	4:D:237:VAL:HG22	1.84	0.59
4:D:106:LYS:HE3	4:D:125:THR:HG21	1.84	0.59
1:H:190:THR:HG21	1:H:239:ARG:HB3	1.84	0.59
1:H:303:ALA:HB3	1:H:307:PRO:HG3	1.85	0.58
1:E:266:ILE:H	1:E:266:ILE:HD12	1.67	0.58
4:D:29:VAL:HA	4:D:32:VAL:HG22	1.86	0.58
1:E:273:CYS:HB3	1:E:462:MET:SD	2.44	0.58
1:E:466:VAL:HG23	1:E:468:LEU:H	1.69	0.57
4:D:198:ARG:NE	4:D:238:CYS:SG	2.77	0.57
3:J:290:ARG:NH1	3:J:327:ASP:O	2.38	0.57
3:J:7:GLU:OE1	3:J:7:GLU:N	2.38	0.56
4:D:194:VAL:N	4:D:241:VAL:O	2.38	0.56
2:I:47:ARG:NE	2:I:57:THR:OG1	2.38	0.56
3:J:27:PRO:HG2	3:J:182:LEU:HD13	1.87	0.56
3:J:261:LEU:HD23	3:J:264:LEU:HD12	1.87	0.56
3:J:401:ASP:OD1	3:J:402:SER:N	2.39	0.56
3:J:268:ASP:HA	3:J:279:ALA:HB3	1.88	0.56
1:E:114:ASP:OD1	3:J:112:ARG:NH2	2.39	0.56
4:D:106:LYS:HG3	4:D:125:THR:OG1	2.06	0.55
4:D:24:THR:HA	4:D:27:ARG:HB3	1.88	0.55
1:E:316:VAL:HG13	1:E:317:LEU:HD23	1.88	0.55
1:E:423:VAL:HA	1:E:426:VAL:HG12	1.89	0.55
3:J:268:ASP:N	3:J:268:ASP:OD1	2.39	0.55
4:D:252:PRO:HA	4:D:256:LEU:HB2	1.88	0.55
1:H:14:VAL:HA	1:H:94:LEU:O	2.07	0.55
3:J:159:ARG:HB3	3:J:234:GLN:HG2	1.89	0.55
1:H:301:ILE:HG23	3:J:184:PRO:HB2	1.89	0.55
3:J:299:ASP:OD1	3:J:299:ASP:N	2.39	0.55
1:H:155:ARG:O	1:H:155:ARG:NH1	2.34	0.54
3:J:98:ASP:OD1	3:J:101:ARG:NH1	2.39	0.54
1:E:367:ALA:HA	1:E:389:HIS:CD2	2.42	0.54
1:H:182:ARG:NH1	1:H:234:GLY:O	2.41	0.54
3:J:243:MET:O	3:J:313:HIS:N	2.37	0.54
3:J:364:ASP:N	3:J:364:ASP:OD1	2.39	0.54
4:D:9:SER:HA	4:D:12:VAL:HG12	1.90	0.54
3:J:11:ARG:HH12	3:J:14:PRO:HG3	1.71	0.53
1:E:239:ARG:C	1:E:241:ILE:H	2.12	0.53
1:E:114:ASP:HA	1:E:117:VAL:HG12	1.90	0.53
1:E:66:ARG:NH2	3:J:389:GLU:OE2	2.34	0.53
1:E:370:ALA:HB3	1:E:389:HIS:CD2	2.43	0.53
1:E:456:ALA:HB1	4:D:6:ALA:HB2	1.90	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:367:ALA:HA	1:H:389:HIS:CD2	2.42	0.53
1:E:346:SER:HB2	1:E:363:VAL:HG13	1.90	0.53
3:J:300:ARG:NH1	3:J:334:LEU:O	2.41	0.53
4:D:176:LEU:HD22	4:D:268:ALA:HA	1.90	0.53
2:I:69:ARG:O	2:I:73:THR:HG23	2.09	0.53
1:E:107:ARG:HD3	3:J:116:ARG:CZ	2.40	0.52
1:H:302:PRO:HB2	1:H:307:PRO:HG2	1.91	0.52
1:E:71:PRO:HD3	1:E:77:PHE:CE1	2.44	0.52
1:E:324:VAL:HG11	4:D:132:LEU:HD22	1.92	0.52
3:J:178:ASP:N	3:J:178:ASP:OD1	2.42	0.52
3:J:269:VAL:HG22	3:J:279:ALA:HB2	1.91	0.52
4:D:212:ILE:HD11	4:D:256:LEU:HD11	1.92	0.52
3:J:289:LEU:HG	3:J:293:LEU:HD12	1.92	0.52
3:J:399:ARG:HB2	3:J:400:TRP:CE3	2.45	0.52
1:E:359:ALA:HA	1:E:362:ILE:HG22	1.91	0.52
4:D:206:ASP:N	4:D:206:ASP:OD1	2.43	0.52
4:D:219:GLU:OE2	4:D:221:TRP:NE1	2.40	0.52
1:E:33:LEU:HD11	1:H:15:LEU:HD22	1.92	0.52
1:E:415:ALA:O	1:E:419:VAL:HG23	2.10	0.52
1:H:163:GLY:O	1:H:167:VAL:HG23	2.10	0.51
4:D:58:ALA:O	4:D:62:ARG:N	2.44	0.51
1:E:218:LEU:HD12	1:E:255:LEU:HD12	1.92	0.51
1:E:121:GLU:OE2	1:E:125:ARG:NH1	2.44	0.51
1:H:331:GLN:HE22	2:I:53:ALA:HA	1.75	0.51
1:H:245:THR:HG21	1:H:330:HIS:HA	1.93	0.51
3:J:321:PRO:HB3	3:J:344:THR:HG23	1.93	0.51
1:E:29:LEU:HD13	1:E:38:ILE:HD12	1.93	0.51
1:H:273:CYS:HB3	1:H:462:MET:HG2	1.93	0.51
3:J:233:ALA:O	3:J:237:THR:OG1	2.22	0.51
4:D:199:VAL:HG21	4:D:208:VAL:HG11	1.92	0.50
4:D:98:ASP:HA	4:D:103:THR:HA	1.92	0.50
1:E:239:ARG:HG3	1:E:240:GLY:H	1.76	0.50
1:E:140:LEU:HD22	1:H:425:ILE:HD11	1.94	0.50
4:D:224:LEU:HD23	4:D:235:LEU:HD11	1.92	0.50
1:E:101:SER:OG	1:E:102:GLY:N	2.45	0.50
1:E:14:VAL:HA	1:E:94:LEU:O	2.11	0.50
3:J:251:PRO:HA	3:J:284:THR:HG23	1.93	0.50
1:H:347:VAL:O	1:H:351:SER:OG	2.20	0.50
3:J:264:LEU:O	3:J:267:VAL:HG22	2.11	0.50
1:E:440:SER:HB2	1:E:443:MET:HB2	1.93	0.50
1:H:423:VAL:HA	1:H:426:VAL:HG12	1.94	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:133:PRO:HG3	3:J:383:ASP:HB3	1.92	0.50
3:J:159:ARG:NH2	3:J:383:ASP:OD2	2.45	0.50
1:E:151:SER:OG	1:E:167:VAL:HG23	2.13	0.49
1:E:288:GLN:N	1:E:288:GLN:OE1	2.41	0.49
1:H:362:ILE:HG23	1:H:458:LEU:HD11	1.94	0.49
1:E:265:VAL:HG22	1:E:266:ILE:H	1.78	0.49
3:J:10:ARG:O	3:J:143:ARG:NH1	2.46	0.49
4:D:4:ARG:HH21	4:D:40:LEU:HD11	1.76	0.49
1:E:240:GLY:O	1:E:243:VAL:HG12	2.12	0.49
2:I:62:ASP:N	2:I:62:ASP:OD1	2.46	0.49
1:H:350:VAL:HG23	1:H:363:VAL:HG21	1.95	0.48
1:E:151:SER:OG	1:E:163:GLY:O	2.31	0.48
3:J:191:ARG:HD3	3:J:191:ARG:HA	1.68	0.48
4:D:48:PHE:HB2	4:D:52:ARG:HH21	1.79	0.48
1:H:141:ILE:HD13	1:H:195:THR:HG21	1.94	0.48
3:J:325:PRO:HG3	3:J:341:HIS:CE1	2.49	0.48
3:J:290:ARG:O	3:J:294:ALA:N	2.47	0.48
1:H:205:ALA:O	1:H:216:ASN:HB3	2.13	0.48
3:J:247:ALA:HB3	3:J:316:VAL:HG22	1.95	0.48
3:J:115:VAL:HG21	3:J:171:LEU:HD21	1.96	0.48
1:E:335:ILE:HD11	1:E:386:LEU:HD21	1.94	0.48
1:H:155:ARG:HG2	1:H:206:LEU:HD22	1.95	0.48
1:H:187:VAL:HG22	1:H:239:ARG:HE	1.79	0.48
1:E:452:THR:HG23	4:D:2:THR:HG22	1.95	0.48
2:I:47:ARG:NH1	3:J:105:LEU:HD13	2.29	0.48
4:D:13:VAL:HA	4:D:16:VAL:HG12	1.94	0.48
1:E:414:LEU:HD22	1:H:150:LEU:HD23	1.97	0.47
1:H:125:ARG:HH21	1:H:130:THR:HG21	1.79	0.47
1:H:211:ASP:O	1:H:216:ASN:ND2	2.47	0.47
1:E:33:LEU:N	1:E:82:THR:OG1	2.47	0.47
3:J:320:ASP:OD1	3:J:320:ASP:N	2.44	0.47
3:J:300:ARG:HD3	3:J:334:LEU:HA	1.96	0.47
1:H:118:ILE:O	1:H:121:GLU:HB3	2.15	0.47
3:J:235:ALA:O	3:J:239:HIS:ND1	2.38	0.47
3:J:276:VAL:HG23	3:J:277:GLY:H	1.80	0.47
1:H:373:ARG:HG3	1:H:386:LEU:HD13	1.96	0.47
1:H:11:ARG:NH2	1:H:90:ASP:OD2	2.42	0.47
3:J:140:PRO:HB3	3:J:397:LEU:HD13	1.97	0.47
4:D:212:ILE:HG21	4:D:239:ALA:HB1	1.96	0.47
4:D:96:TYR:CD1	4:D:99:ARG:HD3	2.50	0.47
1:E:459:ILE:N	1:E:460:PRO:HD2	2.30	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:J:240:ASP:OD2	3:J:402:SER:OG	2.24	0.47
1:E:27:MET:HA	1:H:107:ARG:HH22	1.78	0.47
1:E:242:ALA:O	1:E:245:THR:HG22	2.15	0.47
1:E:167:VAL:HG12	1:E:203:ALA:HB2	1.96	0.46
4:D:96:TYR:O	4:D:104:CYS:HB2	2.15	0.46
1:H:221:ALA:HA	1:H:224:VAL:HG12	1.96	0.46
1:E:184:ARG:HA	1:E:184:ARG:HD2	1.73	0.46
1:E:278:LEU:O	1:E:282:VAL:HG23	2.16	0.46
1:E:349:LEU:HB3	1:E:359:ALA:HB1	1.97	0.46
1:E:25:THR:HB	1:H:109:VAL:HG23	1.97	0.46
4:D:111:HIS:HB2	4:D:222:THR:HG23	1.97	0.46
3:J:214:ARG:O	3:J:358:PRO:HD2	2.16	0.46
3:J:215:ILE:HB	3:J:340:ILE:HG23	1.97	0.46
3:J:263:TRP:HB2	3:J:394:ALA:HB1	1.97	0.46
4:D:208:VAL:O	4:D:212:ILE:HG12	2.16	0.46
1:E:336:ALA:O	1:E:339:VAL:HG12	2.16	0.45
1:E:252:VAL:HG23	1:E:255:LEU:HD23	1.98	0.45
4:D:269:ALA:O	4:D:274:SER:OG	2.34	0.45
1:H:263:LEU:HB2	1:H:264:TRP:CE3	2.51	0.45
1:H:361:TYR:CE2	1:H:461:VAL:HG21	2.52	0.45
4:D:138:ARG:HB3	4:D:143:PRO:HG2	1.99	0.45
1:H:241:ILE:HG22	1:H:242:ALA:H	1.82	0.45
3:J:346:LEU:HD23	3:J:346:LEU:H	1.81	0.45
4:D:225:GLU:HB2	4:D:278:LEU:HD21	1.99	0.45
4:D:102:ILE:O	4:D:131:ASN:ND2	2.45	0.45
4:D:80:LEU:HD23	4:D:166:VAL:HG11	1.99	0.45
1:E:124:ARG:HG3	1:E:124:ARG:O	2.16	0.45
1:E:298:LEU:HG	1:E:326:VAL:HG11	1.98	0.45
3:J:300:ARG:NH2	3:J:330:ARG:HH22	2.15	0.45
2:I:56:ASP:OD1	2:I:56:ASP:N	2.50	0.45
3:J:269:VAL:H	3:J:279:ALA:CB	2.29	0.45
3:J:353:PRO:HG3	3:J:370:TRP:HD1	1.82	0.45
1:E:111:ASP:OD1	1:E:112:ILE:N	2.49	0.45
2:I:76:LEU:HA	2:I:79:VAL:HG12	1.99	0.44
4:D:99:ARG:NH2	4:D:100:TYR:OH	2.33	0.44
1:E:369:GLY:O	1:E:373:ARG:HG3	2.18	0.44
4:D:4:ARG:HB3	4:D:40:LEU:HD21	1.99	0.44
4:D:236:THR:HG23	4:D:278:LEU:HD11	1.99	0.44
1:E:227:TRP:HA	1:E:230:ILE:HG22	1.99	0.44
1:H:349:LEU:HB3	1:H:359:ALA:HB1	1.99	0.44
4:D:96:TYR:CE2	4:D:155:LEU:HB2	2.53	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:D:212:ILE:HG22	4:D:220:THR:OG1	2.18	0.44
1:H:82:THR:O	1:H:85:THR:HG22	2.18	0.44
1:H:10:VAL:HG13	1:H:90:ASP:HA	2.00	0.44
1:H:232:MET:SD	1:H:330:HIS:NE2	2.83	0.44
3:J:3:ARG:HB2	3:J:399:ARG:O	2.18	0.44
1:E:35:LEU:HD23	1:E:38:ILE:HD11	2.00	0.43
1:E:368:ALA:O	1:E:372:LEU:HG	2.18	0.43
1:H:238:ASP:C	1:H:240:GLY:H	2.21	0.43
2:I:43:PHE:HE2	3:J:105:LEU:HD12	1.83	0.43
3:J:101:ARG:HE	3:J:183:GLU:CD	2.21	0.43
2:I:34:THR:HG23	2:I:37:GLN:H	1.82	0.43
3:J:221:ALA:HB1	3:J:225:ARG:CZ	2.48	0.43
3:J:253:LEU:HD12	3:J:282:LEU:HB3	2.00	0.43
4:D:34:ILE:O	4:D:38:ILE:HG12	2.18	0.43
1:E:316:VAL:HG13	1:E:317:LEU:H	1.83	0.43
1:E:347:VAL:O	1:E:351:SER:HB3	2.19	0.43
1:H:155:ARG:HD3	1:H:164:GLN:HE21	1.83	0.43
1:E:456:ALA:HB2	4:D:2:THR:HB	2.00	0.43
4:D:175:PRO:HB3	4:D:221:TRP:CE2	2.53	0.43
3:J:321:PRO:HA	3:J:342:ARG:O	2.19	0.43
4:D:4:ARG:HD3	4:D:4:ARG:HA	1.81	0.42
1:H:15:LEU:HD23	1:H:95:ALA:HB2	2.00	0.42
1:E:358:TRP:HB2	1:E:465:LEU:HD12	2.01	0.42
1:E:359:ALA:O	1:E:363:VAL:HG23	2.19	0.42
1:H:347:VAL:HG23	1:H:397:LEU:HD23	2.01	0.42
1:E:228:SER:HB3	1:E:247:THR:HG23	2.02	0.42
1:E:374:ALA:HA	1:E:386:LEU:HD12	2.00	0.42
1:H:103:PRO:HD2	4:D:161:GLU:HA	2.02	0.42
1:E:246:ALA:O	1:E:250:THR:HG22	2.19	0.42
1:E:270:VAL:HA	1:E:273:CYS:SG	2.60	0.42
3:J:255:SER:C	3:J:257:ASP:H	2.22	0.42
1:E:15:LEU:HD21	1:H:115:ALA:HB1	2.01	0.42
1:E:398:LEU:O	1:E:402:VAL:HG13	2.20	0.42
1:H:246:ALA:HA	1:H:337:ALA:HB2	2.02	0.42
3:J:132:GLU:OE1	3:J:162:ARG:NH1	2.33	0.42
1:H:319:ASP:OD2	1:H:323:ARG:NH1	2.53	0.42
1:H:346:SER:OG	1:H:363:VAL:HG13	2.19	0.42
1:E:265:VAL:HG22	1:E:266:ILE:N	2.35	0.42
1:H:39:LEU:N	1:H:40:PRO:HD2	2.34	0.42
1:H:92:ASP:OD1	3:J:399:ARG:NH2	2.53	0.42
4:D:159:LEU:HD22	4:D:164:TRP:HD1	1.84	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:204:PHE:HD2	1:E:223:GLY:HA3	1.85	0.41
4:D:91:PRO:HA	4:D:94:VAL:HG12	2.01	0.41
3:J:300:ARG:HH21	3:J:330:ARG:HH22	1.68	0.41
3:J:368:GLU:HA	3:J:377:PRO:O	2.20	0.41
4:D:172:VAL:HG22	4:D:173:ASP:H	1.85	0.41
3:J:297:LEU:HD12	3:J:297:LEU:O	2.19	0.41
1:E:152:VAL:O	1:E:156:VAL:HG12	2.20	0.41
3:J:130:HIS:HB3	3:J:159:ARG:HD2	2.01	0.41
4:D:225:GLU:HB3	4:D:236:THR:HG23	2.02	0.41
3:J:149:ASP:OD1	3:J:152:ASP:N	2.54	0.41
3:J:123:ARG:NH1	3:J:202:ASP:O	2.54	0.41
1:E:13:ALA:HA	1:E:26:GLU:HA	2.01	0.41
1:H:340:LEU:HD23	1:H:340:LEU:HA	1.85	0.41
1:E:37:GLU:HG3	1:H:93:LEU:HD22	2.02	0.41
3:J:150:PRO:HA	3:J:155:PHE:CD2	2.55	0.41
3:J:353:PRO:HG2	3:J:371:GLN:NE2	2.36	0.41
1:H:454:LEU:HD23	1:H:454:LEU:HA	1.79	0.41
1:E:30:PRO:HG2	1:H:72:ILE:HD12	2.02	0.41
1:E:239:ARG:CG	1:E:240:GLY:H	2.33	0.41
3:J:361:ARG:HD3	3:J:375:TRP:HZ3	1.86	0.41
1:H:76:PRO:HG2	1:H:100:PRO:HD3	2.03	0.41
3:J:290:ARG:HA	3:J:293:LEU:HB2	2.03	0.41
3:J:187:HIS:CE1	3:J:191:ARG:HE	2.39	0.40
3:J:330:ARG:HG2	3:J:357:ARG:HH22	1.85	0.40
4:D:159:LEU:HD23	4:D:159:LEU:HA	1.90	0.40
1:E:191:SER:O	1:E:195:THR:HG22	2.22	0.40
4:D:34:ILE:HA	4:D:37:VAL:HG12	2.03	0.40
1:E:181:VAL:HA	1:E:184:ARG:HG2	2.03	0.40
1:E:358:TRP:CE3	1:E:358:TRP:HA	2.56	0.40
4:D:117:THR:OG1	4:D:117:THR:O	2.35	0.40
1:H:167:VAL:HG12	1:H:203:ALA:HB2	2.04	0.40
2:I:48:ILE:HA	2:I:48:ILE:HD13	1.89	0.40
3:J:259:SER:O	3:J:262:LYS:HB2	2.22	0.40
3:J:377:PRO:C	3:J:379:VAL:H	2.24	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	E	429/467 (92%)	382 (89%)	47 (11%)	0	100	100
1	H	434/467 (93%)	402 (93%)	32 (7%)	0	100	100
2	I	57/59 (97%)	57 (100%)	0	0	100	100
3	J	318/343 (93%)	262 (82%)	53 (17%)	3 (1%)	19	59
4	D	225/286 (79%)	205 (91%)	19 (8%)	1 (0%)	36	74
All	All	1463/1622 (90%)	1308 (89%)	151 (10%)	4 (0%)	47	79

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	J	258	TRP
3	J	168	ASP
3	J	257	ASP
4	D	279	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	E	313/334 (94%)	312 (100%)	1 (0%)	93	96
1	H	319/334 (96%)	318 (100%)	1 (0%)	93	96
2	I	50/50 (100%)	50 (100%)	0	100	100
3	J	273/281 (97%)	272 (100%)	1 (0%)	92	96

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
4	D	191/224 (85%)	190 (100%)	1 (0%)	90	95
All	All	1146/1223 (94%)	1142 (100%)	4 (0%)	93	96

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	E	295	ARG
1	H	125	ARG
3	J	153	ARG
4	D	106	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	E	389	HIS
1	H	216	ASN
1	H	331	GLN
3	J	187	HIS
3	J	351	GLN
3	J	371	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](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
3	J	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	J	31:PRO	C	92:MET	N	7.66