



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:05 AM UTC

PDB ID : 1VRS / pdb_00001vrs
Title : Crystal structure of the disulfide-linked complex between the N-terminal and C-terminal domain of the electron transfer catalyst DsbD
Authors : Rozhkova, A.; Stirnimann, C.U.; Frei, P.; Grauschopf, U.; Brunisholz, R.; Gruetter, M.G.; Capitani, G.; Glockshuber, R.
Deposited on : 2005-06-17
Resolution : 2.85 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

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

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:

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

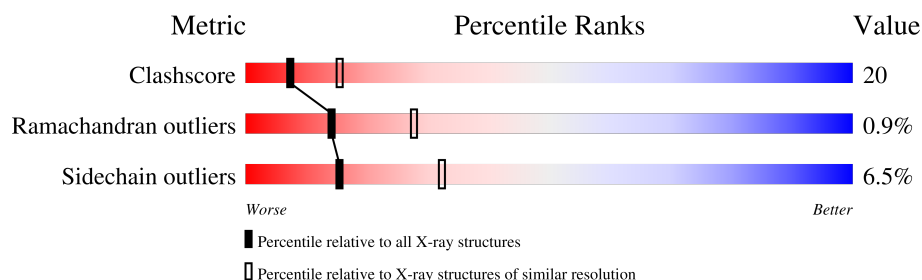
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.85 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))
Clashscore	190562	1446 (2.88-2.84)
Ramachandran outliers	187476	1406 (2.88-2.84)
Sidechain outliers	187428	1407 (2.88-2.84)

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 of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	143	64% 20% • 15%
1	B	143	60% 22% • • 13%
1	C	143	45% 31% • • 21%
2	D	134	53% 31% • 12%
2	E	134	47% 37% • 12%
2	F	134	53% 31% • 12%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 5954 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 Thiol:disulfide interchange protein dsbD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	121	Total	C	N	O	S	0	0	0
			971	623	161	186	1			
1	B	125	Total	C	N	O	S	0	0	0
			999	639	168	191	1			
1	C	113	Total	C	N	O	S	0	0	0
			914	585	152	176	1			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	103	SER	CYS	engineered mutation	UNP P36655
B	103	SER	CYS	engineered mutation	UNP P36655
C	103	SER	CYS	engineered mutation	UNP P36655

- Molecule 2 is a protein called Thiol:disulfide interchange protein dsbD.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	118	Total	C	N	O	S	0	0	0
			930	591	158	178	3			
2	E	118	Total	C	N	O	S	0	0	0
			926	589	155	179	3			
2	F	118	Total	C	N	O	S	0	0	0
			930	591	158	178	3			

There are 21 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
D	464	SER	CYS	engineered mutation	UNP P36655
D	547	HIS	-	expression tag	UNP P36655
D	548	HIS	-	expression tag	UNP P36655
D	549	HIS	-	expression tag	UNP P36655
D	550	HIS	-	expression tag	UNP P36655

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Chain	Residue	Modelled	Actual	Comment	Reference
D	551	HIS	-	expression tag	UNP P36655
D	552	HIS	-	expression tag	UNP P36655
E	464	SER	CYS	engineered mutation	UNP P36655
E	547	HIS	-	expression tag	UNP P36655
E	548	HIS	-	expression tag	UNP P36655
E	549	HIS	-	expression tag	UNP P36655
E	550	HIS	-	expression tag	UNP P36655
E	551	HIS	-	expression tag	UNP P36655
E	552	HIS	-	expression tag	UNP P36655
F	464	SER	CYS	engineered mutation	UNP P36655
F	547	HIS	-	expression tag	UNP P36655
F	548	HIS	-	expression tag	UNP P36655
F	549	HIS	-	expression tag	UNP P36655
F	550	HIS	-	expression tag	UNP P36655
F	551	HIS	-	expression tag	UNP P36655
F	552	HIS	-	expression tag	UNP P36655

- Molecule 3 is water.

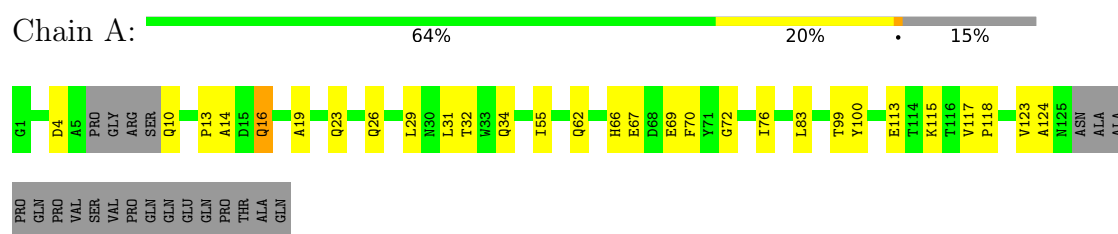
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	93	Total O 93 93	0	0
3	D	31	Total O 31 31	0	0
3	B	75	Total O 75 75	0	0
3	E	34	Total O 34 34	0	0
3	C	25	Total O 25 25	0	0
3	F	26	Total O 26 26	0	0

3 Residue-property plots

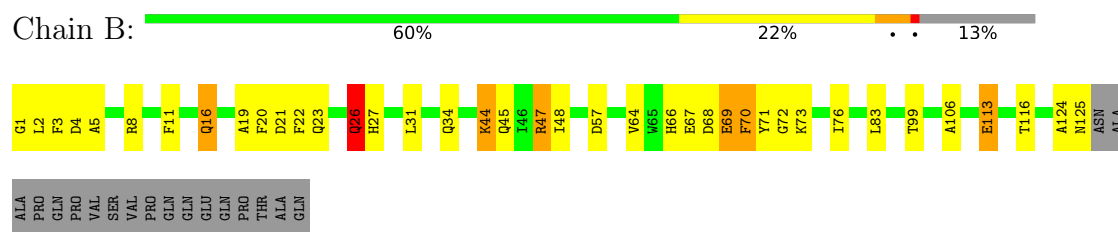
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded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

Note EDS was not executed.

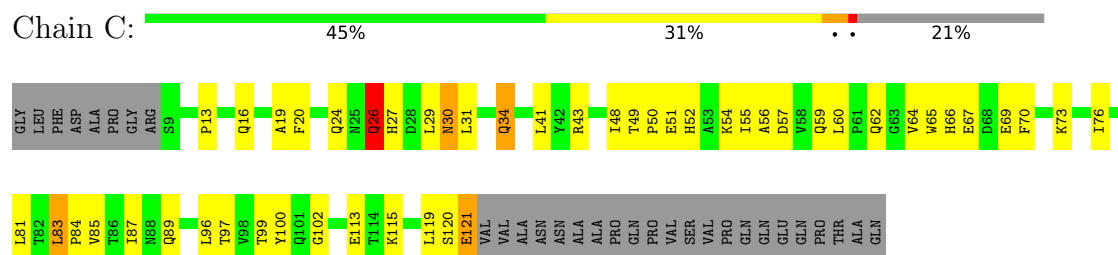
• Molecule 1: Thiol:disulfide interchange protein dsbD



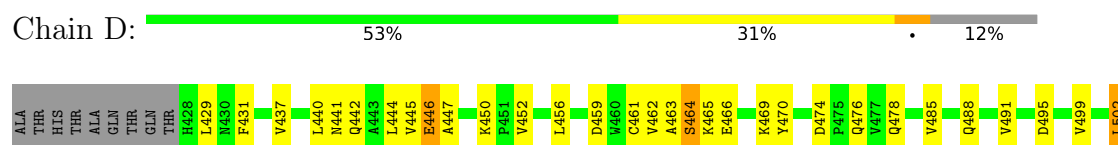
• Molecule 1: Thiol:disulfide interchange protein dsbD



• Molecule 1: Thiol:disulfide interchange protein dsbD



• Molecule 2: Thiol:disulfide interchange protein dsbD





- Molecule 2: Thiol:disulfide interchange protein dsbD



- Molecule 2: Thiol:disulfide interchange protein dsbD



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	188.46 Å 52.60 Å 107.92 Å 90.00° 100.39° 90.00°	Depositor
Resolution (Å)	20.00 – 2.85	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.85)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	0.08	Depositor
Refinement program	CNS	Depositor
R, R_{free}	0.224 , 0.284	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	5954	wwPDB-VP
Average B, all atoms (Å ²)	36.0	wwPDB-VP

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	0.53	0/997	0.93	2/1359 (0.1%)
1	B	0.55	0/1027	0.94	4/1401 (0.3%)
1	C	0.42	0/940	0.94	1/1282 (0.1%)
2	D	0.44	0/948	0.94	3/1287 (0.2%)
2	E	0.47	0/944	0.93	1/1283 (0.1%)
2	F	0.43	0/948	0.89	1/1287 (0.1%)
All	All	0.48	0/5804	0.93	12/7899 (0.2%)

There are no bond length outliers.

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	429	LEU	N-CA-C	-8.44	99.64	110.53
1	A	26	GLN	CB-CA-C	-6.71	108.85	116.63
2	D	523	HIS	CA-C-N	6.26	126.46	119.32
2	D	523	HIS	C-N-CA	6.26	126.46	119.32
1	B	26	GLN	CB-CA-C	-5.65	110.07	116.63
2	F	469	LYS	N-CA-C	5.37	117.22	111.36
1	A	32	THR	N-CA-C	5.29	118.05	109.06
1	C	26	GLN	CB-CA-C	-5.23	110.56	116.63
1	B	116	THR	CA-C-N	-5.21	118.84	122.59
1	B	116	THR	C-N-CA	-5.21	118.84	122.59
2	D	469	LYS	N-CA-C	5.10	116.92	111.36
1	B	16	GLN	N-CA-C	-5.07	107.27	113.50

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	971	0	923	23	0
1	B	999	0	952	38	0
1	C	914	0	865	46	0
2	D	930	0	912	47	0
2	E	926	0	906	49	0
2	F	930	0	912	38	0
3	A	93	0	0	3	0
3	B	75	0	0	4	0
3	C	25	0	0	1	0
3	D	31	0	0	0	0
3	E	34	0	0	2	0
3	F	26	0	0	0	0
All	All	5954	0	5470	228	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 20.

All (228) 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)
2:E:452:VAL:HG12	2:E:485:VAL:HB	1.33	1.06
2:D:452:VAL:HG12	2:D:485:VAL:HB	1.41	1.02
2:E:452:VAL:HG23	2:E:516:PHE:HB2	1.40	1.01
1:C:50:PRO:HG3	1:C:55:ILE:HD12	1.55	0.88
2:F:458:ALA:HA	2:F:492:THR:HG22	1.56	0.86
2:D:502:LEU:HD12	2:D:507:VAL:HB	1.58	0.85
2:E:452:VAL:CG2	2:E:516:PHE:HB2	2.06	0.84
2:E:471:THR:O	2:E:477:VAL:HG21	1.80	0.82
1:B:19:ALA:HB3	1:B:34:GLN:HB2	1.61	0.81
2:D:441:ASN:HA	2:D:444:LEU:HD12	1.61	0.80
1:C:66:HIS:HB2	1:C:76:ILE:HD13	1.63	0.79
2:D:447:ALA:HB1	2:D:485:VAL:HG21	1.65	0.78
1:C:55:ILE:HD11	1:C:96:LEU:HD11	1.67	0.76
2:D:474:ASP:O	2:D:478:GLN:HG3	1.85	0.76
1:B:69:GLU:HG3	1:B:70:PHE:HD1	1.52	0.75
2:D:452:VAL:CG2	2:D:516:PHE:HB2	2.17	0.73
1:C:29:LEU:HD13	1:C:29:LEU:C	2.15	0.72
1:B:71:TYR:OH	2:E:460:TRP:HA	1.89	0.72
2:E:538:SER:HA	2:E:541:LEU:HD12	1.71	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:442:GLN:O	2:E:445:VAL:HG22	1.90	0.71
1:B:44:LYS:CD	1:B:45:GLN:HE21	2.02	0.70
1:B:69:GLU:HG3	1:B:70:PHE:CD1	2.27	0.70
1:B:5:ALA:HB3	1:B:8:ARG:HD2	1.73	0.69
2:E:521:GLN:HE21	2:E:521:GLN:N	1.91	0.69
2:F:459:ASP:H	2:F:492:THR:HG22	1.57	0.69
2:E:522:GLU:O	2:E:524:PRO:HD3	1.92	0.68
2:D:445:VAL:HG23	2:D:446:GLU:OE1	1.95	0.66
1:C:48:ILE:HD11	1:C:83:LEU:HD23	1.77	0.66
2:E:429:LEU:HD21	2:E:478:GLN:HG2	1.77	0.66
2:E:474:ASP:O	2:E:477:VAL:HG22	1.95	0.66
2:E:523:HIS:HB3	2:E:525:GLN:NE2	2.11	0.65
2:F:474:ASP:O	2:F:478:GLN:HG3	1.96	0.65
1:A:70:PHE:CD2	2:D:465:LYS:HD3	2.32	0.65
1:C:29:LEU:HD13	1:C:30:ASN:N	2.12	0.65
2:F:541:LEU:O	2:F:544:ARG:HD3	1.97	0.65
2:D:524:PRO:O	2:D:527:ARG:HG2	1.97	0.64
1:C:55:ILE:HD11	1:C:96:LEU:CD1	2.27	0.64
1:B:44:LYS:HD2	1:B:45:GLN:HE21	1.60	0.64
2:D:452:VAL:HG12	2:D:485:VAL:CB	2.24	0.63
2:D:522:GLU:O	2:D:524:PRO:HD3	1.99	0.62
2:E:521:GLN:HE21	2:E:521:GLN:CA	2.13	0.62
1:B:67:GLU:HA	1:B:72:GLY:O	1.98	0.62
2:D:429:LEU:HD21	2:D:478:GLN:HG2	1.82	0.62
2:D:431:PHE:CD2	2:D:488:GLN:HB2	2.35	0.61
1:B:66:HIS:HB2	1:B:76:ILE:HD13	1.80	0.61
2:F:459:ASP:H	2:F:492:THR:CG2	2.13	0.61
1:A:123:VAL:HG22	3:A:213:HOH:O	2.00	0.61
1:C:55:ILE:CD1	1:C:96:LEU:HD11	2.29	0.61
1:C:50:PRO:HG3	1:C:55:ILE:CD1	2.30	0.61
1:A:13:PRO:HD2	1:A:16:GLN:HE21	1.65	0.60
1:C:55:ILE:HG22	1:C:56:ALA:O	2.01	0.60
2:E:437:VAL:HG13	2:E:504:HIS:CD2	2.37	0.60
2:F:475:PRO:O	2:F:479:LYS:HG3	2.01	0.59
1:B:70:PHE:CD2	2:E:465:LYS:HD3	2.37	0.59
2:D:502:LEU:HD12	2:D:507:VAL:CB	2.29	0.59
2:D:462:VAL:O	2:D:466:GLU:HG3	2.02	0.59
1:C:13:PRO:HD2	1:C:16:GLN:CD	2.28	0.59
2:D:491:VAL:HG11	2:D:502:LEU:HD21	1.85	0.59
2:E:457:TYR:HB2	2:E:464:SER:OG	2.03	0.58
1:C:34:GLN:HA	1:C:34:GLN:NE2	2.18	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:462:VAL:O	2:F:466:GLU:HG3	2.02	0.58
2:D:442:GLN:O	2:D:445:VAL:HG22	2.03	0.58
1:A:13:PRO:HD2	1:A:16:GLN:NE2	2.19	0.58
2:D:459:ASP:O	2:D:465:LYS:NZ	2.32	0.58
2:F:436:THR:H	2:F:439:GLU:HG3	1.68	0.58
2:D:447:ALA:CB	2:D:485:VAL:HG21	2.33	0.58
2:D:452:VAL:HG22	2:D:516:PHE:HB2	1.85	0.58
2:D:505:LEU:HB2	2:D:507:VAL:HG23	1.86	0.57
1:C:34:GLN:HA	1:C:34:GLN:HE21	1.68	0.57
1:C:51:GLU:O	1:C:52:HIS:HB2	2.04	0.57
2:D:517:ASP:C	2:D:519:GLN:H	2.13	0.57
1:C:87:ILE:HD13	1:C:119:LEU:HD22	1.85	0.56
1:C:69:GLU:HG3	1:C:70:PHE:CD1	2.39	0.56
1:A:19:ALA:HB3	1:A:34:GLN:HB3	1.87	0.56
2:E:452:VAL:HG12	2:E:485:VAL:CB	2.21	0.56
2:D:450:LYS:O	2:D:518:GLY:HA2	2.06	0.56
1:B:44:LYS:HG3	3:B:149:HOH:O	2.04	0.56
2:F:476:GLN:HA	2:F:479:LYS:HD2	1.88	0.56
1:C:34:GLN:HE21	1:C:34:GLN:CA	2.18	0.56
1:C:19:ALA:HB3	1:C:34:GLN:HB3	1.87	0.55
1:B:66:HIS:HB2	1:B:76:ILE:CD1	2.37	0.55
1:B:1:GLY:HA3	1:B:4:ASP:OD2	2.06	0.55
1:C:64:VAL:HG12	1:C:65:TRP:N	2.22	0.55
1:A:14:ALA:HB1	3:A:156:HOH:O	2.07	0.54
2:D:461:CYS:HB3	2:D:464:SER:HB2	1.89	0.54
2:E:520:GLY:C	2:E:521:GLN:HE21	2.15	0.54
2:E:541:LEU:C	2:E:543:ASP:H	2.14	0.54
1:C:70:PHE:CD2	2:F:465:LYS:HD3	2.42	0.54
2:F:522:GLU:O	2:F:524:PRO:HD3	2.08	0.54
1:A:4:ASP:OD2	2:D:523:HIS:HD2	1.91	0.54
1:A:69:GLU:HA	1:C:67:GLU:OE2	2.07	0.53
2:E:431:PHE:CD1	2:E:488:GLN:HB2	2.43	0.53
2:E:476:GLN:NE2	2:E:476:GLN:HA	2.25	0.52
1:C:30:ASN:ND2	1:C:84:PRO:HA	2.24	0.52
2:F:451:PRO:O	2:F:484:THR:HG23	2.10	0.52
2:D:452:VAL:HG23	2:D:516:PHE:HB2	1.91	0.52
2:F:429:LEU:HD21	2:F:478:GLN:HG2	1.91	0.52
2:F:447:ALA:O	2:F:448:LYS:C	2.53	0.52
2:F:459:ASP:N	2:F:492:THR:HG22	2.24	0.52
2:E:537:PHE:O	2:E:541:LEU:HG	2.09	0.52
1:C:65:TRP:CE3	1:C:73:LYS:HD3	2.45	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:E:456:LEU:HD12	2:E:512:THR:O	2.10	0.51
1:A:113:GLU:OE1	1:A:115:LYS:HE2	2.10	0.51
1:B:68:ASP:OD1	1:B:71:TYR:HB2	2.11	0.51
1:C:30:ASN:HD22	1:C:84:PRO:HA	1.76	0.51
1:C:29:LEU:HD11	1:C:31:LEU:CD2	2.41	0.51
2:E:461:CYS:HB3	2:E:464:SER:HB2	1.92	0.51
1:C:121:GLU:OE1	1:C:121:GLU:C	2.54	0.51
1:B:113:GLU:HG3	3:B:194:HOH:O	2.11	0.51
2:E:429:LEU:CD2	2:E:478:GLN:HG2	2.40	0.51
2:E:516:PHE:HA	2:E:521:GLN:O	2.10	0.51
1:B:44:LYS:CE	1:B:45:GLN:HE21	2.24	0.50
2:E:514:LEU:HG	2:E:522:GLU:OE2	2.11	0.50
1:C:87:ILE:CD1	1:C:119:LEU:HD22	2.42	0.50
1:B:44:LYS:HD2	1:B:45:GLN:NE2	2.24	0.50
1:B:68:ASP:O	1:B:69:GLU:C	2.54	0.50
1:B:47:ARG:HD3	3:B:216:HOH:O	2.12	0.50
1:C:64:VAL:HG12	1:C:65:TRP:H	1.76	0.50
2:F:525:GLN:OE1	2:F:525:GLN:N	2.38	0.50
2:F:490:ASN:ND2	2:F:492:THR:HG23	2.27	0.49
2:D:517:ASP:O	2:D:519:GLN:N	2.45	0.49
1:C:50:PRO:HA	1:C:96:LEU:HD12	1.94	0.49
2:D:516:PHE:CE2	2:D:522:GLU:HB2	2.47	0.49
1:B:31:LEU:HB2	1:B:83:LEU:HB3	1.94	0.49
2:F:461:CYS:HB3	2:F:464:SER:HB2	1.94	0.49
1:C:20:PHE:CD2	1:C:115:LYS:HG3	2.48	0.49
1:C:99:THR:HA	1:C:113:GLU:O	2.12	0.49
1:B:68:ASP:OD2	1:B:71:TYR:HB2	2.13	0.49
1:C:13:PRO:HA	2:F:508:LEU:HD13	1.95	0.49
1:A:67:GLU:HA	1:A:72:GLY:O	2.13	0.48
2:D:463:ALA:HB3	2:D:511:PRO:HD3	1.94	0.48
2:E:527:ARG:HD3	3:E:230:HOH:O	2.12	0.48
2:D:517:ASP:OD2	2:D:523:HIS:HE1	1.96	0.48
1:B:57:ASP:HA	3:B:169:HOH:O	2.13	0.48
1:C:66:HIS:HB2	1:C:76:ILE:CD1	2.39	0.48
2:F:494:ASN:HD21	2:F:499:VAL:HG22	1.78	0.48
2:E:480:ALA:HA	2:E:542:ARG:HE	1.77	0.48
2:E:505:LEU:O	2:E:506:ASN:HB2	2.13	0.48
2:E:512:THR:C	2:E:513:ILE:HD12	2.39	0.48
2:F:463:ALA:HB3	2:F:511:PRO:HD3	1.95	0.48
2:F:458:ALA:CA	2:F:492:THR:HG22	2.37	0.48
2:F:467:PHE:HA	2:F:531:PHE:HE1	1.79	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:29:LEU:C	1:C:29:LEU:CD1	2.85	0.48
2:E:523:HIS:HB3	2:E:525:GLN:HE22	1.77	0.47
1:C:96:LEU:HD12	1:C:96:LEU:HA	1.54	0.47
2:F:505:LEU:HB2	2:F:507:VAL:HG23	1.96	0.47
1:A:66:HIS:HB2	1:A:76:ILE:HD13	1.95	0.47
1:B:99:THR:HA	1:B:113:GLU:O	2.15	0.47
2:D:437:VAL:HG13	2:D:504:HIS:CD2	2.49	0.47
2:F:441:ASN:O	2:F:445:VAL:HG23	2.14	0.47
1:B:70:PHE:HD1	1:B:70:PHE:H	1.63	0.47
1:B:68:ASP:CG	1:B:71:TYR:HB2	2.40	0.47
2:D:491:VAL:HG11	2:D:502:LEU:CD2	2.44	0.46
2:E:434:ILE:O	2:E:434:ILE:HG13	2.15	0.46
2:E:471:THR:HG23	2:E:534:ALA:HA	1.96	0.46
1:A:70:PHE:CZ	2:D:465:LYS:HB3	2.51	0.46
2:E:505:LEU:O	2:E:506:ASN:CB	2.63	0.46
1:B:48:ILE:HD11	1:B:83:LEU:HD23	1.98	0.46
1:A:4:ASP:HB3	2:D:525:GLN:HB2	1.97	0.46
2:D:442:GLN:O	2:D:445:VAL:CG2	2.64	0.46
2:D:517:ASP:C	2:D:519:GLN:N	2.74	0.46
1:B:44:LYS:HE3	1:B:45:GLN:HE21	1.81	0.46
1:B:68:ASP:OD1	1:B:68:ASP:O	2.34	0.46
2:F:456:LEU:N	2:F:456:LEU:HD22	2.31	0.45
1:C:29:LEU:HD12	1:C:85:VAL:HB	1.97	0.45
2:F:494:ASN:ND2	2:F:499:VAL:HG22	2.31	0.45
2:F:523:HIS:O	2:F:526:ALA:HB3	2.16	0.45
2:D:516:PHE:HA	2:D:522:GLU:HA	1.99	0.45
1:C:43:ARG:HG3	1:C:60:LEU:HD13	1.98	0.45
2:F:495:ASP:O	2:F:499:VAL:HG23	2.17	0.45
2:F:516:PHE:CD1	2:F:516:PHE:N	2.85	0.45
1:B:83:LEU:HA	1:B:83:LEU:HD12	1.70	0.44
2:E:462:VAL:HB	3:E:107:HOH:O	2.16	0.44
1:A:99:THR:HA	1:A:113:GLU:O	2.18	0.44
1:A:117:VAL:HA	1:A:118:PRO:HD3	1.80	0.44
2:D:517:ASP:OD2	2:D:521:GLN:HB2	2.17	0.44
2:E:521:GLN:CA	2:E:521:GLN:NE2	2.76	0.44
1:C:54:LYS:HG3	1:C:89:GLN:HE21	1.82	0.44
1:A:100:TYR:CD1	1:A:100:TYR:N	2.85	0.44
1:B:71:TYR:OH	2:E:459:ASP:O	2.28	0.44
2:E:538:SER:HA	2:E:541:LEU:CD1	2.45	0.44
2:E:474:ASP:O	2:E:478:GLN:HG3	2.17	0.43
2:E:445:VAL:HG23	2:E:446:GLU:N	2.32	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:F:459:ASP:OD2	2:F:492:THR:HG21	2.18	0.43
1:B:44:LYS:CD	1:B:45:GLN:NE2	2.77	0.43
2:E:444:LEU:O	2:E:447:ALA:HB3	2.18	0.43
2:D:516:PHE:CD2	2:D:522:GLU:HB2	2.53	0.43
2:D:517:ASP:HB3	2:D:523:HIS:CE1	2.54	0.43
2:E:469:LYS:HD3	2:E:470:TYR:CZ	2.54	0.43
1:C:24:GLN:NE2	1:C:120:SER:HB2	2.33	0.43
1:A:83:LEU:HD12	1:A:83:LEU:HA	1.75	0.43
2:E:453:MET:HE2	2:E:486:LEU:HD22	2.01	0.42
1:B:20:PHE:CG	1:B:21:ASP:N	2.87	0.42
2:D:440:LEU:O	2:D:444:LEU:HG	2.20	0.42
2:D:452:VAL:HG23	2:D:516:PHE:CD1	2.54	0.42
2:E:456:LEU:HD11	2:E:514:LEU:HD13	2.01	0.42
2:E:476:GLN:HA	2:E:476:GLN:HE21	1.85	0.42
1:C:29:LEU:HB3	1:C:85:VAL:HB	2.02	0.42
2:F:525:GLN:H	2:F:525:GLN:CD	2.18	0.42
2:F:444:LEU:HD21	2:F:516:PHE:CE2	2.54	0.42
1:B:1:GLY:C	1:B:3:PHE:N	2.77	0.42
2:D:495:ASP:O	2:D:499:VAL:HG23	2.19	0.42
1:B:70:PHE:CD1	1:B:70:PHE:N	2.88	0.42
2:D:517:ASP:HB3	2:D:523:HIS:HE1	1.84	0.41
1:A:70:PHE:O	1:C:69:GLU:HA	2.20	0.41
2:F:545:GLN:HE21	2:F:545:GLN:HB3	1.52	0.41
2:E:515:PHE:CD2	2:E:526:ALA:HB1	2.55	0.41
2:E:513:ILE:HD12	2:E:513:ILE:N	2.36	0.41
1:C:41:LEU:HD23	1:C:102:GLY:HA3	2.01	0.41
2:F:475:PRO:HG2	2:F:476:GLN:H	1.84	0.41
1:A:69:GLU:OE1	2:D:470:TYR:OH	2.36	0.41
2:E:476:GLN:NE2	2:E:479:LYS:HD2	2.35	0.41
1:C:57:ASP:HA	3:C:147:HOH:O	2.20	0.41
1:B:11:PHE:HE1	1:B:106:ALA:HB3	1.85	0.41
1:C:26:GLN:HB3	1:C:27:HIS:H	1.51	0.41
1:C:70:PHE:CE2	2:F:465:LYS:HD3	2.55	0.41
2:F:436:THR:HG22	2:F:497:GLN:NE2	2.35	0.41
1:B:124:ALA:O	1:B:125:ASN:C	2.63	0.41
1:A:66:HIS:HE1	3:A:167:HOH:O	2.03	0.40
2:F:516:PHE:HA	2:F:521:GLN:O	2.21	0.40
2:D:522:GLU:C	2:D:524:PRO:HD3	2.46	0.40
1:A:31:LEU:HB2	1:A:83:LEU:HB3	2.03	0.40
1:A:66:HIS:HB2	1:A:76:ILE:CD1	2.51	0.40
1:A:23:GLN:O	1:A:29:LEU:HD12	2.20	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:456:LEU:HD12	2:D:512:THR:O	2.22	0.40
1:C:100:TYR:CD1	1:C:100:TYR:N	2.89	0.40
1:B:22:PHE:CD1	1:B:22:PHE:C	2.99	0.40
1:B:26:GLN:HB3	1:B:27:HIS:H	1.59	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	117/143 (82%)	106 (91%)	10 (8%)	1 (1%)	14	28
1	B	123/143 (86%)	113 (92%)	9 (7%)	1 (1%)	16	31
1	C	111/143 (78%)	103 (93%)	8 (7%)	0	100	100
2	D	116/134 (87%)	107 (92%)	8 (7%)	1 (1%)	14	28
2	E	116/134 (87%)	108 (93%)	6 (5%)	2 (2%)	7	16
2	F	116/134 (87%)	111 (96%)	4 (3%)	1 (1%)	14	28
All	All	699/831 (84%)	648 (93%)	45 (6%)	6 (1%)	14	28

All (6) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	70	PHE
2	D	518	GLY
1	A	124	ALA
2	F	448	LYS
2	E	542	ARG
2	E	541	LEU

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	102/120 (85%)	98 (96%)	4 (4%)	28	54
1	B	105/120 (88%)	95 (90%)	10 (10%)	8	17
1	C	97/120 (81%)	87 (90%)	10 (10%)	7	14
2	D	100/114 (88%)	94 (94%)	6 (6%)	17	36
2	E	100/114 (88%)	95 (95%)	5 (5%)	22	44
2	F	100/114 (88%)	96 (96%)	4 (4%)	28	53
All	All	604/702 (86%)	565 (94%)	39 (6%)	15	32

All (39) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	10	GLN
1	A	16	GLN
1	A	55	ILE
1	A	62	GLN
2	D	446	GLU
2	D	464	SER
2	D	476	GLN
2	D	502	LEU
2	D	522	GLU
2	D	535	GLU
1	B	2	LEU
1	B	16	GLN
1	B	23	GLN
1	B	26	GLN
1	B	44	LYS
1	B	47	ARG
1	B	64	VAL
1	B	69	GLU
1	B	73	LYS
1	B	113	GLU
2	E	444	LEU
2	E	501	LEU

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Mol	Chain	Res	Type
2	E	506	ASN
2	E	519	GLN
2	E	521	GLN
1	C	26	GLN
1	C	30	ASN
1	C	34	GLN
1	C	49	THR
1	C	59	GLN
1	C	62	GLN
1	C	81	LEU
1	C	83	LEU
1	C	97	THR
1	C	121	GLU
2	F	444	LEU
2	F	522	GLU
2	F	525	GLN
2	F	545	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (42) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	16	GLN
1	A	23	GLN
1	A	45	GLN
1	A	52	HIS
1	A	66	HIS
1	A	89	GLN
1	A	125	ASN
2	D	430	ASN
2	D	504	HIS
2	D	506	ASN
2	D	521	GLN
2	D	523	HIS
1	B	27	HIS
1	B	34	GLN
1	B	45	GLN
1	B	59	GLN
1	B	88	ASN
1	B	125	ASN
2	E	428	HIS
2	E	430	ASN
2	E	433	GLN

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Mol	Chain	Res	Type
2	E	441	ASN
2	E	476	GLN
2	E	488	GLN
2	E	494	ASN
2	E	504	HIS
2	E	521	GLN
1	C	10	GLN
1	C	16	GLN
1	C	25	ASN
1	C	30	ASN
1	C	34	GLN
1	C	59	GLN
1	C	62	GLN
1	C	89	GLN
2	F	433	GLN
2	F	441	ASN
2	F	490	ASN
2	F	494	ASN
2	F	497	GLN
2	F	506	ASN
2	F	545	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

There are no ligands in this entry.

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

EDS was not executed - this section is therefore empty.

6.2 Non-standard residues in protein, DNA, RNA chains

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.