



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 20, 2026 – 04:08 PM UTC

PDB ID : 7QTZ / pdb_00007qtz
Title : Crystal structure of Iripin-1 serpin from tick Ixodes ricinus
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Deposited on : 2022-01-17
Resolution : 2.10 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)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

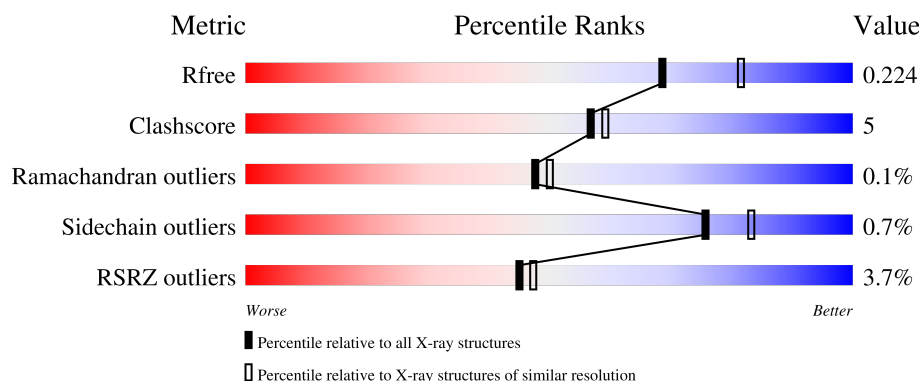
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.10 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}	180053	6658 (2.10-2.10)
Clashscore	190562	7164 (2.10-2.10)
Ramachandran outliers	187476	7099 (2.10-2.10)
Sidechain outliers	187428	7100 (2.10-2.10)
RSRZ outliers	180081	6662 (2.10-2.10)

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 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 $\leq 5\%$. 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	377	
1	B	377	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 6190 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 Putative salivary serpin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	359	Total	C	N	O	S	0	2	0
			2856	1821	491	537	7			
1	B	351	Total	C	N	O	S	0	4	0
			2813	1793	483	530	7			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	MET	-	initiating methionine	UNP Q06B75
B	1	MET	-	initiating methionine	UNP Q06B75

- Molecule 2 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Mg	0	0
			1	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	234	Total	O	0	7
			241	241		
3	B	267	Total	O	0	13
			279	279		

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	48.82Å 91.00Å 95.83Å 90.00° 97.53° 90.00°	Depositor
Resolution (Å)	48.44 – 2.10 48.44 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.1 (48.44-2.10) 99.4 (48.44-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.13	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.74 (at 2.10Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.190 , 0.251 (Not available) , 0.224	Depositor DCC
R_{free} test set	2465 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å ²)	31.0	Xtriage
Anisotropy	0.404	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.30 , 39.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	6190	wwPDB-VP
Average B, all atoms (Å ²)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.60% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: MG

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	1.04	0/2920	1.30	4/3950 (0.1%)
1	B	1.03	0/2880	1.31	0/3895
All	All	1.03	0/5800	1.30	4/7845 (0.1%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	297	SER	CA-C-N	5.62	127.16	120.14
1	A	297	SER	C-N-CA	5.62	127.16	120.14
1	A	132	LYS	CA-C-N	5.13	125.67	119.98
1	A	132	LYS	C-N-CA	5.13	125.67	119.98

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	2856	0	2813	25	1
1	B	2813	0	2760	27	1
2	A	1	0	0	0	0
3	A	241	0	0	4	0
3	B	279	0	0	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	6190	0	5573	52	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 5.

All (52) 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:108:TYR:CZ	1:B:112[B]:ARG:HD2	2.04	0.91
1:A:96:ASN:OD1	1:A:168[B]:ASN:ND2	2.21	0.74
1:A:143:LYS:NZ	3:A:502:HOH:O	2.27	0.64
1:B:175:SER:O	1:B:227:GLN:N	2.24	0.64
1:A:289:ASN:ND2	3:A:501:HOH:O	2.23	0.64
1:B:108:TYR:CZ	1:B:112[A]:ARG:HD2	2.32	0.64
1:B:177:ASN:HA	1:B:227:GLN:HA	1.81	0.62
1:B:108:TYR:CE2	1:B:112[B]:ARG:HD2	2.36	0.60
1:A:1:MET:N	1:A:367:ASP:OD2	2.35	0.60
1:A:284:LYS:NZ	3:A:504:HOH:O	2.34	0.59
1:B:188:SER:OG	1:B:202:MET:HE2	2.03	0.59
1:B:96:ASN:ND2	1:B:168[A]:ASN:OD1	2.31	0.57
1:A:40:ALA:HB2	1:A:168[A]:ASN:OD1	2.05	0.56
1:B:92:LEU:HD11	1:B:170:ILE:HD11	1.91	0.52
1:A:345:THR:O	1:A:346:GLN:C	2.53	0.52
1:B:297:SER:O	1:B:300:SER:HB2	2.10	0.52
1:B:206:SER:OG	1:B:267:ARG:NH2	2.44	0.51
1:A:267:ARG:HD3	1:A:345:THR:HA	1.91	0.51
1:B:108:TYR:OH	1:B:112[A]:ARG:HD2	2.11	0.51
1:B:33:SER:HB3	1:B:36:SER:HB3	1.93	0.51
1:A:96:ASN:OD1	1:A:168[A]:ASN:ND2	2.31	0.49
1:B:212:HIS:CD2	3:B:566:HOH:O	2.66	0.49
1:B:153:LEU:O	1:B:280:GLU:OE2	2.30	0.49
1:A:285:GLU:HB3	1:A:286:PRO:HD3	1.95	0.48
1:B:45:TYR:OH	1:B:69[A]:GLN:HG3	2.13	0.48
1:A:266:ARG:HD3	1:A:348:PHE:HE2	1.77	0.48
1:B:176:TRP:HA	1:B:226:TYR:HA	1.96	0.48
1:B:284:LYS:HG3	1:B:296:PHE:CD1	2.49	0.47
1:A:345:THR:O	1:A:347:ALA:N	2.47	0.47
1:A:258:LYS:O	1:A:262:GLU:HG3	2.16	0.46
1:B:40:ALA:HB2	1:B:168[A]:ASN:ND2	2.31	0.46
1:A:266:ARG:HD3	1:A:348:PHE:CE2	2.51	0.45
1:A:41:LEU:HD13	1:A:60:LEU:CD2	2.47	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:233:MET:HE2	1:A:358:PHE:CD1	2.52	0.45
1:A:171:TYR:OH	1:A:323:GLU:OE1	2.33	0.44
1:A:56:LEU:O	1:A:60:LEU:HG	2.17	0.44
1:B:212:HIS:HD2	3:B:551:HOH:O	2.00	0.44
1:B:169:ALA:HA	1:B:319:LYS:O	2.18	0.44
1:A:230:ASP:OD1	1:A:230:ASP:N	2.51	0.43
1:B:216:ASP:HB2	3:B:593:HOH:O	2.18	0.43
1:A:297:SER:O	1:A:300:SER:HB2	2.19	0.43
1:A:256:PHE:CZ	1:A:361:ARG:HD2	2.53	0.42
1:A:256:PHE:HZ	1:A:361:ARG:HD2	1.84	0.42
1:B:40:ALA:HA	1:B:43:MET:HE2	2.00	0.42
1:A:99:VAL:HA	1:A:123:LEU:O	2.19	0.42
1:A:43:MET:HE1	1:A:97:ALA:C	2.45	0.42
1:B:108:TYR:OH	1:B:112[B]:ARG:HD2	2.17	0.41
1:B:97:ALA:HB2	1:B:141:TRP:CZ2	2.56	0.41
1:B:215:ARG:NH2	3:B:403:HOH:O	2.30	0.41
1:B:28:GLU:O	1:B:375:ASN:HB2	2.20	0.40
1:A:257:GLN:NE2	3:A:529:HOH:O	2.55	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:A:189:GLU:OE1	1:B:240:ARG:NH2[1_556]	1.90	0.30

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	355/377 (94%)	345 (97%)	9 (2%)	1 (0%)	36	36
1	B	349/377 (93%)	339 (97%)	10 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	704/754 (93%)	684 (97%)	19 (3%)	1 (0%)	48 50

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	346	GLN

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	310/326 (95%)	309 (100%)	1 (0%)	86 91
1	B	307/326 (94%)	304 (99%)	3 (1%)	68 76
All	All	617/652 (95%)	613 (99%)	4 (1%)	76 86

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

Mol	Chain	Res	Type
1	A	349	GLU
1	B	58	GLU
1	B	175	SER
1	B	270	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	129	ASN
1	B	177	ASN

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](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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, 95th 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 ²)	Q<0.9
1	A	359/377 (95%)	0.27	15 (4%)	40 42	15, 37, 78, 108	2 (0%)
1	B	351/377 (93%)	0.11	11 (3%)	51 54	14, 36, 66, 93	4 (1%)
All	All	710/754 (94%)	0.19	26 (3%)	45 47	14, 37, 72, 108	6 (0%)

All (26) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	176	TRP	5.4
1	A	347	ALA	4.8
1	B	179	ARG	4.3
1	A	176	TRP	4.3
1	A	185	THR	3.9
1	B	178	THR	3.7
1	A	348	PHE	3.2
1	A	2	GLN	3.1
1	A	1	MET	3.1
1	B	300	SER	2.8
1	A	204	MET	2.8
1	A	213	PHE	2.7
1	B	299	GLY	2.6
1	B	309[A]	ASN	2.6
1	B	347	ALA	2.6
1	A	364	VAL	2.5
1	B	108	TYR	2.4
1	A	200	VAL	2.3
1	A	207	MET	2.3
1	A	271	LEU	2.3
1	B	228	GLY	2.2
1	B	227	GLN	2.2
1	A	205	GLY	2.1
1	A	175	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	345	THR	2.0
1	B	185	THR	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 oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	MG	A	401	1/1	0.99	0.03	21,21,21,21	0

6.5 Other polymers [i](#)

There are no such residues in this entry.