



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2014 – 03:30 AM GMT

PDB ID : 1FBZ  
Title : Structure-based design of a novel, osteoclast-selective, nonpeptide Src SH2 inhibitor with in vivo anti-resorptive activity  
Authors : Shakespeare, W.; Yang, M.; Bohacek, R.; Cerasoli, F.; Stebbis, K.; Sundaramoorthi, R.; Vu, C.; Pradeepan, S.; Metcalf, C.; Haraldson, C.; Merry, T.; Dalgarno, D.; Narula, S.; Hatada, M.; Lu, X.; Van Schravendijk, M.R.; Adams, S.; Violette, S.; Smith, J.; Guan, W.; Bartlett, C.; Herson, J.; Iuliucci, J.; Weigele, M.; Sawyer, T.  
Deposited on : 2000-07-17  
Resolution : 2.40 Å(reported)

This is a full wwPDB 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 <http://wwpdb.org/ValidationPDFNotes.html>

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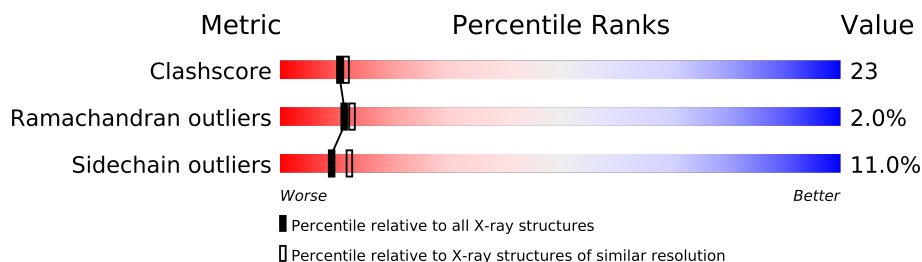
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.15 2013
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	21963
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP)	:	stable22683

# 1 Overall quality at a glance

The reported resolution of this entry is 2.40 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	79885	2789 (2.40-2.40)
Ramachandran outliers	78287	2736 (2.40-2.40)
Sidechain outliers	78261	2737 (2.40-2.40)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	104	
1	B	104	

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 2286 atoms, of which 488 are hydrogens and 0 are deuterium.

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.

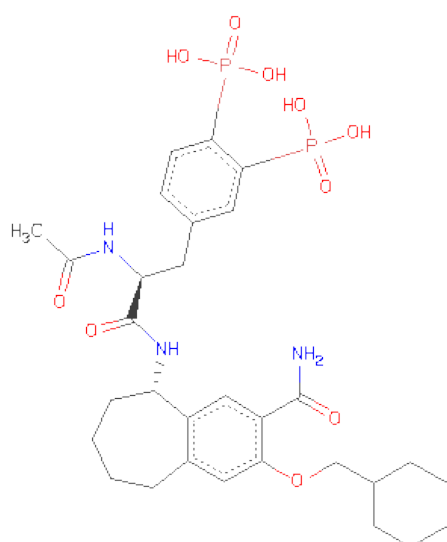
- Molecule 1 is a protein called PROTO-ONCOGENE TYROSINE-PROTEIN KINASE LCK.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	104	1038	522	204	154	155	3	0	0	0
1	B	104	1038	522	204	154	155	3	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	42	CYS	SER	CONFLICT	UNP P06239
B	242	CYS	SER	CONFLICT	UNP P06239

- Molecule 2 is {4-[2-ACETYLAMINO-2-(3-CARBAMOYL-2-CYCLOHEXYLMETHOXY-6,7,8,9-TETRAHYDRO-5H-BENZOCYCLOHEPTEN-5YLCARBAMOYL)-ETHYL]-2-PHOSPHONO-PHENYL}-PHOSPHONICACID (three-letter code: CC1) (formula: C<sub>30</sub>H<sub>41</sub>N<sub>3</sub>O<sub>10</sub>P<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			45	30	3	10	2		
2	B	1	Total	C	N	O	P	0	0
			45	30	3	10	2		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	23	Total	H	O	0	0
			69	46	23		
3	B	17	Total	H	O	0	0
			51	34	17		

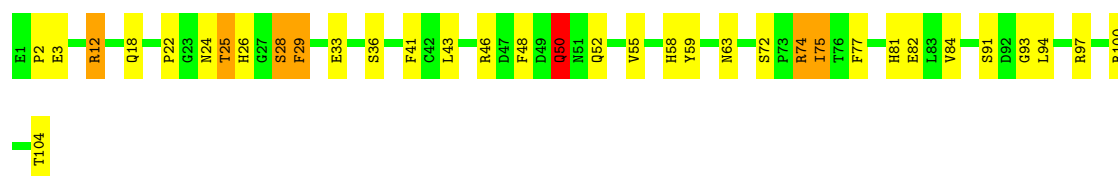
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry 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.

Note EDS was not executed.

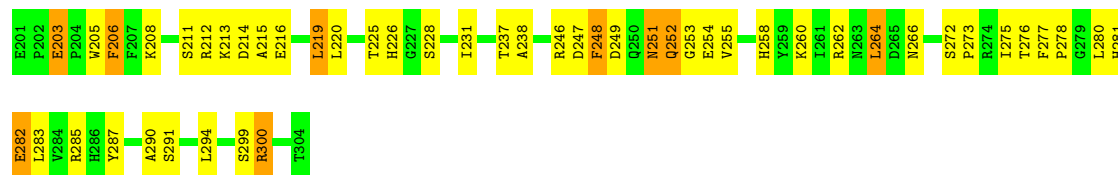
#### • Molecule 1: PROTO-ONCOGENE TYROSINE-PROTEIN KINASE LCK

Chain A: 



#### • Molecule 1: PROTO-ONCOGENE TYROSINE-PROTEIN KINASE LCK

Chain B: 



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	44.87Å 56.26Å 102.77Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 2.40	Depositor
% Data completeness (in resolution range)	88.3 (15.00-2.40)	Depositor
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.230 , 0.360	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2286	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	30.0	wwPDB-VP

## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CC1

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	0.40	0/855	0.65	0/1154
1	B	0.40	0/855	0.63	0/1154
All	All	0.40	0/1710	0.64	0/2308

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	834	204	599	32	0
1	B	834	204	599	46	0
2	A	45	0	37	9	0
2	B	45	0	37	5	0
3	A	23	46	0	4	0
3	B	17	34	0	3	0
All	All	1798	488	1272	79	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 23.

All (79) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:72:SER:HB2	2:A:150:CC1:H252	1.40	1.04
1:B:272:SER:HB2	2:B:350:CC1:H252	1.62	0.79
1:A:26:HIS:CD2	1:A:48:PHE:HB2	2.20	0.77
1:A:74:ARG:HG3	1:A:75:ILE:HG13	1.72	0.71
1:B:220:LEU:HA	1:B:246:ARG:NH1	2.07	0.70
1:B:264:LEU:HD22	1:B:266:ASN:HD22	1.58	0.69
1:B:278:PRO:HG2	1:B:282:GLU:HG3	1.75	0.69
1:B:249:ASP:HB3	1:B:252:GLN:HG2	1.75	0.69
1:A:26:HIS:NE2	1:A:48:PHE:HB2	2.09	0.68
1:B:228:SER:HA	1:B:300:ARG:O	1.97	0.65
1:A:29:PHE:HD1	1:A:43:LEU:HD11	1.64	0.62
1:B:225:THR:HG22	1:B:226:HIS:H	1.64	0.62
1:B:272:SER:HB2	2:B:350:CC1:C25	2.30	0.61
1:B:215:ALA:O	1:B:219:LEU:HD12	1.99	0.61
1:B:203:GLU:HG2	1:B:206:PHE:HB2	1.82	0.61
1:B:237:THR:HG22	1:B:238:ALA:H	1.65	0.60
1:A:93:GLY:HA3	2:A:150:CC1:H231	1.85	0.59
1:A:50:GLN:HA	3:A:159:HOH:O	2.00	0.59
1:B:264:LEU:HD22	1:B:266:ASN:ND2	2.17	0.58
1:A:29:PHE:HD1	1:A:43:LEU:CD1	2.16	0.57
1:B:264:LEU:CD1	1:B:276:THR:HG23	2.34	0.57
1:B:251:ASN:HB2	3:B:79:HOH:O	2.03	0.57
1:B:291:SER:O	1:B:294:LEU:HB2	2.05	0.56
1:B:205:TRP:CZ3	1:B:231:ILE:HD12	2.41	0.55
1:B:216:GLU:O	1:B:220:LEU:HG	2.07	0.55
1:A:74:ARG:HG3	1:A:75:ILE:N	2.22	0.54
1:A:58:HIS:HB2	2:A:150:CC1:HC71	1.89	0.54
1:A:29:PHE:CD1	1:A:43:LEU:HD11	2.42	0.53
1:B:281:HIS:CD2	1:B:285:ARG:HD2	2.43	0.53
1:B:219:LEU:O	1:B:246:ARG:HD2	2.09	0.53
1:A:29:PHE:HE1	1:A:84:VAL:HG22	1.75	0.52
1:B:252:GLN:HE21	1:B:255:VAL:HG21	1.75	0.51
1:A:74:ARG:HG3	1:A:75:ILE:H	1.74	0.51
1:A:63:ASN:H	3:A:152:HOH:H2	1.58	0.51
1:A:33:GLU:HG3	1:A:41:PHE:CE2	2.46	0.51
1:B:281:HIS:O	1:B:285:ARG:HG3	2.12	0.50
1:B:281:HIS:HB2	3:B:32:HOH:O	2.11	0.50
1:B:262:ARG:HH11	1:B:262:ARG:HG3	1.75	0.50
1:A:59:TYR:OH	2:A:150:CC1:H301	2.12	0.50
1:A:2:PRO:HB2	1:A:3:GLU:OE1	2.12	0.49
1:B:300:ARG:HG3	1:B:300:ARG:HH11	1.78	0.48
1:B:264:LEU:HD13	1:B:276:THR:HG23	1.94	0.48

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:25:THR:O	1:A:28:SER:HB2	2.13	0.48
1:B:252:GLN:HG3	1:B:255:VAL:CG2	2.44	0.47
1:A:24:ASN:O	1:A:46:ARG:NH1	2.47	0.47
1:A:24:ASN:C	1:A:46:ARG:NH1	2.68	0.47
1:B:248:PHE:HA	1:B:253:GLY:O	2.15	0.47
1:B:277:PHE:CD1	1:B:283:LEU:HG	2.49	0.47
1:B:211:SER:OG	1:B:214:ASP:HB2	2.15	0.47
1:B:231:ILE:HG21	1:B:280:LEU:HD13	1.97	0.46
1:B:258:HIS:HB2	2:B:350:CC1:HC71	1.98	0.46
1:A:58:HIS:CB	2:A:150:CC1:HC71	2.46	0.46
1:B:300:ARG:H	1:B:300:ARG:HD3	1.81	0.46
1:A:97:ARG:HH21	3:A:161:HOH:H2	1.63	0.46
1:A:28:SER:HA	1:A:100:ARG:O	2.15	0.45
1:B:273:PRO:HG2	3:B:21:HOH:H2	1.81	0.45
1:A:12:ARG:NH2	2:A:150:CC1:O4	2.49	0.45
1:A:12:ARG:NH2	2:A:150:CC1:H131	2.33	0.44
1:A:81:HIS:HD2	3:A:172:HOH:O	2.01	0.44
1:B:203:GLU:N	1:B:203:GLU:CD	2.72	0.43
1:A:18:GLN:OE1	1:A:104:THR:HG23	2.19	0.43
1:B:220:LEU:HA	1:B:246:ARG:HH11	1.79	0.43
1:B:212:ARG:HD2	2:B:350:CC1:OR4	2.19	0.42
1:B:281:HIS:NE2	1:B:285:ARG:HD2	2.34	0.42
1:B:275:ILE:HD12	1:B:277:PHE:CZ	2.54	0.42
1:B:287:TYR:HA	1:B:290:ALA:O	2.19	0.42
2:A:150:CC1:H201	2:A:150:CC1:H181	1.92	0.42
1:B:203:GLU:H	1:B:203:GLU:CD	2.23	0.41
1:A:59:TYR:CZ	2:A:150:CC1:H301	2.55	0.41
1:B:277:PHE:HE1	1:B:287:TYR:CE1	2.38	0.41
1:A:77:PHE:HD2	1:A:82:GLU:HG3	1.86	0.41
1:B:300:ARG:HG3	1:B:300:ARG:NH1	2.34	0.41
1:B:247:ASP:O	1:B:254:GLU:HA	2.19	0.41
1:B:212:ARG:O	1:B:216:GLU:HG2	2.20	0.41
1:B:258:HIS:CB	2:B:350:CC1:HC71	2.51	0.41
1:A:46:ARG:HA	1:A:55:VAL:O	2.20	0.40
1:B:275:ILE:HD12	1:B:277:PHE:HZ	1.86	0.40
1:A:91:SER:O	1:A:94:LEU:HB2	2.21	0.40
1:A:77:PHE:CD2	1:A:82:GLU:HG3	2.56	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	102/104 (98%)	90 (88%)	11 (11%)	1 (1%)	22	32
1	B	102/104 (98%)	86 (84%)	13 (13%)	3 (3%)	7	6
All	All	204/208 (98%)	176 (86%)	24 (12%)	4 (2%)	11	13

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	208	LYS
1	B	299	SER
1	A	50	GLN
1	B	252	GLN

### 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	91/92 (99%)	81 (89%)	10 (11%)	9	12
1	B	91/92 (99%)	81 (89%)	10 (11%)	9	12
All	All	182/184 (99%)	162 (89%)	20 (11%)	9	12

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	12	ARG
1	A	22	PRO
1	A	25	THR
1	A	28	SER
1	A	29	PHE

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Mol	Chain	Res	Type
1	A	36	SER
1	A	50	GLN
1	A	52	GLN
1	A	74	ARG
1	A	75	ILE
1	B	203	GLU
1	B	206	PHE
1	B	213	LYS
1	B	219	LEU
1	B	248	PHE
1	B	251	ASN
1	B	260	LYS
1	B	264	LEU
1	B	282	GLU
1	B	300	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	63	ASN
1	A	81	HIS
1	B	226	HIS
1	B	251	ASN
1	B	266	ASN

### 5.3.3 RNA ⓘ

There are no RNA chains in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

### 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
2	CC1	A	150	-	48,48,48	1.38	7 (14%)	70,70,70	1.47	7 (10%)
2	CC1	B	350	-	48,48,48	1.46	8 (16%)	70,70,70	1.51	9 (12%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	CC1	A	150	-	-	0/37/56/56	0/2/4/4
2	CC1	B	350	-	-	0/37/56/56	0/2/4/4

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	350	CC1	P2-C8	3.62	1.86	1.79
2	B	350	CC1	P1-C10	3.33	1.85	1.79
2	A	150	CC1	P1-OR4	-3.11	1.48	1.54
2	A	150	CC1	P1-C10	2.96	1.84	1.79
2	B	350	CC1	C16-C27	2.81	1.53	1.50
2	B	350	CC1	P1-OR4	-2.80	1.49	1.54
2	A	150	CC1	P2-OR3	-2.77	1.49	1.54
2	A	150	CC1	P2-OR1	-2.70	1.49	1.54
2	A	150	CC1	P1-OR5	-2.64	1.49	1.54
2	B	350	CC1	P2-OR1	-2.47	1.49	1.54
2	B	350	CC1	P1-OR5	-2.40	1.49	1.54
2	B	350	CC1	P2-OR3	-2.37	1.49	1.54
2	A	150	CC1	P2-C8	2.32	1.83	1.79
2	B	350	CC1	C6-C8	2.21	1.43	1.40
2	A	150	CC1	C16-C27	2.15	1.52	1.50

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	150	CC1	C17-C16-C27	-7.91	120.71	125.11
2	B	350	CC1	C17-C16-C27	-7.78	120.78	125.11
2	A	150	CC1	C5-C4-CO	-3.69	102.94	113.31
2	B	350	CC1	C19-C14-C1	-3.50	120.02	124.75
2	A	150	CC1	C20-O5-C17	3.10	124.04	117.93
2	B	350	CC1	C11-C1-C14	-2.86	103.90	114.27
2	B	350	CC1	C11-C1-N1	-2.81	104.49	109.97
2	B	350	CC1	C14-C1-N1	2.73	115.73	110.59
2	A	150	CC1	C11-C1-N1	-2.58	104.94	109.97
2	A	150	CC1	C11-C1-C14	-2.57	104.95	114.27
2	B	350	CC1	O5-C20-C21	2.50	115.25	107.65
2	A	150	CC1	C19-C14-C1	-2.34	121.59	124.75
2	B	350	CC1	C16-C27-N3	2.33	121.52	118.11
2	B	350	CC1	C5-C4-CO	-2.25	106.98	113.31
2	A	150	CC1	O5-C20-C21	2.24	114.46	107.65
2	B	350	CC1	O6-C27-C16	-2.19	117.64	120.33

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

## 5.7 Other polymers ⓘ

There are no such residues in this entry.

## 5.8 Polymer linkage issues

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 will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

### 6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

### 6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

### 6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.