



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 24, 2020 – 10:24 pm BST

PDB ID : 3OWQ  
Title : X-Ray Structure of Lin1025 protein from *Listeria innocua*, Northeast Structural Genomics Consortium Target LkR164  
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Deposited on : 2010-09-20  
Resolution : 2.61 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
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

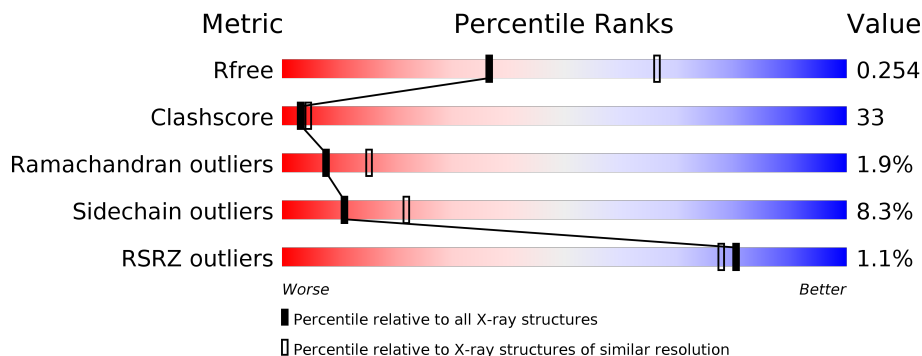
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.61 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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	321	 41% 29% 6% 2% 22%
1	B	321	 37% 32% 2% 29%
1	C	321	 33% 35% 6% 2% 24%
1	D	321	 37% 33% 2% 28%

## 2 Entry composition [i](#)

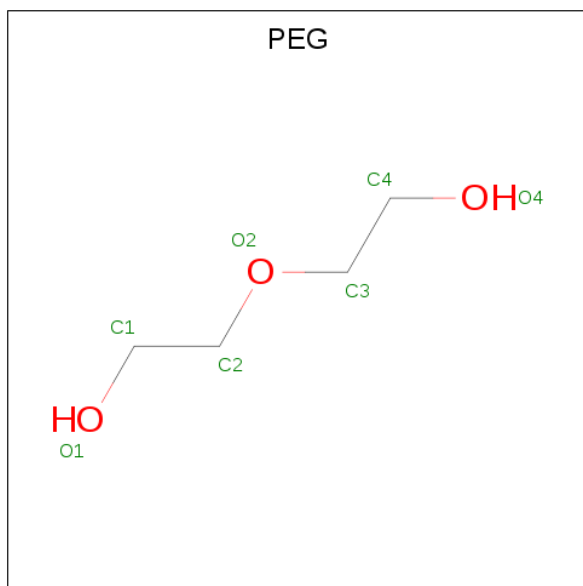
There are 3 unique types of molecules in this entry. The entry contains 7361 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Lin1025 protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
1	A	237	Total 1832	C 1146	N 305	O 372	Se 9	0	0	0
1	B	233	Total 1790	C 1117	N 301	O 363	Se 9	0	0	0
1	C	237	Total 1830	C 1148	N 305	O 368	Se 9	0	0	0
1	D	237	Total 1840	C 1155	N 305	O 371	Se 9	0	0	0

- Molecule 2 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	B	1	Total 7	C 4	O 3	0	0
2	C	1	Total 7	C 4	O 3	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
2	D	1	7	4	3	0	0

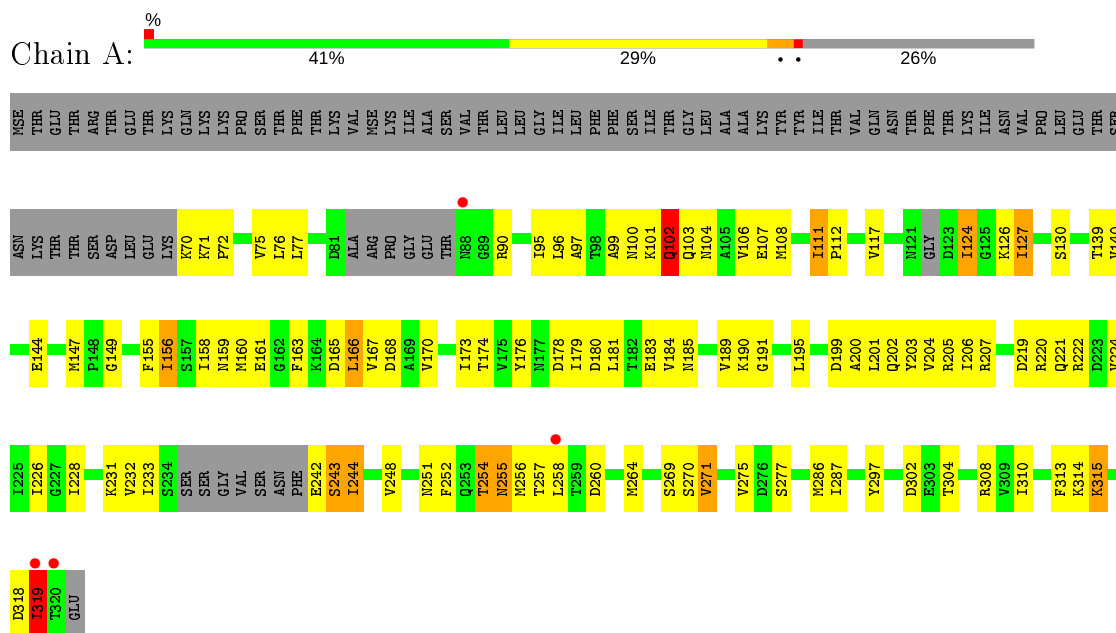
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	8	Total	O	0	0
			8	8		
3	B	12	Total	O	0	0
			12	12		
3	C	11	Total	O	0	0
			11	11		
3	D	17	Total	O	0	0
			17	17		

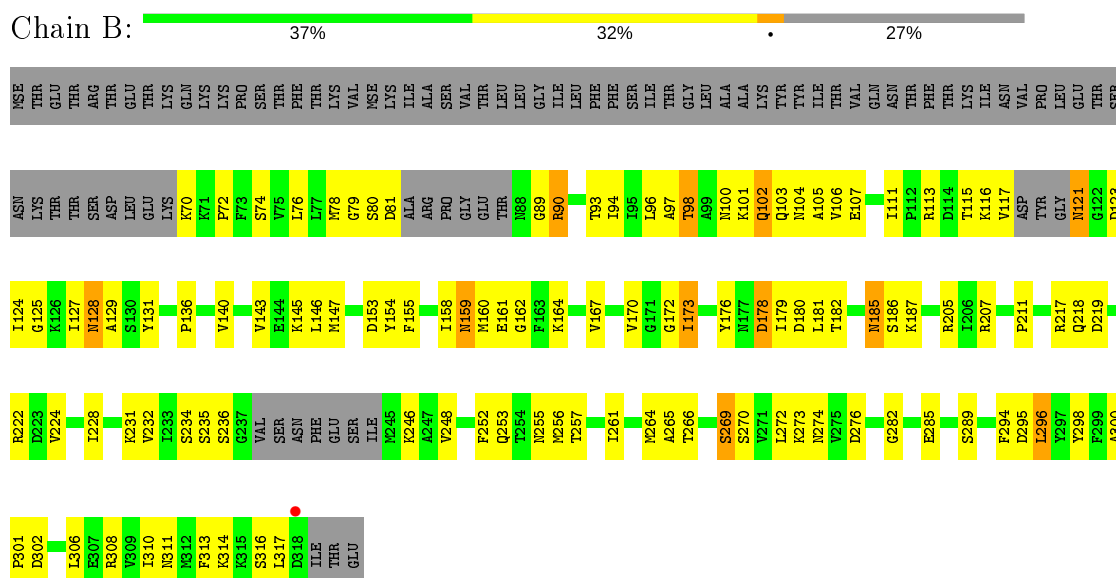
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of 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.

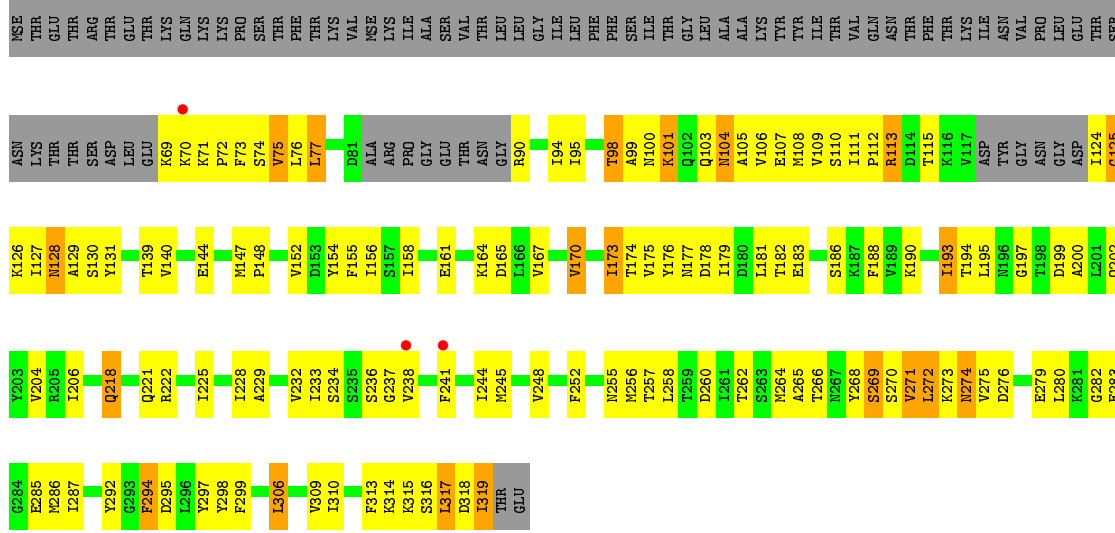
#### • Molecule 1: Lin1025 protein



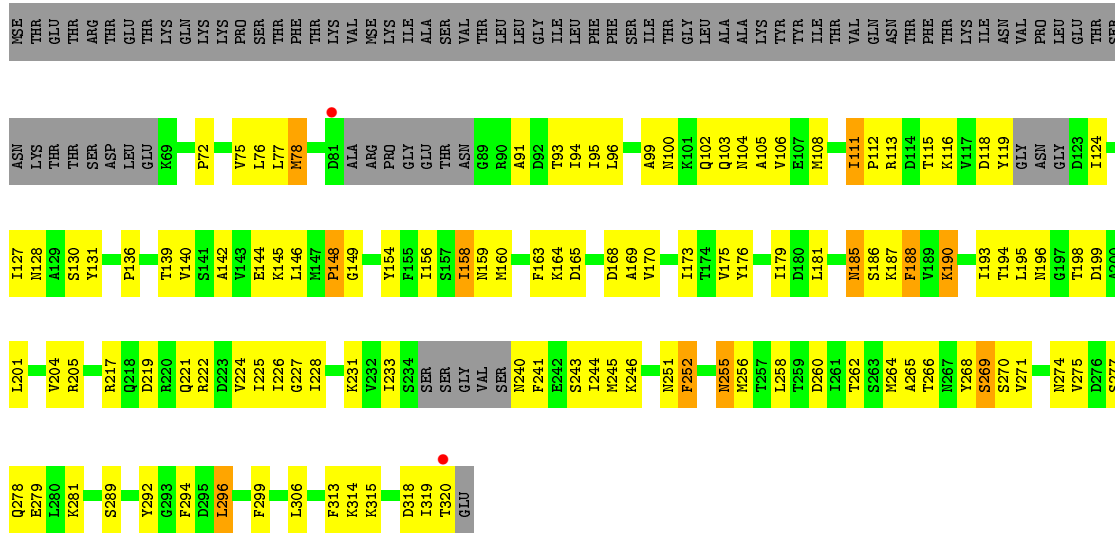
#### • Molecule 1: Lin1025 protein



• Molecule 1: Lin1025 protein



• Molecule 1: Lin1025 protein



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	56.51Å 157.04Å 57.28Å 90.00° 98.38° 90.00°	Depositor
Resolution (Å)	28.33 – 2.61 28.33 – 2.61	Depositor EDS
% Data completeness (in resolution range)	99.3 (28.33-2.61) 99.3 (28.33-2.61)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.84 (at 2.61Å)	Xtrriage
Refinement program	PHENIX 1.6.4_486	Depositor
R, $R_{free}$	0.225 , 0.260 0.220 , 0.254	Depositor DCC
$R_{free}$ test set	1515 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	46.8	Xtrriage
Anisotropy	0.733	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 38.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	0.106 for l,-k,h	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	7361	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.60% 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](#)

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

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	0.41	0/1846	0.63	0/2474
1	B	0.40	0/1804	0.65	0/2417
1	C	0.40	0/1845	0.62	1/2472 (0.0%)
1	D	0.40	0/1855	0.65	0/2485
All	All	0.40	0/7350	0.64	1/9848 (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	C	125	GLY	N-CA-C	5.50	126.84	113.10

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	1832	0	1803	118	0
1	B	1790	0	1763	124	0
1	C	1830	0	1817	129	0
1	D	1840	0	1816	120	0
2	B	7	0	10	0	0
2	C	7	0	10	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	7	0	10	1	0
3	A	8	0	0	0	0
3	B	12	0	0	1	0
3	C	11	0	0	0	0
3	D	17	0	0	0	0
All	All	7361	0	7229	480	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 33.

The worst 5 of 480 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:A:111:ILE:HD11	1:A:127:ILE:HG21	1.31	1.11
1:D:106:VAL:HG22	1:D:271:VAL:HG12	1.34	1.05
1:D:190:LYS:H	1:D:190:LYS:HD3	1.20	1.03
1:B:116:LYS:HG3	1:B:124:ILE:HD11	1.41	0.99
1:C:241:PHE:HE1	1:C:258:LEU:HG	1.22	0.99

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 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	229/321 (71%)	200 (87%)	24 (10%)	5 (2%)	<b>6</b>   <b>12</b>
1	B	225/321 (70%)	192 (85%)	27 (12%)	6 (3%)	<b>5</b>   <b>8</b>
1	C	231/321 (72%)	199 (86%)	29 (13%)	3 (1%)	<b>12</b>   <b>24</b>
1	D	229/321 (71%)	208 (91%)	18 (8%)	3 (1%)	<b>12</b>   <b>24</b>
All	All	914/1284 (71%)	799 (87%)	98 (11%)	17 (2%)	<b>8</b>   <b>15</b>

5 of 17 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	243	SER
1	B	102	GLN
1	B	235	SER
1	C	269	SER
1	A	166	LEU

### 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	205/269 (76%)	188 (92%)	17 (8%)	11	22
1	B	200/269 (74%)	183 (92%)	17 (8%)	10	21
1	C	206/269 (77%)	188 (91%)	18 (9%)	10	20
1	D	206/269 (77%)	190 (92%)	16 (8%)	12	25
All	All	817/1076 (76%)	749 (92%)	68 (8%)	11	22

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	257	THR
1	C	104	ASN
1	D	258	LEU
1	B	272	LEU
1	C	75	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 23 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	267	ASN
1	B	311	ASN
1	D	278	GLN
1	B	274	ASN
1	C	100	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

3 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	PEG	B	322	-	6,6,6	0.58	0	5,5,5	0.69	0
2	PEG	D	322	-	6,6,6	0.56	0	5,5,5	0.64	0
2	PEG	C	322	-	6,6,6	0.47	0	5,5,5	0.72	0

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	PEG	B	322	-	-	2/4/4/4	-
2	PEG	D	322	-	-	1/4/4/4	-
2	PEG	C	322	-	-	1/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	322	PEG	O2-C3-C4-O4
2	B	322	PEG	O1-C1-C2-O2
2	D	322	PEG	O1-C1-C2-O2
2	C	322	PEG	O2-C3-C4-O4

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	322	PEG	1	0
2	C	322	PEG	1	0

## 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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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	228/321 (71%)	-0.33	4 (1%) 68 64	31, 52, 82, 122	0
1	B	224/321 (69%)	-0.31	1 (0%) 92 91	22, 56, 84, 110	0
1	C	228/321 (71%)	-0.30	3 (1%) 77 73	23, 53, 87, 134	0
1	D	228/321 (71%)	-0.33	2 (0%) 84 82	28, 51, 77, 120	0
All	All	908/1284 (70%)	-0.32	10 (1%) 80 78	22, 53, 84, 134	0

The worst 5 of 10 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	238	VAL	4.2
1	A	319	ILE	4.1
1	A	320	THR	3.7
1	A	258	LEU	3.2
1	D	320	THR	2.9

### 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](#)

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, 95<sup>th</sup> 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	PEG	D	322	7/7	0.87	0.13	49,63,72,75	0
2	PEG	B	322	7/7	0.91	0.17	58,63,71,73	0
2	PEG	C	322	7/7	0.94	0.17	46,54,61,62	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.