



wwPDB X-ray Structure Validation Summary Report ⓘ

Oct 6, 2024 – 01:02 pm BST

PDB ID : 7OYK
Title : DNA-binding domain of CggR in complex with the DNA operator
Authors : Novakova, M.; Rezacova, P.; Skerlova, J.; Brynda, J.
Deposited on : 2021-06-24
Resolution : 2.10 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

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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 3.0
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.003 (Gargrove)
Density-Fitness : 1.0.11
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.39

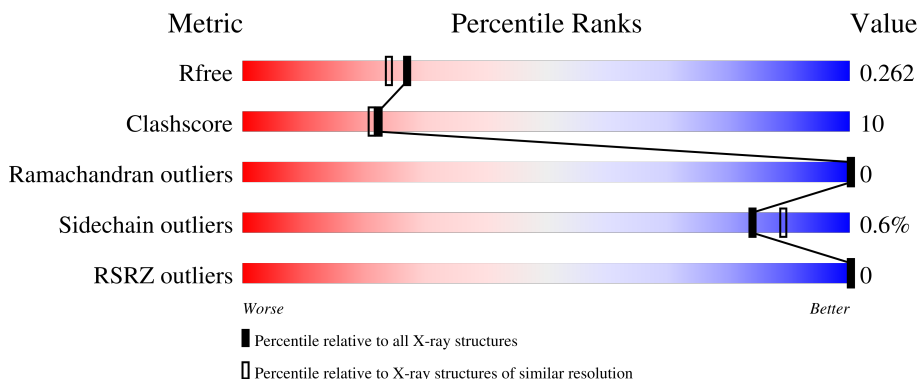
1 Overall quality at a glance i

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}	164625	6234 (2.10-2.10)
Clashscore	180529	6893 (2.10-2.10)
Ramachandran outliers	177936	6839 (2.10-2.10)
Sidechain outliers	177891	6840 (2.10-2.10)
RSRZ outliers	164620	6234 (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	AAA	96	81% (green), 18% (yellow), . (grey)
1	BBB	96	83% (green), 17% (yellow)
1	CCC	96	86% (green), 12% (yellow), . (grey)
1	DDD	96	78% (green), 20% (yellow), .. (grey)
2	EEE	16	75% (green), 25% (yellow)

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Mol	Chain	Length	Quality of chain
2	GGG	16	 81% 19%
2	LLL	16	 50% 50%
3	FFF	16	 81% 19%
3	HHH	16	 88% 12%
3	KKK	16	 31% 69%

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 5175 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 Central glycolytic genes regulator.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	Se			
1	AAA	96	Total 771	C 485	N 133	O 149	Se 4	0	1	0
1	DDD	95	Total 756	C 476	N 130	O 146	Se 4	0	0	0
1	CCC	96	Total 768	C 484	N 132	O 148	Se 4	0	1	0
1	BBB	96	Total 774	C 489	N 132	O 149	Se 4	0	2	0

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	-4	SER	-	expression tag	UNP O32253
AAA	-3	ASN	-	expression tag	UNP O32253
AAA	-2	ALA	-	expression tag	UNP O32253
AAA	-1	ALA	-	expression tag	UNP O32253
AAA	0	SER	-	expression tag	UNP O32253
DDD	-4	SER	-	expression tag	UNP O32253
DDD	-3	ASN	-	expression tag	UNP O32253
DDD	-2	ALA	-	expression tag	UNP O32253
DDD	-1	ALA	-	expression tag	UNP O32253
DDD	0	SER	-	expression tag	UNP O32253
CCC	-4	SER	-	expression tag	UNP O32253
CCC	-3	ASN	-	expression tag	UNP O32253
CCC	-2	ALA	-	expression tag	UNP O32253
CCC	-1	ALA	-	expression tag	UNP O32253
CCC	0	SER	-	expression tag	UNP O32253
BBB	-4	SER	-	expression tag	UNP O32253
BBB	-3	ASN	-	expression tag	UNP O32253
BBB	-2	ALA	-	expression tag	UNP O32253
BBB	-1	ALA	-	expression tag	UNP O32253
BBB	0	SER	-	expression tag	UNP O32253

- Molecule 2 is a DNA chain called DNA operator - strand 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	EEE	16	Total	C	N	O	P	0	0	0
			325	155	67	88	15			
2	LLL	16	Total	C	N	O	P	0	16	0
			325	155	67	88	15			
2	GGG	16	Total	C	N	O	P	0	16	0
			325	155	67	88	15			

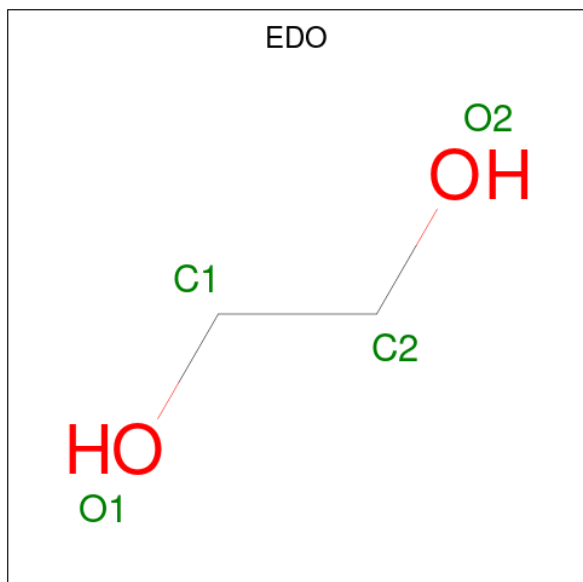
- Molecule 3 is a DNA chain called DNA operator - strand 2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	FFF	16	Total	C	N	O	P	0	0	0
			325	157	53	100	15			
3	KKK	16	Total	C	N	O	P	0	16	0
			325	157	53	100	15			
3	HHH	16	Total	C	N	O	P	0	16	0
			325	157	53	100	15			

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

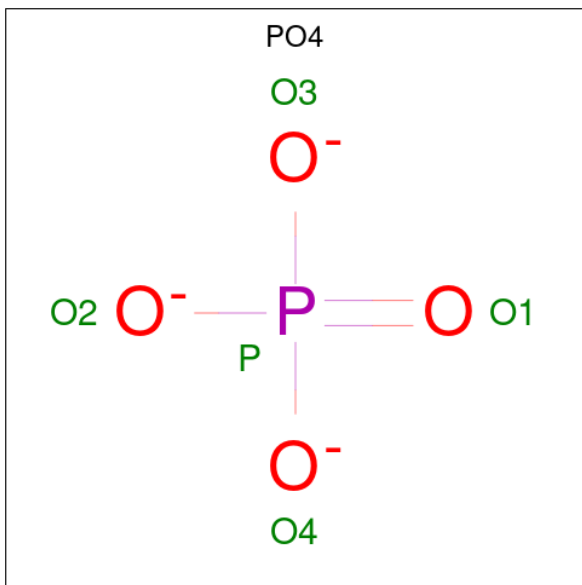
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	AAA	1	Total	Ca	0	0
			1	1		
4	DDD	1	Total	Ca	0	0
			1	1		

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C₂H₆O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	CCC	1	Total C O 4 2 2	0	0

- Molecule 6 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	FFF	1	Total O P 5 4 1	0	0
6	GGG	1	Total O P 5 4 1	0	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	AAA	20	Total O 20 20	0	0
7	DDD	11	Total O 11 11	0	1
7	CCC	19	Total O 19 19	0	1
7	BBB	21	Total O 21 21	0	0
7	EEE	15	Total O 15 15	0	0
7	FFF	25	Total O 25 25	0	0
7	LLL	4	Total O 5 5	0	1

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	KKK	10	Total O 10 10	0	4
7	HHH	4	Total O 4 4	0	1
7	GGG	10	Total O 10 10	0	4

3 Residue-property plots [i](#)


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 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.

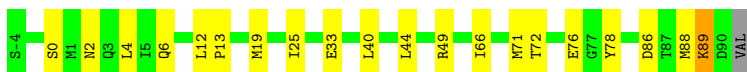
- Molecule 1: Central glycolytic genes regulator

Chain AAA:  81% 18%




- Molecule 1: Central glycolytic genes regulator

Chain DDD:  78% 20%




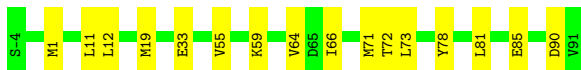
- Molecule 1: Central glycolytic genes regulator

Chain CCC:  86% 12%




- Molecule 1: Central glycolytic genes regulator

Chain BBB:  83% 17%



- Molecule 2: DNA operator - strand 1

Chain EEE:  75% 25%

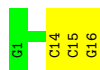
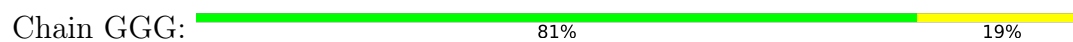


- Molecule 2: DNA operator - strand 1

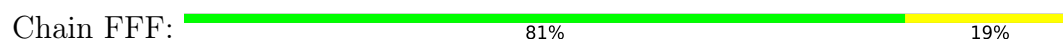
Chain LLL:  50% 50%



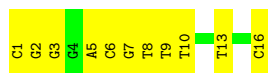
- Molecule 2: DNA operator - strand 1



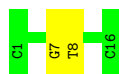
- Molecule 3: DNA operator - strand 2



- Molecule 3: DNA operator - strand 2



- Molecule 3: DNA operator - strand 2



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	57.97Å 103.14Å 51.11Å 90.00° 90.54° 90.00°	Depositor
Resolution (Å)	45.84 – 2.10 45.84 – 2.10	Depositor EDS
% Data completeness (in resolution range)	98.2 (45.84-2.10) 95.8 (45.84-2.10)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.62 (at 2.10Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.208 , 0.253 0.219 , 0.262	Depositor DCC
R_{free} test set	1726 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	38.6	Xtrriage
Anisotropy	0.157	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 33.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtrriage
Estimated twinning fraction	0.349 for -h,-k,l	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	5175	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.46% 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: PO4, CA, EDO

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	AAA	0.65	0/772	0.81	1/1030 (0.1%)
1	BBB	0.66	0/778	0.83	0/1039
1	CCC	0.65	0/772	0.83	1/1030 (0.1%)
1	DDD	0.66	0/757	0.80	0/1009
2	EEE	0.44	0/366	0.79	0/562
2	GGG	0.40	0/366	0.87	0/562
2	LLL	0.40	0/366	0.81	0/562
3	FFF	0.49	0/362	0.75	0/558
3	HHH	0.37	0/362	0.79	0/558
3	KKK	0.45	1/362 (0.3%)	0.72	0/558
All	All	0.57	1/5263 (0.0%)	0.81	2/7468 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	KKK	1[A]	DC	O3'-P	-5.24	1.54	1.61

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	AAA	88	MSE	CG-SE-CE	5.60	111.22	98.90
1	CCC	33	GLU	CB-CA-C	-5.22	99.95	110.40

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	AAA	771	0	811	22	0
1	BBB	774	0	821	17	0
1	CCC	768	0	812	21	0
1	DDD	756	0	797	30	0
2	EEE	325	0	179	2	0
2	GGG	325	0	161	3	0
2	LLL	325	0	161	8	0
3	FFF	325	0	185	3	0
3	HHH	325	0	175	1	0
3	KKK	325	0	173	10	0
4	AAA	1	0	0	0	0
4	DDD	1	0	0	0	0
5	CCC	4	0	6	0	0
6	FFF	5	0	0	0	0
6	GGG	5	0	0	0	0
7	AAA	20	0	0	1	0
7	BBB	21	0	0	0	0
7	CCC	19	0	0	1	0
7	DDD	11	0	0	1	0
7	EEE	15	0	0	0	0
7	FFF	25	0	0	0	0
7	GGG	10	0	0	0	0
7	HHH	4	0	0	0	0
7	KKK	10	0	0	2	0
7	LLL	5	0	0	1	0
All	All	5175	0	4281	93	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 10.

The worst 5 of 93 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:DDD:19:MSE:HE2	1:CCC:12:LEU:HD12	1.26	1.16
1:DDD:19:MSE:CE	1:CCC:12:LEU:HD12	1.76	1.13

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:KKK:9[A]:DT:H2''	3:KKK:10[A]:DT:OP2	1.45	1.11
1:AAA:19:MSE:CE	1:BBB:12:LEU:HD12	1.80	1.10
1:AAA:19:MSE:HE2	1:BBB:12:LEU:HD12	1.35	1.08

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	AAA	95/96 (99%)	94 (99%)	1 (1%)	0	100	100
1	BBB	96/96 (100%)	95 (99%)	1 (1%)	0	100	100
1	CCC	95/96 (99%)	93 (98%)	2 (2%)	0	100	100
1	DDD	93/96 (97%)	88 (95%)	5 (5%)	0	100	100
All	All	379/384 (99%)	370 (98%)	9 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	AAA	88/83 (106%)	88 (100%)	0	100	100
1	BBB	89/83 (107%)	88 (99%)	1 (1%)	70	77

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	CCC	88/83 (106%)	88 (100%)	0	100	100
1	DDD	86/83 (104%)	85 (99%)	1 (1%)	67	74
All	All	351/332 (106%)	349 (99%)	2 (1%)	84	89

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	DDD	89	LYS
1	BBB	59	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 5 ligands modelled in this entry, 2 are monoatomic - leaving 3 for Mogul analysis.

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	$\# Z > 2$
5	EDO	CCC	101	-	3,3,3	0.18	0	2,2,2	0.33	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	PO4	FFF	101	-	4,4,4	1.21	0	6,6,6	0.45	0
6	PO4	GGG	101	-	4,4,4	0.84	0	6,6,6	0.49	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
5	EDO	CCC	101	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	CCC	101	EDO	O1-C1-C2-O2

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 [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, 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	AAA	92/96 (95%)	-1.20	0 100 100	29, 43, 68, 101	1 (1%)
1	BBB	92/96 (95%)	-1.25	0 100 100	20, 44, 72, 77	2 (2%)
1	CCC	92/96 (95%)	-1.22	0 100 100	24, 46, 73, 79	1 (1%)
1	DDD	91/96 (94%)	-1.19	0 100 100	31, 46, 70, 98	0
2	EEE	16/16 (100%)	-1.58	0 100 100	32, 41, 51, 55	0
2	GGG	16/16 (100%)	-1.54	0 100 100	14, 20, 27, 28	16 (100%)
2	LLL	16/16 (100%)	-1.49	0 100 100	17, 21, 23, 26	16 (100%)
3	FFF	16/16 (100%)	-1.62	0 100 100	28, 39, 51, 52	0
3	HHH	16/16 (100%)	-1.50	0 100 100	13, 20, 27, 27	16 (100%)
3	KKK	16/16 (100%)	-1.37	0 100 100	14, 21, 26, 28	16 (100%)
All	All	463/480 (96%)	-1.28	0 100 100	13, 42, 70, 101	68 (14%)

There are no RSRZ outliers to report.

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 monosaccharides 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(Å ²)	Q<0.9
5	EDO	CCC	101	4/4	0.97	0.09	62,64,64,65	0
6	PO4	FFF	101	5/5	0.97	0.04	49,52,59,67	0
6	PO4	GGG	101	5/5	0.98	0.06	44,49,50,60	5
4	CA	AAA	101	1/1	0.99	0.08	55,55,55,55	0
4	CA	DDD	101	1/1	1.00	0.07	58,58,58,58	0

6.5 Other polymers [i](#)

There are no such residues in this entry.