



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 28, 2014 – 11:14 AM GMT

PDB ID : 4I2X  
Title : Crystal structure of Signal Regulatory Protein gamma (SIRP-gamma) in complex with FabOX117  
Authors : Nettleship, J.E.; Ren, J.; Stuart, D.I.; Owens, R.J.; Oxford Protein Production Facility (OPPF)  
Deposited on : 2012-11-23  
Resolution : 2.48 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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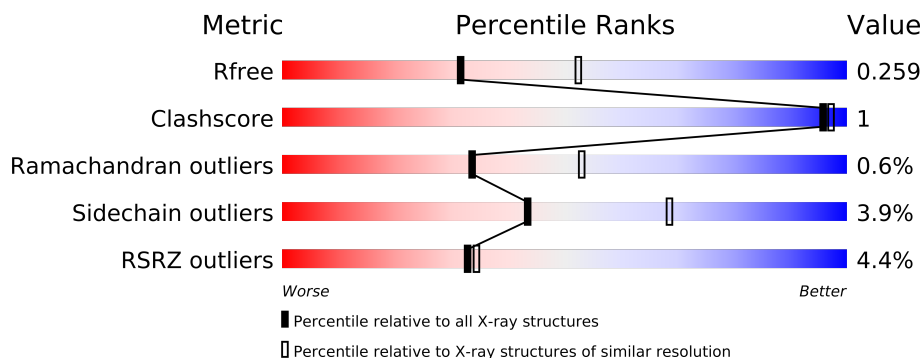
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1323  
EDS : stable22639  
Percentile statistics : 21963  
Refmac : 5.8.0049  
CCP4 : 6.3.0 (Settle)  
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 2.48 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))
$R_{free}$	66092	3277 (2.50-2.46)
Clashscore	79885	4136 (2.50-2.46)
Ramachandran outliers	78287	4052 (2.50-2.46)
Sidechain outliers	78261	4054 (2.50-2.46)
RSRZ outliers	66119	3279 (2.50-2.46)

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.

Mol	Chain	Length	Quality of chain
1	A	214	
1	C	214	
2	B	229	
2	D	229	
3	E	328	
3	F	328	

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 11813 atoms, of which 0 are hydrogen 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 FabOX117 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	214	Total	C	N	O	S	0	0	0
			1663	1041	277	338	7			
1	C	214	Total	C	N	O	S	0	0	0
			1663	1041	277	338	7			

- Molecule 2 is a protein called FabOX117 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	229	Total	C	N	O	S	0	0	0
			1746	1111	295	333	7			
2	D	219	Total	C	N	O	S	0	0	0
			1659	1060	272	321	6			

- Molecule 3 is a protein called Signal-regulatory protein gamma.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	E	314	Total	C	N	O	S	0	0	0
			2442	1536	429	466	11			
3	F	296	Total	C	N	O	S	0	0	0
			2307	1454	404	439	10			

There are 18 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	320	SER	-	EXPRESSION TAG	UNP Q9P1W8
E	321	THR	-	EXPRESSION TAG	UNP Q9P1W8
E	322	ARG	-	EXPRESSION TAG	UNP Q9P1W8
E	323	HIS	-	EXPRESSION TAG	UNP Q9P1W8
E	324	HIS	-	EXPRESSION TAG	UNP Q9P1W8
E	325	HIS	-	EXPRESSION TAG	UNP Q9P1W8
E	326	HIS	-	EXPRESSION TAG	UNP Q9P1W8
E	327	HIS	-	EXPRESSION TAG	UNP Q9P1W8

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Chain	Residue	Modelled	Actual	Comment	Reference
E	328	HIS	-	EXPRESSION TAG	UNP Q9P1W8
F	320	SER	-	EXPRESSION TAG	UNP Q9P1W8
F	321	THR	-	EXPRESSION TAG	UNP Q9P1W8
F	322	ARG	-	EXPRESSION TAG	UNP Q9P1W8
F	323	HIS	-	EXPRESSION TAG	UNP Q9P1W8
F	324	HIS	-	EXPRESSION TAG	UNP Q9P1W8
F	325	HIS	-	EXPRESSION TAG	UNP Q9P1W8
F	326	HIS	-	EXPRESSION TAG	UNP Q9P1W8
F	327	HIS	-	EXPRESSION TAG	UNP Q9P1W8
F	328	HIS	-	EXPRESSION TAG	UNP Q9P1W8

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total Zn 1 1	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	D	1	Total Cl 1 1	0	0
5	E	1	Total Cl 1 1	0	0

- Molecule 6 is SUGAR (N-ACETYL-D-GLUCOSAMINE) (three-letter code: NAG) (formula: C<sub>8</sub>H<sub>15</sub>NO<sub>6</sub>).

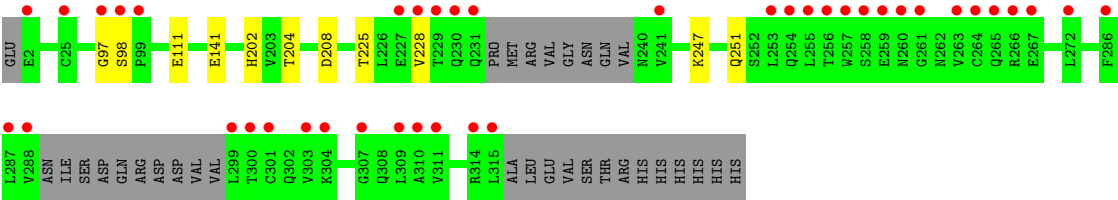


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
6	E	1	Total	C	N	O	0	0
			14	8	1	5		
6	F	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	38	Total	O	0	0
			38	38		
7	B	64	Total	O	0	0
			64	64		
7	C	31	Total	O	0	0
			31	31		
7	D	52	Total	O	0	0
			52	52		
7	E	66	Total	O	0	0
			66	66		
7	F	51	Total	O	0	0
			51	51		





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	140.36Å 174.19Å 81.73Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.82 – 2.48 29.80 – 2.48	Depositor EDS
% Data completeness (in resolution range)	99.0 (29.82-2.48) 99.1 (29.80-2.48)	Depositor EDS
$R_{merge}$	0.16	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.72 (at 2.48Å)	Xtriage
Refinement program	REFMAC 5.7.0032	Depositor
R, $R_{free}$	0.196 , 0.260 0.196 , 0.259	Depositor DCC
$R_{free}$ test set	3594 reflections (5.32%)	DCC
Wilson B-factor (Å <sup>2</sup> )	42.6	Xtriage
Anisotropy	0.354	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 28.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Outliers	2 of 71141 reflections (0.003%)	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	11813	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.



## 5 Model quality

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ZN, NAG, CL

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	0.37	0/1703	0.57	0/2315
1	C	0.39	0/1703	0.58	0/2315
2	B	0.39	0/1801	0.58	0/2461
2	D	0.40	0/1708	0.59	0/2336
3	E	0.37	0/2495	0.56	0/3401
3	F	0.35	0/2358	0.57	0/3212
All	All	0.38	0/11768	0.57	0/16040

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	1663	0	0	4	0
1	C	1663	0	0	3	0
2	B	1746	0	0	2	0
2	D	1659	0	0	4	0
3	E	2442	0	0	3	0
3	F	2307	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
6	E	14	0	13	0	0
6	F	14	0	13	0	0
7	A	38	0	0	0	0
7	B	64	0	0	0	0
7	C	31	0	0	0	0
7	D	52	0	0	0	0
7	E	66	0	0	0	0
7	F	51	0	0	0	0
All	All	11813	0	26	14	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 1.

All (14) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:C:6:GLN:NE2	1:C:86:TYR:O	2.33	0.62
3:E:221:ARG:NH1	3:E:306:ASP:OD2	2.39	0.56
2:B:50:TRP:CD1	2:B:50:TRP:C	2.83	0.52
3:F:202:HIS:CD2	3:F:204:THR:OG1	2.64	0.50
1:A:4:ILE:CG2	1:A:23:CYS:SG	3.00	0.50
2:D:50:TRP:CD1	2:D:50:TRP:C	2.88	0.46
3:E:171:THR:N	3:F:111:GLU:OE2	2.50	0.45
1:A:155:ARG:NH2	1:A:185:GLU:OE1	2.49	0.45
1:C:91:HIS:CE1	2:D:103:ARG:O	2.69	0.45
1:C:120:PRO:O	2:D:219:ARG:NH1	2.51	0.44
3:E:202:HIS:CD2	3:E:204:THR:OG1	2.72	0.42
1:A:6:GLN:NE2	1:A:86:TYR:O	2.52	0.42
1:A:91:HIS:CE1	2:B:103:ARG:O	2.73	0.41
2:D:131:ALA:O	2:D:219:ARG:NH2	2.54	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	212/214 (99%)	203 (96%)	9 (4%)	0	100	100
1	C	212/214 (99%)	204 (96%)	8 (4%)	0	100	100
2	B	227/229 (99%)	205 (90%)	18 (8%)	4 (2%)	13	19
2	D	217/229 (95%)	207 (95%)	10 (5%)	0	100	100
3	E	310/328 (94%)	295 (95%)	13 (4%)	2 (1%)	33	53
3	F	290/328 (88%)	279 (96%)	8 (3%)	3 (1%)	22	36
All	All	1468/1542 (95%)	1393 (95%)	66 (4%)	9 (1%)	33	53

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	E	99	PRO
2	B	138	THR
3	E	291	SER
3	F	98	SER
2	B	133	GLY
2	B	178	SER
2	B	65	LYS
3	F	247	LYS
3	F	97	GLY

### 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	190/190 (100%)	180 (95%)	10 (5%)	32	53
1	C	190/190 (100%)	181 (95%)	9 (5%)	36	59
2	B	194/194 (100%)	183 (94%)	11 (6%)	29	48
2	D	185/194 (95%)	180 (97%)	5 (3%)	57	82
3	E	278/292 (95%)	267 (96%)	11 (4%)	42	67
3	F	262/292 (90%)	257 (98%)	5 (2%)	69	90

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1299/1352 (96%)	1248 (96%)	51 (4%)	43 68

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1	ASP
1	A	3	VAL
1	A	14	SER
1	A	50	SER
1	A	58	VAL
1	A	93	SER
1	A	97	THR
1	A	122	SER
1	A	143	ASP
1	A	181	LEU
2	B	12	VAL
2	B	50	TRP
2	B	85	SER
2	B	121	LYS
2	B	139	ASN
2	B	156	VAL
2	B	183	LEU
2	B	191	SER
2	B	196	SER
2	B	210	THR
2	B	229	HIS
1	C	7	SER
1	C	60	ASP
1	C	94	THR
1	C	103	LYS
1	C	127	SER
1	C	168	SER
1	C	181	LEU
1	C	185	GLU
1	C	203	SER
2	D	50	TRP
2	D	77	SER
2	D	84	SER
2	D	144	LEU
2	D	162	SER
3	E	70	ASN
3	E	98	SER

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Mol	Chain	Res	Type
3	E	130	THR
3	E	208	ASP
3	E	225	THR
3	E	228	VAL
3	E	251	GLN
3	E	255	LEU
3	E	287	LEU
3	E	290	ILE
3	E	293	GLN
3	F	141	GLU
3	F	208	ASP
3	F	225	THR
3	F	228	VAL
3	F	251	GLN

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

### 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 ⓘ

Of 5 ligands modelled in this entry, 3 are monoatomic - leaving 2 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
6	NAG	E	401	3	12,14,15	0.58	0	15,19,21	0.92	1 (6%)
6	NAG	F	401	3	12,14,15	0.59	0	15,19,21	0.76	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
6	NAG	E	401	3	-	0/6/23/26	0/1/1/1
6	NAG	F	401	3	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	E	401	NAG	O5-C5-C6	2.16	109.25	106.98

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 ⓘ

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	214/214 (100%)	-0.31	1 (0%) 88 90	25, 56, 92, 115	0
1	C	214/214 (100%)	-0.22	1 (0%) 88 90	29, 54, 94, 132	0
2	B	229/229 (100%)	-0.31	3 (1%) 74 75	29, 49, 92, 153	0
2	D	219/229 (95%)	-0.32	0 100 100	27, 49, 74, 119	0
3	E	314/328 (95%)	-0.04	21 (6%) 17 17	30, 51, 124, 204	0
3	F	296/328 (90%)	0.41	40 (13%) 4 3	27, 59, 178, 219	0
All	All	1486/1542 (96%)	-0.10	66 (4%) 33 34	25, 52, 120, 219	0

All (66) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	F	288	VAL	10.7
3	F	299	LEU	10.3
3	E	234	ARG	7.6
3	F	230	GLN	6.9
3	F	287	LEU	6.7
3	F	315	LEU	6.2
3	E	235	VAL	5.7
3	F	267	GLU	5.4
3	F	255	LEU	5.3
3	F	263	VAL	5.0
3	F	266	ARG	5.0
3	F	286	PHE	4.6
3	F	314	ARG	4.6
3	F	259	GLU	4.5
3	F	309	LEU	4.4
3	F	231	GLN	4.3
3	F	228	VAL	4.3
3	F	241	VAL	4.2
3	E	292	ASP	4.1

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Mol	Chain	Res	Type	RSRZ
3	E	289	ASN	4.1
3	F	256	THR	4.0
3	F	97	GLY	4.0
3	E	98	SER	4.0
3	E	99	PRO	4.0
3	F	300	THR	3.9
3	F	260	ASN	3.9
3	E	233	MET	3.8
3	F	265	GLN	3.8
3	E	97	GLY	3.7
3	E	237	ASN	3.7
3	F	264	CYS	3.6
3	F	2	GLU	3.6
2	B	229	HIS	3.3
3	E	290	ILE	3.3
3	F	272	LEU	3.2
3	F	229	THR	3.1
3	F	254	GLN	3.0
2	B	137	GLN	3.0
3	F	99	PRO	3.0
3	F	303	VAL	3.0
3	F	258	SER	2.9
3	E	293	GLN	2.9
3	F	311	VAL	2.9
3	E	239	VAL	2.8
3	F	227	GLU	2.8
3	E	291	SER	2.8
3	F	307	GLY	2.8
3	E	100	GLU	2.7
3	E	317	LEU	2.7
3	E	238	GLN	2.6
3	F	304	LYS	2.6
3	F	310	ALA	2.5
3	F	98	SER	2.5
3	E	297	VAL	2.5
3	E	316	ALA	2.5
3	F	253	LEU	2.4
1	A	118	PHE	2.4
3	E	236	GLY	2.4
3	F	257	TRP	2.3
1	C	188	ARG	2.3
3	F	261	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
2	B	136	ALA	2.1
3	F	25	CYS	2.1
3	F	301	CYS	2.1
3	E	314	ARG	2.0
3	E	232	PRO	2.0

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

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

## 6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 6.4 Ligands ⓘ

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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. 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	RSR	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
6	NAG	F	401	14/15	0.37	0.20	98,166,213,219	0
6	NAG	E	401	14/15	0.15	-0.46	63,86,128,134	0
4	ZN	B	301	1/1	0.07	-1.22	68,68,68,68	0
5	CL	E	402	1/1	0.06	-1.37	68,68,68,68	0
5	CL	D	301	1/1	0.10	-2.22	67,67,67,67	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.