



# Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 10:10 PM GMT

PDB ID : 3H3Q  
Title : Crystal structure of the CERT START domain in complex with HPA-13  
Authors : Kudo, N.; Wakatsuki, S.; Kato, R.  
Deposited on : 2009-04-17  
Resolution : 2.00 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>

---

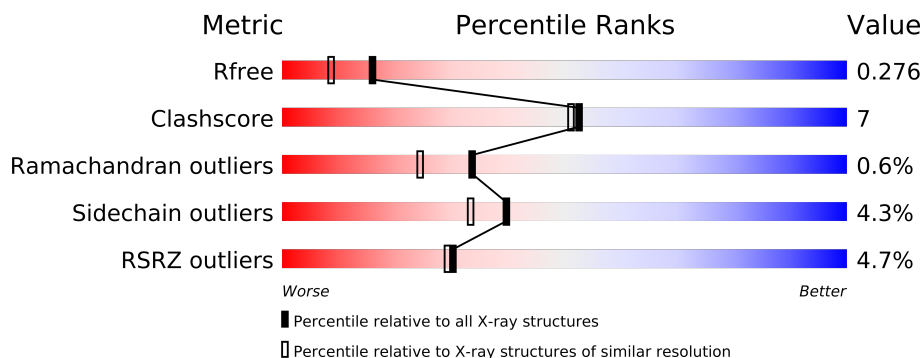
The following versions of software and data (see [references](#)) were used in the production of this report:

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 2.00 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	4888 (2.00-2.00)
Clashscore	79885	6188 (2.00-2.00)
Ramachandran outliers	78287	6102 (2.00-2.00)
Sidechain outliers	78261	6100 (2.00-2.00)
RSRZ outliers	66119	4890 (2.00-2.00)

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	255	
1	B	255	

The following table lists non-polymeric compounds that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Geometry	Electron density
2	H13	B	600	-	X

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 3901 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.

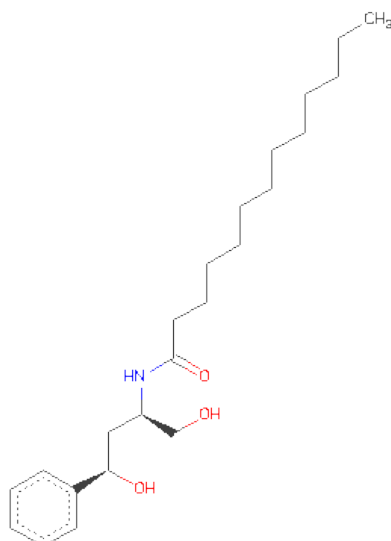
- Molecule 1 is a protein called Goodpasture antigen binding protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	236	Total	C	N	O	S	0	1	0
			1900	1205	334	352	9			
1	B	234	Total	C	N	O	S	0	0	0
			1882	1194	332	347	9			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	344	SER	-	EXPRESSION TAG	UNP A8K7S2
A	345	ASN	-	EXPRESSION TAG	UNP A8K7S2
A	346	SER	-	EXPRESSION TAG	UNP A8K7S2
B	344	SER	-	EXPRESSION TAG	UNP A8K7S2
B	345	ASN	-	EXPRESSION TAG	UNP A8K7S2
B	346	SER	-	EXPRESSION TAG	UNP A8K7S2

- Molecule 2 is N-[(1R,3R)-3-HYDROXY-1-(HYDROXYMETHYL)-3-PHENYLPROPYL]TRIDECANAMIDE (three-letter code: H13) (formula: C<sub>23</sub>H<sub>39</sub>NO<sub>3</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			27	23	1	3		
2	B	1	Total	C	N	O	0	0
			27	23	1	3		

- Molecule 3 is water.

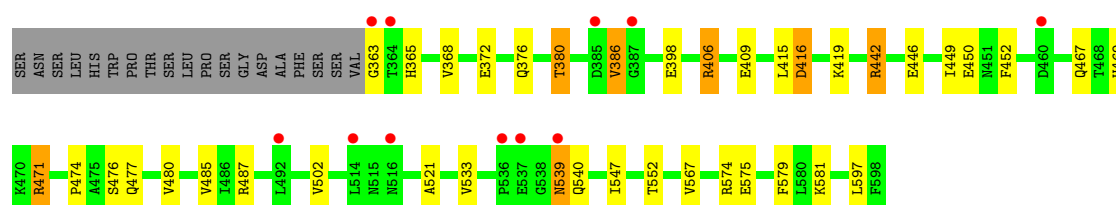
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	28	Total	O	0	0
			28	28		
3	B	37	Total	O	0	0
			37	37		

### 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.

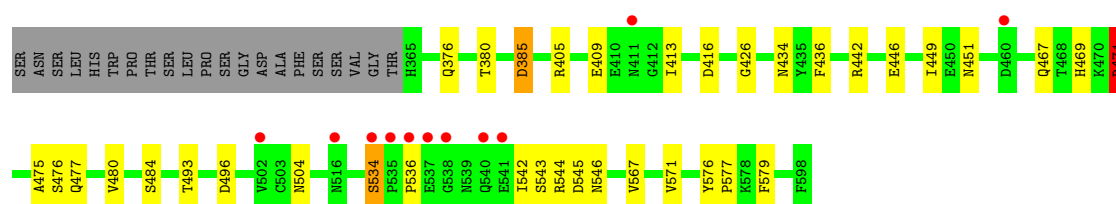
- Molecule 1: Goodpasture antigen binding protein

Chain A: 



- Molecule 1: Goodpasture antigen binding protein

Chain B: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	42.48Å 74.71Å 77.61Å 90.00° 102.64° 90.00°	Depositor
Resolution (Å)	20.00 – 2.00 19.97 – 2.00	Depositor EDS
% Data completeness (in resolution range)	93.9 (20.00-2.00) 93.9 (19.97-2.00)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.12 (at 2.01Å)	Xtriage
Refinement program	REFMAC 5.4.0069	Depositor
R, $R_{free}$	0.216 , 0.282 0.217 , 0.276	Depositor DCC
$R_{free}$ test set	1507 reflections (5.27%)	DCC
Wilson B-factor (Å <sup>2</sup> )	35.9	Xtriage
Anisotropy	0.138	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 41.5	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 30090 reflections	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	3901	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 57.17 % of the origin peak, indicating pseudo translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo translational symmetry is equal to 2.4618e-05. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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

## 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: H13

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	0.67	0/1948	0.74	1/2652 (0.0%)
1	B	0.75	0/1926	0.77	2/2622 (0.1%)
All	All	0.71	0/3874	0.75	3/5274 (0.1%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	471	ARG	NE-CZ-NH1	-6.66	116.97	120.30
1	B	405	ARG	NE-CZ-NH1	-6.01	117.29	120.30
1	A	471	ARG	NE-CZ-NH1	-5.61	117.50	120.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 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 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	1900	0	1875	31	0
1	B	1882	0	1856	22	0
2	A	27	0	38	2	0
2	B	27	0	38	0	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	28	0	0	0	0
3	B	37	0	0	0	0
All	All	3901	0	3807	54	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 7.

All (54) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:406:ARG:HH11	1:A:406:ARG:CG	1.86	0.88
1:A:376:GLN:O	1:A:380:THR:HG23	1.79	0.83
1:B:446:GLU:CG	1:B:449:ILE:HG12	2.16	0.76
1:B:446:GLU:HG2	1:B:449:ILE:HG12	1.71	0.73
1:B:543:SER:H	1:B:546:ASN:HD22	1.35	0.73
1:A:539:ASN:N	1:A:539:ASN:HD22	1.87	0.73
1:A:406:ARG:HH11	1:A:406:ARG:HG3	1.56	0.69
1:B:446:GLU:HG2	1:B:449:ILE:CG1	2.22	0.69
1:B:567:VAL:O	1:B:571:VAL:HG13	1.95	0.67
1:A:406:ARG:HH11	1:A:406:ARG:HG2	1.58	0.65
1:A:446:GLU:HG2	1:A:449:ILE:HD12	1.79	0.64
1:A:372:GLU:OE2	1:A:487:ARG:NH1	2.30	0.63
1:B:543:SER:H	1:B:546:ASN:ND2	1.99	0.60
1:A:452:PHE:HB2	1:A:467:GLN:HB3	1.86	0.57
1:B:471:ARG:NH1	1:B:475:ALA:O	2.39	0.56
1:B:469:HIS:O	1:B:477:GLN:HG3	2.06	0.56
1:A:480[B]:VAL:HG22	1:A:521:ALA:HB3	1.88	0.56
1:B:493:THR:OG1	1:B:496:ASP:OD2	2.22	0.55
1:A:398:GLU:OE2	1:A:581:LYS:NZ	2.21	0.55
1:B:567:VAL:O	1:B:571:VAL:CG1	2.57	0.53
1:A:419:LYS:HE3	1:A:552:THR:HG23	1.91	0.52
1:B:426:GLY:HA2	1:B:544:ARG:O	2.11	0.51
1:A:442:ARG:NH2	2:A:600:H13:H1A	2.26	0.51
1:A:474:PRO:HG3	1:A:567:VAL:HG11	1.93	0.49
1:A:386:VAL:CG1	1:A:386:VAL:O	2.61	0.48
1:A:471:ARG:HH11	1:A:471:ARG:HG3	1.77	0.48
2:A:600:H13:C4	2:A:600:H13:C21	2.92	0.48
1:B:376:GLN:NE2	1:B:380:THR:OG1	2.47	0.48
1:A:365:HIS:O	1:A:368:VAL:HG22	2.13	0.48
1:B:484:SER:OG	1:B:504:ASN:ND2	2.47	0.47
1:A:467:GLN:HE21	1:A:469:HIS:CE1	2.32	0.47
1:A:450:GLU:OE1	1:A:477:GLN:NE2	2.48	0.47
1:B:436:PHE:O	1:B:442:ARG:NH1	2.47	0.46

*Continued on next page...*



Continued from previous page...

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:446:GLU:HG2	1:B:449:ILE:HG13	1.97	0.45
1:A:406:ARG:CG	1:A:406:ARG:NH1	2.57	0.45
1:A:474:PRO:HD3	1:A:567:VAL:HG11	1.99	0.45
1:B:576:TYR:HB2	1:B:577:PRO:HD3	1.98	0.45
1:A:376:GLN:OE1	1:A:380:THR:HG22	2.15	0.45
1:B:409:GLU:HA	1:B:413:ILE:O	2.17	0.45
1:A:539:ASN:N	1:A:539:ASN:ND2	2.59	0.44
1:B:542:ILE:HG23	1:B:546:ASN:HB2	1.98	0.44
1:A:533:VAL:HG12	1:A:547:ILE:HG22	1.98	0.44
1:A:485:VAL:O	1:A:502:VAL:HA	2.17	0.44
1:A:406:ARG:NH1	1:A:406:ARG:HG3	2.29	0.43
1:A:415:LEU:O	1:A:416:ASP:C	2.57	0.43
1:A:574:ARG:HD2	1:A:575:GLU:OE2	2.18	0.42
1:A:406:ARG:HG2	1:A:406:ARG:NH1	2.28	0.42
1:A:450:GLU:CD	1:A:477:GLN:HE22	2.23	0.42
1:A:386:VAL:HG13	1:A:386:VAL:O	2.20	0.42
1:B:467:GLN:HG2	1:B:480:VAL:HG13	2.00	0.42
1:B:385:ASP:C	1:B:385:ASP:OD1	2.58	0.41
1:A:363:GLY:HA3	1:A:368:VAL:HG11	2.03	0.41
1:B:467:GLN:HG2	1:B:480:VAL:CG1	2.50	0.41
1:B:534:SER:O	1:B:546:ASN:HB3	2.20	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	235/255 (92%)	230 (98%)	4 (2%)	1 (0%)	43	36
1	B	232/255 (91%)	229 (99%)	1 (0%)	2 (1%)	25	14
All	All	467/510 (92%)	459 (98%)	5 (1%)	3 (1%)	33	24

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	536	PRO
1	A	416	ASP
1	B	416	ASP

### 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	210/226 (93%)	200 (95%)	10 (5%)	35	28
1	B	207/226 (92%)	199 (96%)	8 (4%)	43	38
All	All	417/452 (92%)	399 (96%)	18 (4%)	40	33

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	380	THR
1	A	386	VAL
1	A	406	ARG
1	A	409	GLU
1	A	442	ARG
1	A	476	SER
1	A	539	ASN
1	A	540	GLN
1	A	579	PHE
1	A	597	LEU
1	B	385	ASP
1	B	434	ASN
1	B	451	ASN
1	B	471	ARG
1	B	476	SER
1	B	534	SER
1	B	545	ASP
1	B	579	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	411	ASN
1	A	434	ASN
1	A	443	ASN
1	A	477	GLN
1	A	495	ASN
1	A	504	ASN
1	A	539	ASN
1	A	556	ASN
1	A	588	GLN
1	B	369	GLN
1	B	376	GLN
1	B	434	ASN
1	B	443	ASN
1	B	504	ASN
1	B	546	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	H13	A	600	-	27,27,27	0.54	0	31,31,31	2.43	7 (22%)
2	H13	B	600	-	27,27,27	0.54	0	31,31,31	2.55	7 (22%)

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	H13	A	600	-	-	0/26/26/26	0/1/1/1
2	H13	B	600	-	1/1/3/4	0/26/26/26	0/1/1/1

There are no bond length outliers.

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	600	H13	C4-C3-C2	-9.15	99.89	114.12
2	A	600	H13	C4-C3-C2	-8.65	100.67	114.12
2	A	600	H13	C3-C4-C5	6.04	122.35	111.16
2	B	600	H13	C3-C4-C5	6.01	122.30	111.16
2	B	600	H13	O4-C4-C5	5.47	123.07	111.24
2	A	600	H13	O4-C4-C5	4.85	121.74	111.24
2	B	600	H13	O1-C1-C2	-3.71	102.02	112.07
2	A	600	H13	C3-C2-C1	-3.04	107.88	111.61
2	B	600	H13	C10-C5-C4	-2.60	115.64	120.75
2	A	600	H13	C10-C5-C4	-2.52	115.80	120.75
2	A	600	H13	O1-C1-C2	-2.49	105.32	112.07
2	B	600	H13	C6-C5-C4	2.47	125.61	120.75
2	B	600	H13	O4-C4-C3	2.28	113.55	108.78
2	A	600	H13	O21-C21-N2	2.07	126.67	123.08

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	B	600	H13	C4

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	236/255 (92%)	0.28	11 (4%) 30 29	23, 36, 53, 62	0
1	B	234/255 (91%)	0.21	11 (4%) 30 29	23, 34, 50, 64	0
All	All	470/510 (92%)	0.25	22 (4%) 30 29	23, 35, 52, 64	0

All (22) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	536	PRO	4.7
1	A	364	THR	3.9
1	A	539	ASN	3.7
1	B	537	GLU	3.7
1	A	516	ASN	3.3
1	A	363	GLY	3.2
1	A	514	LEU	3.2
1	B	411	ASN	3.0
1	A	492	LEU	2.8
1	B	460	ASP	2.6
1	B	502	VAL	2.5
1	A	536	PRO	2.5
1	A	387	GLY	2.4
1	B	535	PRO	2.4
1	A	460	ASP	2.4
1	A	385	ASP	2.3
1	B	541	GLU	2.3
1	B	534	SER	2.2
1	B	538	GLY	2.2
1	B	540	GLN	2.2
1	A	537	GLU	2.1
1	B	516	ASN	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
2	H13	B	600	27/27	0.21	2.17	25,29,45,47	0
2	H13	A	600	27/27	0.20	1.80	24,29,40,42	0

## 6.5 Other polymers ⓘ

There are no such residues in this entry.