



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 13, 2020 – 12:33 am BST

PDB ID : 3UUX  
Title : Crystal structure of yeast Fis1 in complex with Mdv1 fragment containing N-terminal extension and coiled coil domains  
Authors : Zhang, Y.; Chan, N.C.; Gristick, H.; Chan, D.C.  
Deposited on : 2011-11-28  
Resolution : 3.90 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.

---

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

MolProbity : 4.02b-467  
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

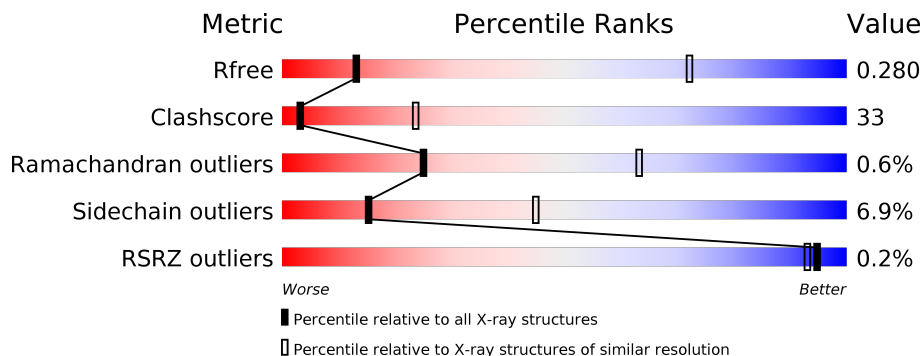
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.90 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	1002 (4.14-3.66)
Clashscore	141614	1004 (4.12-3.68)
Ramachandran outliers	138981	1021 (4.14-3.66)
Sidechain outliers	138945	1014 (4.14-3.66)
RSRZ outliers	127900	1275 (4.20-3.60)

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	129	
1	C	129	
2	B	242	
2	D	242	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4076 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 Mitochondria fission 1 protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	127	1028	654	172	198	4	0	0	0
1	C	125	1004	638	168	194	4	0	0	0

- Molecule 2 is a protein called Mitochondrial division protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	132	1013	641	164	206	2	0	0	0
2	D	135	1031	651	169	209	2	0	0	0

There are 46 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	73	MET	-	EXPRESSION TAG	UNP P47025
B	74	GLY	-	EXPRESSION TAG	UNP P47025
B	75	SER	-	EXPRESSION TAG	UNP P47025
B	76	SER	-	EXPRESSION TAG	UNP P47025
B	77	HIS	-	EXPRESSION TAG	UNP P47025
B	78	HIS	-	EXPRESSION TAG	UNP P47025
B	79	HIS	-	EXPRESSION TAG	UNP P47025
B	80	HIS	-	EXPRESSION TAG	UNP P47025
B	81	HIS	-	EXPRESSION TAG	UNP P47025
B	82	HIS	-	EXPRESSION TAG	UNP P47025
B	83	SER	-	EXPRESSION TAG	UNP P47025
B	84	SER	-	EXPRESSION TAG	UNP P47025
B	85	GLY	-	EXPRESSION TAG	UNP P47025
B	86	LEU	-	EXPRESSION TAG	UNP P47025
B	87	VAL	-	EXPRESSION TAG	UNP P47025
B	88	PRO	-	EXPRESSION TAG	UNP P47025

*Continued on next page...*

*Continued from previous page...*

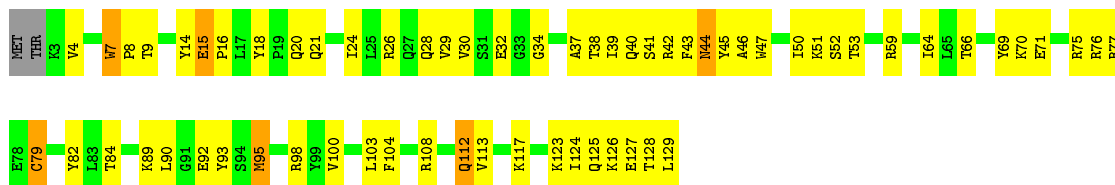
Chain	Residue	Modelled	Actual	Comment	Reference
B	89	ARG	-	EXPRESSION TAG	UNP P47025
B	90	GLY	-	EXPRESSION TAG	UNP P47025
B	91	SER	-	EXPRESSION TAG	UNP P47025
B	92	HIS	-	EXPRESSION TAG	UNP P47025
B	93	MET	-	EXPRESSION TAG	UNP P47025
B	215	ALA	LYS	ENGINEERED MUTATION	UNP P47025
B	216	ALA	LYS	ENGINEERED MUTATION	UNP P47025
D	73	MET	-	EXPRESSION TAG	UNP P47025
D	74	GLY	-	EXPRESSION TAG	UNP P47025
D	75	SER	-	EXPRESSION TAG	UNP P47025
D	76	SER	-	EXPRESSION TAG	UNP P47025
D	77	HIS	-	EXPRESSION TAG	UNP P47025
D	78	HIS	-	EXPRESSION TAG	UNP P47025
D	79	HIS	-	EXPRESSION TAG	UNP P47025
D	80	HIS	-	EXPRESSION TAG	UNP P47025
D	81	HIS	-	EXPRESSION TAG	UNP P47025
D	82	HIS	-	EXPRESSION TAG	UNP P47025
D	83	SER	-	EXPRESSION TAG	UNP P47025
D	84	SER	-	EXPRESSION TAG	UNP P47025
D	85	GLY	-	EXPRESSION TAG	UNP P47025
D	86	LEU	-	EXPRESSION TAG	UNP P47025
D	87	VAL	-	EXPRESSION TAG	UNP P47025
D	88	PRO	-	EXPRESSION TAG	UNP P47025
D	89	ARG	-	EXPRESSION TAG	UNP P47025
D	90	GLY	-	EXPRESSION TAG	UNP P47025
D	91	SER	-	EXPRESSION TAG	UNP P47025
D	92	HIS	-	EXPRESSION TAG	UNP P47025
D	93	MET	-	EXPRESSION TAG	UNP P47025
D	215	ALA	LYS	ENGINEERED MUTATION	UNP P47025
D	216	ALA	LYS	ENGINEERED MUTATION	UNP P47025

### 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.

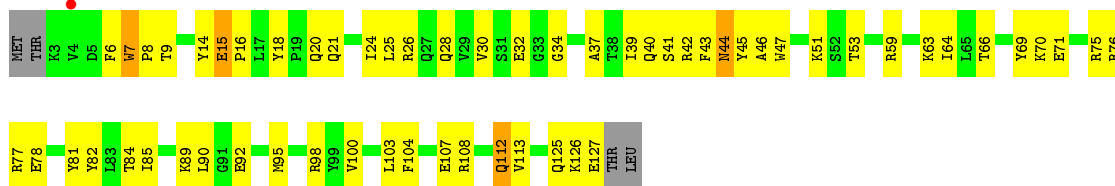
- Molecule 1: Mitochondria fission 1 protein

Chain A: 

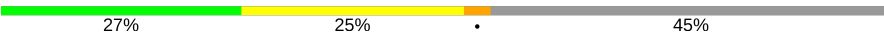


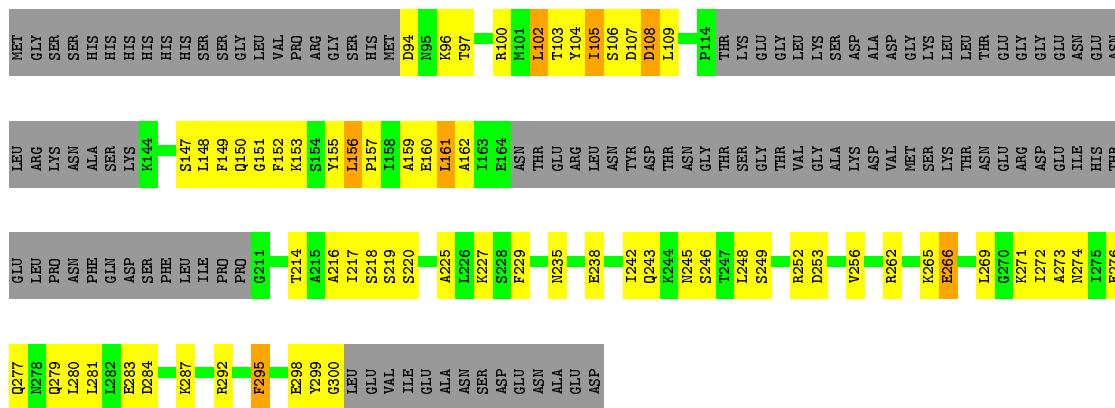
- Molecule 1: Mitochondria fission 1 protein

Chain C: 



- Molecule 2: Mitochondrial division protein 1

Chain B: 



- Molecule 2: Mitochondrial division protein 1

Chain D:



MET	GLY	SER	SER	HIS	HIS	HIS	HIS	HIS	SER	GLY	LEU	VAL	PRO	ARG	GLY	SER	H92	M93	D94	M95	K96	T97	C98	F99	R100	T103	Y104	I105	S106	D107	D108	L109	L110	M111	E112	I113	P114	THR	LYS	GLY	GLY	LEU	LYS	SER	ASP	ALA	ASP	GLY	LYS	LEU	LEU	THR	GLU	GLY	GLU	GLU	GLU
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

ASN	GLU	ASN	LEU	ASN	ARG	LYS	ASN	ALA	SER	LYS	LYS	E145	T146	S147	L148	F149	Q150	K153	S154	Y155	L156	P157	I158	A159	E164	THR	GLU	ARG	LEU	ASN	TYR	ASP	THR	ASN	GLY	THR	SER	GLY	THR	VAL	GLY	ALA	LYS	ASP	VAL	MET	SER	LYS	THR	ASN	GLU	ARG	ASP	GLU	ILE	HIS	THR
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

GLU	LEU	PRO	ASN	PHE	GLN	ASP	SER	PHE	LEU	ILE	PRO	P210	S218	S219	S220	Y221	S222	F223	S224	A225	L226	K227	Q231	V234	N235	F238	F239	L240	Q243	K244	N245	L248	S249	R252	D253	V256	E257	L261	R262	K265	E266	L269	G270	K271	I272	A273	N274	I275
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

E276	Q277	I278	Q279	L280	E283	D284	K287	Q288	I289	R292	L293	L296	E297	E298	Y299	G300	L301	GLU	VAL	ILE	GLU	ALA	ASN	SER	ASP	GLU	ASN	ALA	GLU	ASP
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

## 4 Data and refinement statistics

Property	Value	Source
Space group	I 4 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	174.68Å 174.68Å 167.30Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	123.51 – 3.90 19.81 – 3.90	Depositor EDS
% Data completeness (in resolution range)	98.6 (123.51-3.90) 99.6 (19.81-3.90)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.87 (at 3.94Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.270 , 0.284 0.266 , 0.280	Depositor DCC
$R_{free}$ test set	1178 reflections (9.82%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	122.5	Xtriage
Anisotropy	0.559	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 107.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.000 for l,-k,h 0.028 for -h,-l,-k	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	4076	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	126.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.56% 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](#)

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	0.87	3/1048 (0.3%)	0.87	1/1417 (0.1%)
1	C	0.86	2/1024 (0.2%)	0.85	1/1388 (0.1%)
2	B	0.96	2/1023 (0.2%)	1.00	4/1382 (0.3%)
2	D	1.33	5/1042 (0.5%)	1.06	4/1407 (0.3%)
All	All	1.02	12/4137 (0.3%)	0.95	10/5594 (0.2%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	B	0	1
2	D	0	1
All	All	0	2

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	218	SER	CB-OG	18.31	1.66	1.42
2	D	225	ALA	C-O	13.78	1.49	1.23
1	C	127	GLU	C-O	9.32	1.41	1.23
2	B	225	ALA	C-O	-9.14	1.05	1.23
1	C	44	ASN	CB-CG	-7.00	1.34	1.51

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	44	ASN	CB-CA-C	-7.88	94.63	110.40
2	B	161	LEU	CA-CB-CG	6.80	130.95	115.30
2	D	98	CYS	CA-CB-SG	-6.67	101.99	114.00
2	D	292	ARG	NE-CZ-NH2	-6.50	117.05	120.30
2	D	107	ASP	N-CA-C	-6.41	93.71	111.00



There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	220	SER	Peptide
2	D	225	ALA	Mainchain

## 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	1028	0	1001	70	0
1	C	1004	0	961	72	0
2	B	1013	0	975	70	0
2	D	1031	0	986	105	2
All	All	4076	0	3923	266	2

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 266 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)
2:D:113:ILE:CG1	2:D:113:ILE:CD1	1.82	1.54
2:D:218:SER:OG	2:D:218:SER:CB	1.66	1.39
1:C:77:ARG:NH2	2:D:114:PRO:HD3	1.46	1.26
1:C:59:ARG:HD2	2:D:99:PHE:HD1	1.02	1.15
1:A:126:LYS:HB3	2:D:104:TYR:CE2	1.86	1.10

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:98:CYS:SG	2:D:98:CYS:SG[5_555]	1.04	1.16
2:D:218:SER:OG	2:D:292:ARG:NH2[5_555]	1.82	0.38

## 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	125/129 (97%)	118 (94%)	6 (5%)	1 (1%)	19	57
1	C	123/129 (95%)	115 (94%)	7 (6%)	1 (1%)	19	57
2	B	126/242 (52%)	118 (94%)	7 (6%)	1 (1%)	19	57
2	D	129/242 (53%)	119 (92%)	10 (8%)	0	100	100
All	All	503/742 (68%)	470 (93%)	30 (6%)	3 (1%)	25	63

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	34	GLY
1	C	34	GLY
2	B	217	ILE

### 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	109/116 (94%)	104 (95%)	5 (5%)	27	55
1	C	105/116 (90%)	100 (95%)	5 (5%)	25	54
2	B	110/217 (51%)	103 (94%)	7 (6%)	17	47
2	D	111/217 (51%)	98 (88%)	13 (12%)	5	26
All	All	435/666 (65%)	405 (93%)	30 (7%)	15	45

5 of 30 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	9	THR
1	C	112	GLN
2	D	266	GLU
1	C	95	MET
2	D	95	ASN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
2	B	285	ASN
1	C	28	GLN
2	D	231	GLN
2	B	243	GLN
1	C	112	GLN

### 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](#)

There are no ligands in this entry.

### 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	127/129 (98%)	-0.42	0 <b>100</b>   <b>100</b>	101, 123, 134, 138	0
1	C	125/129 (96%)	-0.28	1 (0%) <b>86</b>   <b>79</b>	108, 124, 135, 145	0
2	B	132/242 (54%)	-0.56	0 <b>100</b>   <b>100</b>	104, 128, 138, 145	0
2	D	135/242 (55%)	-0.39	0 <b>100</b>   <b>100</b>	108, 133, 146, 152	0
All	All	519/742 (69%)	-0.42	1 (0%) <b>95</b>   <b>93</b>	101, 127, 142, 152	0

All (1) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	4	VAL	2.0

### 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](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.