



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 02:46 PM UTC

PDB ID : 3PSF / pdb\_00003psf  
Title : Crystal Structure of the Spt6 core domain from *Saccharomyces cerevisiae*,  
Form Spt6(236-1259)  
Authors : Close, D.; Hill, C.P.  
Deposited on : 2010-12-01  
Resolution : 2.59 Å(reported)

This is a Full wwPDB X-ray Structure 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

<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>.

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

MolProbity : 4-5-2 with Phenix2.0  
Xtrriage (Phenix) : 2.0  
EDS : 3.0  
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)  
CCP4 : 9.0.010 (Gargrove)  
Density-Fitness : 1.0.12  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.49

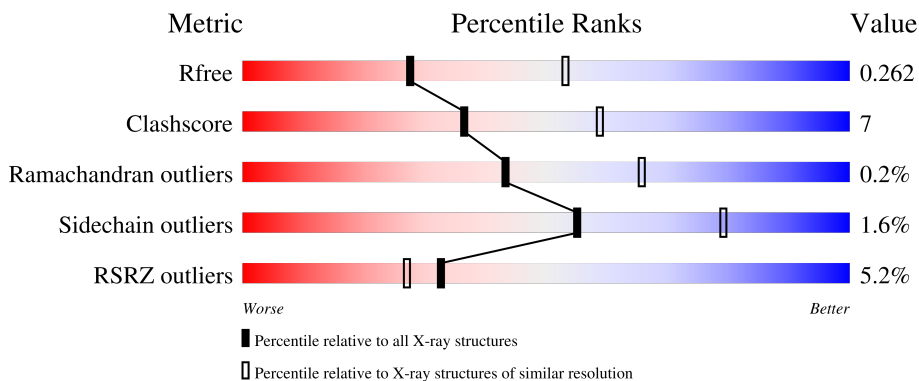
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.59 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))
$R_{free}$	180053	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (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 of 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	1030	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 13444 atoms, of which 6655 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 Transcription elongation factor SPT6.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	C	H	N	O	S			
1	A	826	13396	4272	6655	1134	1317	18	0	0	0

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	230	GLY	-	expression tag	UNP P23615
A	231	ILE	-	expression tag	UNP P23615
A	232	ASP	-	expression tag	UNP P23615
A	233	PRO	-	expression tag	UNP P23615
A	234	PHE	-	expression tag	UNP P23615

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	48	Total	O	0	0
			48	48		



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	115.05Å 116.18Å 117.35Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	32.32 – 2.59 32.32 – 2.59	Depositor EDS
% Data completeness (in resolution range)	96.5 (32.32-2.59) 96.2 (32.32-2.59)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.21 (at 2.57Å)	Xtriage
Refinement program	PHENIX 1.6.4_486	Depositor
R, $R_{free}$	0.224 , 0.265 0.217 , 0.262	Depositor DCC
$R_{free}$ test set	1978 reflections (3.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	65.1	Xtriage
Anisotropy	0.581	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 56.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.020 for -h,l,k 0.017 for -l,-k,-h 0.016 for k,h,-l 0.007 for k,l,h 0.007 for l,h,k	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	13444	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	103.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.28% 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	0.44	0/6869	0.75	2/9278 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	637	ASP	CA-C-N	5.01	124.62	119.56
1	A	637	ASP	C-N-CA	5.01	124.62	119.56

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	6741	6655	6635	96	0
2	A	48	0	0	2	0
All	All	6789	6655	6635	96	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 7.

All (96) 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:626:ALA:HB1	1:A:629:ARG:HE	1.60	0.65
1:A:532:HIS:NE2	1:A:534:ILE:HG22	2.15	0.61
1:A:357:VAL:HG12	1:A:358:ASP:N	2.16	0.60
1:A:412:ASP:OD1	1:A:726:ARG:NH1	2.35	0.59
1:A:817:ASN:HB2	1:A:818:PRO:CD	2.33	0.58
1:A:615:GLN:O	1:A:616:LYS:HB2	2.04	0.58
1:A:1009:GLU:N	1:A:1012:GLU:HG2	2.19	0.58
1:A:629:ARG:NH1	1:A:1224:ILE:HB	2.18	0.57
1:A:615:GLN:O	1:A:616:LYS:CB	2.51	0.57
1:A:347:GLU:HB2	1:A:424:PHE:CE2	2.39	0.57
1:A:1046:GLU:O	1:A:1050:GLN:HG2	2.05	0.57
1:A:347:GLU:HG3	1:A:424:PHE:CG	2.41	0.56
1:A:817:ASN:HB2	1:A:818:PRO:HD2	1.88	0.56
1:A:650:LEU:HB3	1:A:652:LEU:HD13	1.90	0.54
1:A:604:VAL:HG13	1:A:653:LEU:HD22	1.90	0.53
1:A:803:ILE:HG21	1:A:836:ILE:HG21	1.91	0.53
1:A:530:SER:O	1:A:531:GLN:HB2	2.09	0.53
1:A:638:PRO:HB3	1:A:720:LEU:HD12	1.90	0.52
1:A:800:ASP:O	1:A:804:GLN:HG2	2.10	0.52
1:A:534:ILE:HG13	1:A:535:HIS:CD2	2.45	0.51
1:A:610:GLY:O	1:A:614:ILE:HG12	2.10	0.51
1:A:735:GLN:HB3	1:A:887:PRO:HG2	1.91	0.51
1:A:347:GLU:HG3	1:A:424:PHE:CD2	2.46	0.51
1:A:655:VAL:HG13	1:A:655:VAL:O	2.10	0.51
1:A:1019:THR:HB	1:A:1100:GLU:HB3	1.91	0.50
1:A:864:ALA:O	1:A:868:PRO:HA	2.12	0.50
1:A:604:VAL:CG1	1:A:653:LEU:HD22	2.42	0.49
1:A:441:LEU:HD21	1:A:481:ILE:HG22	1.94	0.49
1:A:612:LYS:O	1:A:615:GLN:HG2	2.12	0.49
1:A:642:LEU:HB2	1:A:910:LEU:HD13	1.95	0.49
1:A:511:TYR:CD2	1:A:511:TYR:O	2.66	0.49
1:A:1118:ASP:N	1:A:1118:ASP:OD1	2.45	0.49
1:A:392:TYR:CE2	1:A:396:ARG:NH2	2.82	0.48
1:A:1090:LYS:O	1:A:1094:LEU:HG	2.14	0.48
1:A:969:LEU:O	1:A:971:GLU:HG2	2.13	0.47
1:A:545:PRO:O	1:A:549:ILE:HG12	2.14	0.47
1:A:646:GLU:O	1:A:650:LEU:HG	2.15	0.47
1:A:650:LEU:CB	1:A:652:LEU:HD13	2.44	0.47
1:A:653:LEU:C	1:A:653:LEU:HD12	2.40	0.47
1:A:390:PHE:CD2	1:A:390:PHE:C	2.92	0.47
1:A:1117:GLY:HA2	1:A:1120:ILE:HD12	1.98	0.46
1:A:843:THR:HG22	2:A:29:HOH:O	2.14	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:642:LEU:CB	1:A:910:LEU:HD13	2.46	0.46
1:A:572:ASP:O	1:A:576:LYS:HG3	2.16	0.46
1:A:583:SER:O	1:A:589:ARG:HD2	2.15	0.46
1:A:600:TYR:CE1	1:A:631:PRO:HG3	2.51	0.46
1:A:1096:THR:O	1:A:1100:GLU:HG2	2.16	0.46
1:A:1125:THR:HG22	1:A:1127:GLU:H	1.81	0.45
1:A:639:ASP:HB2	1:A:907:HIS:NE2	2.32	0.45
1:A:441:LEU:O	1:A:442:HIS:HB3	2.16	0.45
1:A:318:ARG:HD3	1:A:961:ASP:HB2	1.98	0.45
1:A:1221:ASP:OD1	1:A:1222:PRO:HD2	2.16	0.45
1:A:436:ARG:O	1:A:440:GLU:HB2	2.16	0.45
1:A:445:ASP:HB2	1:A:477:TYR:OH	2.17	0.45
1:A:1037:LEU:HD21	1:A:1060:LEU:HD12	1.98	0.45
1:A:1226:ASP:CG	1:A:1229:GLN:HB2	2.42	0.45
1:A:799:LEU:HD23	1:A:830:VAL:HG11	1.99	0.44
1:A:702:PHE:O	1:A:706:SER:HB2	2.18	0.44
1:A:601:LEU:HB3	1:A:628:ASN:HA	1.97	0.44
1:A:353:GLU:O	1:A:356:SER:HB3	2.17	0.44
1:A:540:HIS:HD2	1:A:543:SER:H	1.66	0.44
1:A:650:LEU:O	1:A:652:LEU:HD12	2.18	0.44
1:A:1020:ARG:NH2	1:A:1108:LEU:HG	2.32	0.44
1:A:433:TYR:CD2	1:A:433:TYR:C	2.96	0.44
1:A:308:ASN:O	1:A:309:LEU:HB2	2.18	0.43
1:A:772:ARG:CZ	1:A:772:ARG:HB2	2.49	0.43
1:A:386:LEU:HD13	1:A:390:PHE:CE2	2.54	0.43
1:A:930:LEU:O	1:A:1020:ARG:NH1	2.52	0.43
1:A:799:LEU:HD23	1:A:830:VAL:CG1	2.49	0.42
1:A:1125:THR:CG2	1:A:1127:GLU:HG3	2.50	0.42
1:A:505:PHE:O	1:A:508:SER:HB3	2.18	0.42
1:A:528:ILE:HG13	1:A:673:ALA:HB2	2.01	0.42
1:A:540:HIS:HA	1:A:541:PRO:HD3	1.91	0.42
1:A:836:ILE:HG22	1:A:844:ILE:HD12	2.00	0.42
1:A:1060:LEU:HD21	1:A:1070:LEU:HD11	2.02	0.42
1:A:1238:ARG:NH1	1:A:1242:MET:SD	2.92	0.42
1:A:639:ASP:HB2	1:A:907:HIS:CD2	2.54	0.42
1:A:321:ASP:OD1	1:A:989:ILE:HG12	2.19	0.42
1:A:1220:LYS:HA	1:A:1225:TRP:CG	2.54	0.42
1:A:315:MET:O	1:A:319:LYS:HG2	2.20	0.42
1:A:619:LEU:C	1:A:620:TYR:CD1	2.98	0.41
1:A:387:GLU:HB3	1:A:389:PRO:HD2	2.01	0.41
1:A:862:ARG:NH2	2:A:47:HOH:O	2.53	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:502:TYR:CD2	1:A:502:TYR:C	2.98	0.41
1:A:621:GLU:O	1:A:621:GLU:HG2	2.20	0.41
1:A:640:VAL:HG12	1:A:644:MET:HE3	2.02	0.41
1:A:600:TYR:CD2	1:A:600:TYR:C	2.99	0.41
1:A:1037:LEU:O	1:A:1038:GLU:HB2	2.19	0.41
1:A:672:ILE:O	1:A:672:ILE:CG2	2.67	0.41
1:A:309:LEU:HB3	1:A:957:ARG:HG2	2.03	0.41
1:A:469:ILE:HD13	1:A:586:THR:HG21	2.03	0.41
1:A:606:LEU:HD23	1:A:653:LEU:HB3	2.03	0.41
1:A:921:GLU:O	1:A:925:VAL:HG23	2.21	0.40
1:A:505:PHE:CD1	1:A:505:PHE:C	2.99	0.40
1:A:840:ARG:HG3	1:A:840:ARG:O	2.21	0.40
1:A:466:LEU:HD12	1:A:466:LEU:HA	1.96	0.40

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	814/1030 (79%)	772 (95%)	40 (5%)	2 (0%)	43 66

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	616	LYS
1	A	357	VAL

#### 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	748/929 (80%)	736 (98%)	12 (2%)	55 79

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	309	LEU
1	A	623	ILE
1	A	672	ILE
1	A	757	GLN
1	A	813	ILE
1	A	980	ILE
1	A	1000	SER
1	A	1013	HIS
1	A	1095	ASN
1	A	1096	THR
1	A	1097	ILE
1	A	1118	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	425	HIS
1	A	535	HIS
1	A	540	HIS
1	A	662	GLN
1	A	687	ASN
1	A	696	GLN
1	A	885	HIS
1	A	1093	ASN
1	A	1229	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 oligosaccharides 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

### 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	826/1030 (80%)	0.45	43 (5%) <span style="border: 1px solid red; padding: 2px;">33</span> <span style="border: 1px solid red; padding: 2px;">27</span>	62, 97, 162, 215	0

All (43) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	567	THR	6.2
1	A	455	GLN	4.6
1	A	1219	SER	4.4
1	A	652	LEU	3.9
1	A	619	LEU	3.7
1	A	1124	LEU	3.7
1	A	442	HIS	3.6
1	A	1248	LYS	3.6
1	A	1002	ASN	3.4
1	A	298	ASP	3.3
1	A	620	TYR	3.2
1	A	301	ASP	3.1
1	A	641	PHE	2.9
1	A	651	ASN	2.9
1	A	616	LYS	2.8
1	A	509	PRO	2.6
1	A	310	MET	2.6
1	A	302	LEU	2.6
1	A	1128	SER	2.6
1	A	436	ARG	2.5
1	A	974	LEU	2.5
1	A	501	SER	2.5
1	A	646	GLU	2.5
1	A	1011	LEU	2.5
1	A	299	ILE	2.4
1	A	364	ASN	2.4
1	A	300	TYR	2.3

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Mol	Chain	Res	Type	RSRZ
1	A	910	LEU	2.3
1	A	615	GLN	2.2
1	A	642	LEU	2.2
1	A	464	ASN	2.2
1	A	481	ILE	2.2
1	A	660	SER	2.1
1	A	839	SER	2.1
1	A	303	GLU	2.1
1	A	831	LEU	2.1
1	A	838	ASP	2.1
1	A	645	VAL	2.0
1	A	1126	GLY	2.0
1	A	622	ASP	2.0
1	A	427	LEU	2.0
1	A	439	ALA	2.0
1	A	608	ALA	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 oligosaccharides 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.