



# wwPDB X-ray Structure Validation Summary Report

Aug 8, 2023 – 10:54 AM EDT

PDB ID : 1P9X  
Title : THE CRYSTAL STRUCTURE OF THE 50S LARGE RIBOSOMAL SUB-UNIT FROM DEINOCOCCUS RADIODURANS COMPLEXED WITH TELITHROMYCIN KETOLIDE ANTIBIOTIC  
Authors : Berisio, R.; Harms, J.; Schluenzen, F.; Zarivach, R.; Hansen, H.A.; Fucini, P.; Yonath, A.  
Deposited on : 2003-05-13  
Resolution : 3.40 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 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 : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtrriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.35

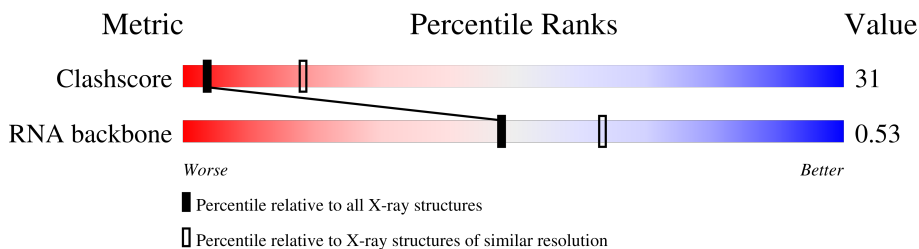
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.40 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))
Clashscore	141614	1055 (3.48-3.32)
RNA backbone	3102	1006 (3.84-2.96)

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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	0	2880	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	TEL	0	2881	X	-	-	-

## 2 Entry composition [i](#)

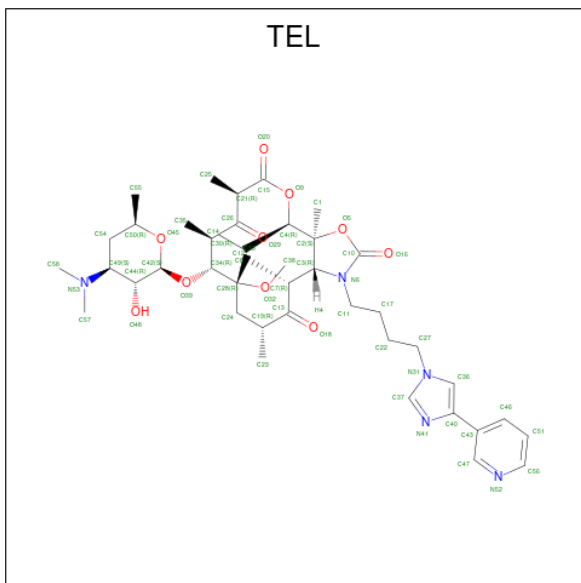
There are 2 unique types of molecules in this entry. The entry contains 58817 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 RNA chain called 23S RIBOSOMAL RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	P			
1	0	2738	58759	26211	10836	18975	2737	0	0	0

- Molecule 2 is TELITHROMYCIN (three-letter code: TEL) (formula: C<sub>43</sub>H<sub>65</sub>N<sub>5</sub>O<sub>10</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	0	1	58	43	5	10	0	0

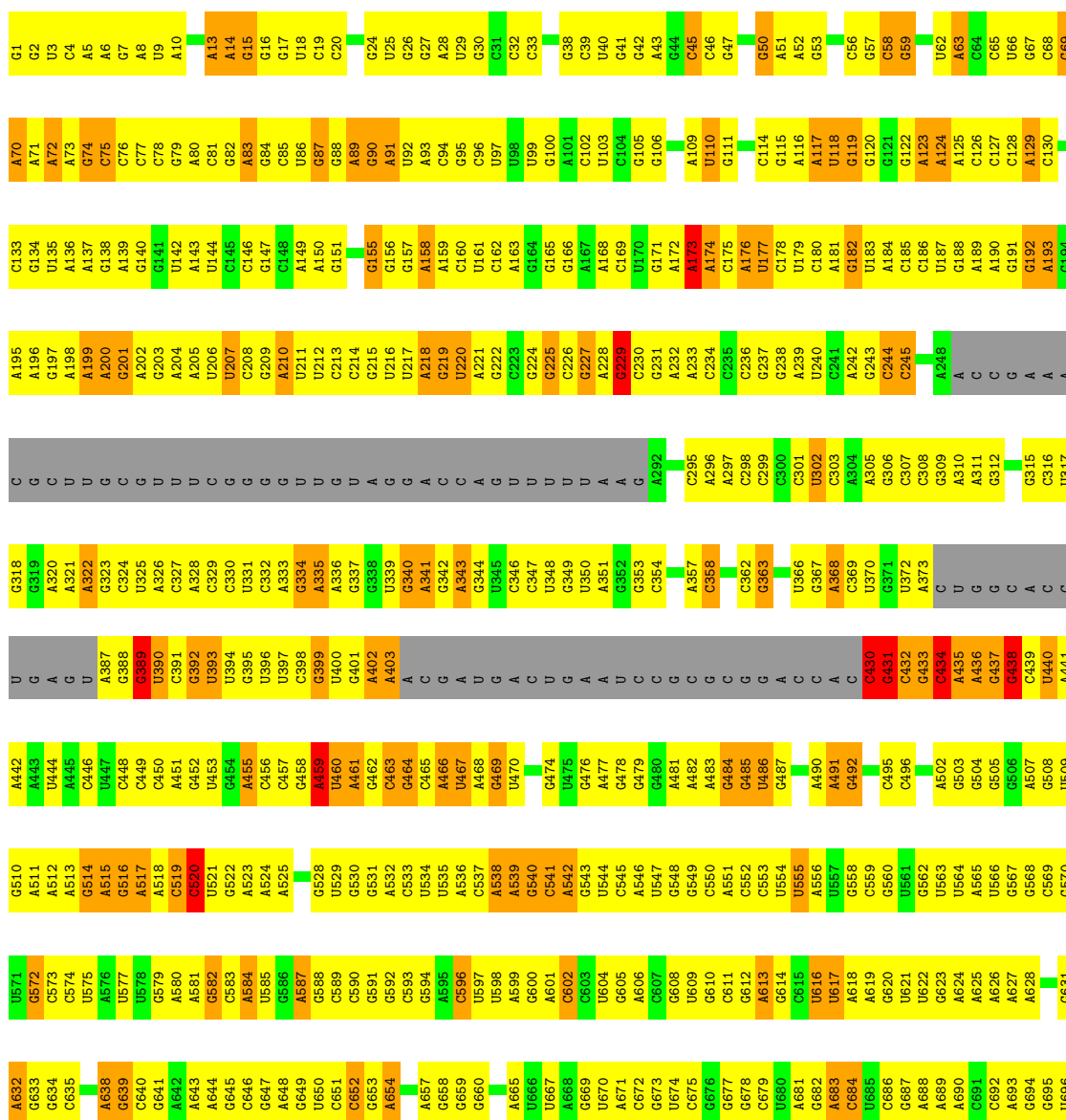
### 3 Residue-property plots

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. 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. 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.

Note EDS was not executed.

- Molecule 1: 23S RIBOSOMAL RNA

Chain 0: 



C1616	C1617	A1619	C1620	C1621	C1622	C1623	A1624	C1625	A1626	C1627	C1628	A1629	A1630	A1631	A1632	C1633	A1634	C1635	C1641	C1642	A1643	C1644	C1645	C1646	C1647	C1648	A1651	C1652	C1653	A1654	C1655	A1656	A1657	C1661	C1662	C1663	C1664	C1665	A1669	C1670	A1671	C1672	C1673	C1674	C1675	A1676	C1677	C1678	A1679	C1680	A1681	C1682	C1683	C1684						
C1549	C1550	U1551	C1552	C1553	G1554	A1555	U1556	G1557	C1558	G1559	A1560	C1561	C1562	G1566	C1567	A1568	C1569	C1570	C1571	C1572	C1573	A1574	C1575	C1576	C1577	C1578	C1579	A1582	A1583	C1584	A1585	C1586	A1587	A1588	G1589	U1592	C1593	U1594	A1595	A1596	A1597	C1598	A1603	A1604	A1605	C1606	A1607	A1608	C1609	A1610	A1611	U1612	C1613	C1614	C1615					
A1474	U1475	C1476	C1477	U1478	C1479	C1480	U1481	U1482	C1483	G1484	U1485	C1486	C1487	G1488	C1489	U1490	G1494	G1495	C1496	C1497	C1498	A1499	U1500	C1501	U1502	U1505	G1508	U1513	C1514	U1515	C1516	C1517	C1522	A1523	C1524	G1527	C1528	C1529	U1530	C1531	A1532	C1533	U1537	A1538	A1539	C1540	C1541	C1542	C1543	A1544	C1545	C1546	C1547	C1548	C1549					
C1411	C1412	U1413	C1414	C1415	C1416	C1417	C1418	C1419	A1420	U1424	G1425	G1428	C1429	C1430	U1431	G1432	A1433	U1434	G1435	C1436	C1437	A1438	C1439	C1440	A1441	C1442	C1443	C1444	U1445	C1446	U1447	C1448	C1449	C1450	C1451	C1452	A1453	C1454	U1455	C1456	A1457	A1458	U1459	C1460	C1461	C1462	A1463	A1464	C1465	C1466	U1467	C1468	C1469	A1470	C1471	C1472	U1473			
A1349	C1350	G1351	C1352	A1353	A1354	C1355	U1356	U1357	C1358	C1359	C1363	C1364	U1365	A1366	C1367	C1368	U1369	U1370	C1371	A1372	C1373	C1374	C1375	C1376	C1377	A1378	C1379	C1380	C1381	C1382	C1383	C1384	C1385	A1386	C1387	C1388	C1389	C1390	A1391	U1392	G1393	C1394	C1396	C1397	C1398	C1399	A1400	C1401	C1402	C1403	C1404	C1405	C1406	U1407	A1408	C1409	U1410			
C1284	A1285	U1286	C1287	A1288	A1289	A1293	C1294	U1295	C1296	C1297	A1298	C1299	A1300	U1301	C1302	U1303	U1304	C1305	C1308	C1309	C1310	C1311	C1312	U1313	A1314	C1315	C1316	C1317	A1318	C1319	A1320	C1321	C1322	C1323	C1324	U1325	C1326	C1327	C1328	U1329	C1332	C1333	A1334	C1335	C1336	C1337	C1338	U1339	C1340	C1341	C1342	C1343	C1344	C1345	C1346					
C1221	G1222	C1223	A1224	G1225	A1226	A1227	C1228	C1229	C1230	A1231	U1232	C1233	C1234	C1235	A1238	A1242	U1243	U1244	G1245	C1246	U1247	G1248	G1249	A1250	C1251	C1252	C1253	G1254	A1255	C1256	C1257	U1258	A1259	A1260	G1261	U1262	C1263	C1264	G1265	G1266	A1267	U1268	C1269	C1270	C1271	G1272	G1273	C1274	A	U1276	C1277	C1214	A1278	C1279	U1280	A1281	C1282	C1283		
A1153	A1154	G1155	U1159	U1160	U1161	A1162	C1163	A1164	C1165	A1166	A1167	G1168	U1172	C1173	G1174	A1175	U1176	U1177	U1178	A1179	A1180	C1181	U1182	C1183	C1184	C1185	G1191	A1192	C1193	U1194	U1195	C1196	U1197	C1198	U1199	C1200	C1201	U1202	A1203	G1204	C1205	A1137	C1206	C1207	A1139	C1209	C1210	U1211	U1212	C1213	C1214	A1215	C1216	U1217	C1218	C1219	G1220			
A1088	C1089	C1090	C1091	U1092	C1093	A1094	A1095	A1096	A1099	G1102	C1103	G1104	C1105	U1106	A1107	C1108	A1109	G1110	C1111	U1112	C1113	C1114	C1115	G1118	U1119	C1120	G1121	A1122	C1123	U1124	G1125	A1126	C1127	G1128	A1129	U1130	G1133	U1202	A1203	G1204	C1205	A1137	A1138	A1139	C1140	U1141	G1142	A1143	C1144	U1145	A1080	A1011	U1012	G1013	C1083	C1086	C1087			
C1018	U1019	A1020	A1021	A1022	U1023	G1024	A1025	U1026	C1027	G1028	C1029	U1030	C1031	A1032	G1033	U1034	G1035	C1036	U1037	U1038	A1039	A1040	G1041	U1043	U1044	G1045	U1046	C1052	C1053	C1054	A1055	C1056	G1057	C1058	A1059	G1066	C1067	A1068	C1069	G1070	U1071	U1072	C1073	G1074	C1001	C1002	A1007	G1008	G1009	A1010	U1011	G1012	G1013	C1083	C1086	C1087				
G953	U954	G955	A956	C957	G958	C959	U960	G961	C962	G963	A964	G965	A966	C968	U969	A970	A971	C972	U973	U974	C975	U978	A979	G980	C981	G982	G983	A984	G985	C986	G987	C988	G989	A990	A991	A992	C993	A994	C995	A996	C997	G998	G999	C999	G1000	G1001	C1002	A1007	G1008	G1009	A1011	U1012	G1013	C1083	C1086	C1087				
C828	C829	C830	C831	A832	C833	A834	U837	A838	U839	C840	A841	A842	G843	C844	U845	C846	C847	C851	U852	C853	C854	G855	A856	U857	G858	U859	C860	C861	C862	C863	C864	C865	C866	U867	C868	C869	C870	C808	C809	C810	C811	C812	A813	A814	A815	U816	A817	C818	C819	U820	A821	G822	U823	U824	C825	U826	A827	A828		
C765	A766	G767	U768	C769	G772	A774	U775	C776	A777	U778	A779	U780	G781	U782	C783	A784	C787	A787	G788	G789	C790	A791	U792	G793	A794	U795	A796	C797	A797	G798	C799	U800	A801	A802	C803	C804	G805	A806	A807	C808	C809	U810	C811	C812	A813	A814	A815	U816	A817	C818	C819	U820	A821	G822	U823	U824	C825	U826	A827	A828
A691	C914	C915	U916	U917	A918	U919	G920	A921	U922	U923	A924	C925	C926	C927	C928	A929	A930	G931	G932	G933	G934	C935	A936	C937	C938	A999	G1000	A1001	C1002	A1007	G1008	G1009	A1011	U1012	G1013	C1083	C1086	C1087																						



G2678	G2741	G2804	U2872
G2679	G2742	G2805	C2875
U2680	G2743	G2806	C2876
A2681	A2744	U2807	A2877
A2684	A2745	U2808	C
A2685	G2746	A2809	U
C2686	C2747	A2810	C
G2687	A2748	G2811	
G2688	A2749	A2812	
C2689	C2753	G2813	
A2690	C2754	G2814	
C2691	A2755	C2815	
A2692	A2756	C2816	
U2693	G2757	A2817	
G2694	A2758	G2821	
C2695	U2759	U2822	
A2696	G2760	G2823	
G2697	A2761	C2824	
G2698	G2762	A2825	
G2699	U2763	C2826	
A2700	U2764	G2827	
A2701	C2765	C2828	
G2702	U2766	A2829	
C2703	C2767	U2830	
U2704	C2768	A2831	
A2705	C2769	A2835	
U2706	A2770	U2836	
G2707	C2771	G2837	
U2708	U2772	U2841	
C2709	G2773	C2842	
C2710	U2774	A2843	
G2711	U	G2844	
G2712	A	C2845	
A2713	U2778	G2846	
A2714	C2779	G2847	
C2715	U2780	A2848	
G2716	G2781	C2849	
G2717	G2782	U2850	
G2718	U2783	G2851	
U2719	A2784	G2852	
A2720	U2785	U2853	
A2721	G2786	G2854	
C2722	A2787	C2855	
C2723	C2788	U2856	
G2724	U2789	C2857	
C2725	C2790	A2858	
U2726	C2791	G2862	
G2727	G2792	U2863	
A2728	A2793	C2864	
U2729	G2794	G2865	
A2730	A2795	G2866	
A2731	U2796	A2866	
G2732	A2797	G2867	
A2733	U2798	G2868	
U2734	A2799	U2869	
C2735	C2800	C2870	
U2736	A2801	U2871	

## 4 Data and refinement statistics

Xtrriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	170.00Å 414.50Å 693.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	15.00 – 3.40	Depositor
% Data completeness (in resolution range)	(Not available) (15.00-3.40)	Depositor
$R_{merge}$	0.18	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	CNS	Depositor
R, $R_{free}$	0.273 , 0.340	Depositor
Estimated twinning fraction	No twinning to report.	Xtrriage
Total number of atoms	58817	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	58.0	wwPDB-VP



## 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: TEL

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	0	0.77	20/65792 (0.0%)	0.71	28/102613 (0.0%)

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
1	0	0	28

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	0	762	A	O3'-P	-8.05	1.51	1.61
1	0	1410	U	N1-C2	6.70	1.44	1.38
1	0	2493	U	N1-C2	-6.33	1.32	1.38
1	0	1276	U	N1-C2	6.27	1.44	1.38
1	0	2555	G	C5-C6	-6.20	1.36	1.42

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	0	1182	U	O4'-C1'-N1	13.88	119.30	108.20
1	0	2044	G	P-O3'-C3'	11.50	133.50	119.70
1	0	765	C	N1-C1'-C2'	11.09	128.42	114.00
1	0	2001	G	N9-C1'-C2'	-9.80	101.22	112.00
1	0	2041	A	OP1-P-OP2	-6.87	109.30	119.60

There are no chirality outliers.

5 of 28 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	0	229	G	Sidechain
1	0	389	G	Sidechain
1	0	431	G	Sidechain
1	0	438	G	Sidechain
1	0	459	A	Sidechain

## 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	0	58759	0	29615	2745	0
2	0	58	0	65	11	0
All	All	58817	0	29680	2746	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 31.

The worst 5 of 2746 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)
1:0:940:G:H3'	1:0:941:U:H5''	1.24	1.18
1:0:752:G:H5'	1:0:1775:A:H61	1.07	1.13
1:0:1572:C:H2'	1:0:1573:G:H5''	1.21	1.10
1:0:2451:G:H1'	1:0:2457:A:H61	1.16	1.09
1:0:387:A:H5'	1:0:436:A:H62	1.07	1.08

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

There are no protein molecules in this entry.

### 5.3.2 Protein sidechains [i](#)

There are no protein molecules in this entry.

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	0	2727/2880 (94%)	580 (21%)	62 (2%)

5 of 580 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	0	13	A
1	0	14	A
1	0	15	G
1	0	45	C
1	0	50	G

5 of 62 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	0	1299	A
1	0	2404	A
1	0	1626	A
1	0	2377	U
1	0	2758	A

## 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

1 ligand is 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	TEL	0	2881	-	59,62,62	3.60	31 (52%)	77,92,92	3.46	33 (42%)

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	TEL	0	2881	-	1/1/19/19	23/73/108/108	0/4/5/5

The worst 5 of 31 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	0	2881	TEL	C30-C34	12.60	1.72	1.54
2	0	2881	TEL	C7-C3	8.59	1.65	1.54
2	0	2881	TEL	C24-C28	7.93	1.64	1.52
2	0	2881	TEL	O9-C15	7.30	1.51	1.34
2	0	2881	TEL	C47-C43	6.74	1.51	1.39

The worst 5 of 33 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	0	2881	TEL	O9-C15-C21	13.29	124.38	110.88
2	0	2881	TEL	C3-N6-C10	-11.45	96.35	111.69
2	0	2881	TEL	C42-O39-C34	7.20	128.76	116.25
2	0	2881	TEL	O20-C15-C21	-6.87	115.73	124.77
2	0	2881	TEL	C11-N6-C10	-6.78	113.68	122.25

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	0	2881	TEL	C21

5 of 23 torsion outliers are listed below:

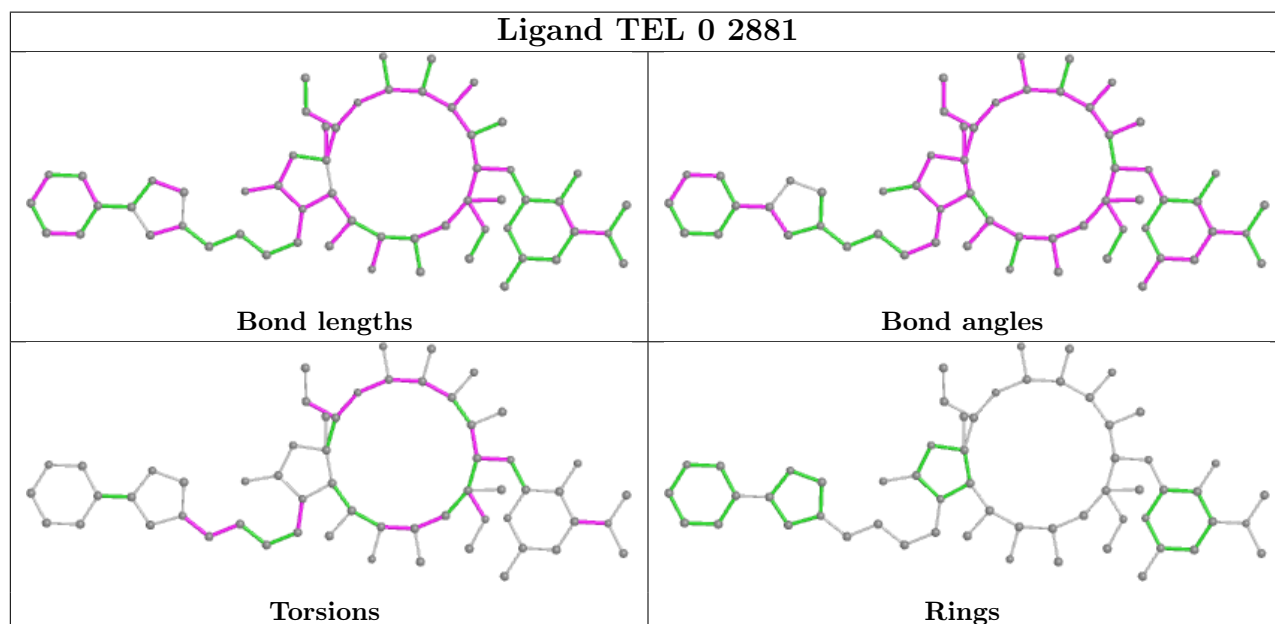
Mol	Chain	Res	Type	Atoms
2	0	2881	TEL	C7-C13-C19-C24
2	0	2881	TEL	O9-C15-C21-C25
2	0	2881	TEL	C25-C21-C26-O29
2	0	2881	TEL	C25-C21-C26-C30
2	0	2881	TEL	C26-C30-C34-C28

There are no ring outliers.

1 monomer is involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	0	2881	TEL	11	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.