# WORLDWIDE wwPDB PROTEIN DATA BANK

# Full wwPDB EM Validation Report ⓘ

Jul 16, 2025 – 11:55 AM JST

| | | |
|---|---|---|
| PDB ID | : | 8WRM / pdb_00008wrm |
| EMDB ID | : | EMD-37781 |
| Title | : | XBB.1.5 spike protein in complex with ACE2 |
| Authors | : | Feng, L.L.; Feng, L.L. |
| Deposited on | : | 2023-10-15 |
| Resolution | : | 4.34 Å(reported) |

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

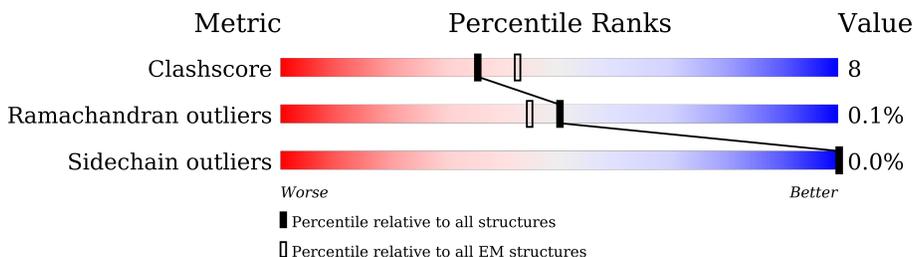| | | |
|---|---|---|
| EMDB validation analysis | : | FAILED |
| MolProbity | : | 4-5-2 with Phenix2.0rc1 |
| Percentile statistics | : | 20231227.v01 (using entries in the PDB archive December 27th 2023) |
| MapQ | : | FAILED |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.44 |

# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 4.34 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 | Percentile Ranks | Value |
|---|---|---|
| Clashscore | | 8 |
| Ramachandran outliers | | 0.1% |
| Sidechain outliers | | 0.0% |

*Worse* *Better*

▮ Percentile relative to all structures
▯ Percentile relative to all EM structures

| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|---|---|---|
| Clashscore | 210492 | 15764 |
| Ramachandran outliers | 207382 | 16835 |
| Sidechain outliers | 206894 | 16415 |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=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 <=5%

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | C | 1221 | 68% 20% 13% |
| 1 | F | 1221 | 70% 17% 13% |
| 1 | G | 1221 | 71% 16% 13% |
| 2 | D | 594 | 82% 18% |

## 2 Entity composition ⓘ

There are 2 unique types of molecules in this entry. The entry contains 29931 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Spike glycoprotein.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|:---:|:---:|:---:|:---|:---|:---|:---|:---|:---:|:---:|
| 1 | F | 1066 | Total<br>8360 | C<br>5346 | N<br>1396 | O<br>1579 | S<br>39 | 0 | 0 |
| 1 | G | 1066 | Total<br>8359 | C<br>5344 | N<br>1396 | O<br>1580 | S<br>39 | 0 | 0 |
| 1 | C | 1067 | Total<br>8367 | C<br>5350 | N<br>1397 | O<br>1581 | S<br>39 | 0 | 0 |

There are 372 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| F | 19 | ILE | THR | variant | UNP P0DTC2 |
| F | 26 | GLN | PRO | conflict | UNP P0DTC2 |
| F | 27 | SER | ALA | conflict | UNP P0DTC2 |
| F | 83 | ALA | VAL | variant | UNP P0DTC2 |
| F | 142 | ASP | GLY | variant | UNP P0DTC2 |
| F | 146 | GLN | HIS | variant | UNP P0DTC2 |
| F | 183 | GLU | GLN | variant | UNP P0DTC2 |
| F | 213 | GLU | VAL | variant | UNP P0DTC2 |
| F | 252 | VAL | GLY | variant | UNP P0DTC2 |
| F | 339 | HIS | GLY | variant | UNP P0DTC2 |
| F | 346 | THR | ARG | variant | UNP P0DTC2 |
| F | 368 | ILE | LEU | variant | UNP P0DTC2 |
| F | 371 | PHE | SER | variant | UNP P0DTC2 |
| F | 373 | PRO | SER | variant | UNP P0DTC2 |
| F | 375 | PHE | SER | variant | UNP P0DTC2 |
| F | 376 | ALA | THR | variant | UNP P0DTC2 |
| F | 405 | ASN | ASP | variant | UNP P0DTC2 |
| F | 408 | SER | ARG | variant | UNP P0DTC2 |
| F | 417 | ASN | LYS | variant | UNP P0DTC2 |
| F | 440 | LYS | ASN | variant | UNP P0DTC2 |
| F | 445 | PRO | VAL | variant | UNP P0DTC2 |
| F | 446 | SER | GLY | variant | UNP P0DTC2 |
| F | 460 | LYS | ASN | variant | UNP P0DTC2 |
| F | 477 | ASN | SER | variant | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| F | 478 | LYS | THR | variant | UNP P0DTC2 |
| F | 484 | ALA | GLU | variant | UNP P0DTC2 |
| F | 486 | PRO | PHE | variant | UNP P0DTC2 |
| F | 490 | SER | PHE | variant | UNP P0DTC2 |
| F | 498 | ARG | GLN | variant | UNP P0DTC2 |
| F | 501 | TYR | ASN | variant | UNP P0DTC2 |
| F | 505 | HIS | TYR | variant | UNP P0DTC2 |
| F | 614 | GLY | ASP | variant | UNP P0DTC2 |
| F | 655 | TYR | HIS | variant | UNP P0DTC2 |
| F | 764 | LYS | ASN | variant | UNP P0DTC2 |
| F | 796 | TYR | ASP | variant | UNP P0DTC2 |
| F | 817 | PRO | PHE | conflict | UNP P0DTC2 |
| F | 892 | PRO | ALA | conflict | UNP P0DTC2 |
| F | 899 | PRO | ALA | conflict | UNP P0DTC2 |
| F | 942 | PRO | ALA | conflict | UNP P0DTC2 |
| F | 954 | HIS | GLN | variant | UNP P0DTC2 |
| F | 969 | LYS | ASN | variant | UNP P0DTC2 |
| F | 986 | PRO | LYS | variant | UNP P0DTC2 |
| F | 987 | PRO | VAL | variant | UNP P0DTC2 |
| F | 1141 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1142 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1143 | SER | - | expression tag | UNP P0DTC2 |
| F | 1144 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1145 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1146 | SER | - | expression tag | UNP P0DTC2 |
| F | 1147 | TYR | - | expression tag | UNP P0DTC2 |
| F | 1148 | ILE | - | expression tag | UNP P0DTC2 |
| F | 1149 | PRO | - | expression tag | UNP P0DTC2 |
| F | 1150 | GLU | - | expression tag | UNP P0DTC2 |
| F | 1151 | ALA | - | expression tag | UNP P0DTC2 |
| F | 1152 | PRO | - | expression tag | UNP P0DTC2 |
| F | 1153 | ARG | - | expression tag | UNP P0DTC2 |
| F | 1154 | ASP | - | expression tag | UNP P0DTC2 |
| F | 1155 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1156 | GLN | - | expression tag | UNP P0DTC2 |
| F | 1157 | ALA | - | expression tag | UNP P0DTC2 |
| F | 1158 | TYR | - | expression tag | UNP P0DTC2 |
| F | 1159 | VAL | - | expression tag | UNP P0DTC2 |
| F | 1160 | ARG | - | expression tag | UNP P0DTC2 |
| F | 1161 | LYS | - | expression tag | UNP P0DTC2 |
| F | 1162 | ASP | - | expression tag | UNP P0DTC2 |
| F | 1163 | GLY | - | expression tag | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| F | 1164 | GLU | - | expression tag | UNP P0DTC2 |
| F | 1165 | TRP | - | expression tag | UNP P0DTC2 |
| F | 1166 | VAL | - | expression tag | UNP P0DTC2 |
| F | 1167 | LEU | - | expression tag | UNP P0DTC2 |
| F | 1168 | LEU | - | expression tag | UNP P0DTC2 |
| F | 1169 | SER | - | expression tag | UNP P0DTC2 |
| F | 1170 | THR | - | expression tag | UNP P0DTC2 |
| F | 1171 | PHE | - | expression tag | UNP P0DTC2 |
| F | 1172 | LEU | - | expression tag | UNP P0DTC2 |
| F | 1173 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1174 | ARG | - | expression tag | UNP P0DTC2 |
| F | 1175 | SER | - | expression tag | UNP P0DTC2 |
| F | 1176 | LEU | - | expression tag | UNP P0DTC2 |
| F | 1177 | GLU | - | expression tag | UNP P0DTC2 |
| F | 1178 | VAL | - | expression tag | UNP P0DTC2 |
| F | 1179 | LEU | - | expression tag | UNP P0DTC2 |
| F | 1180 | PHE | - | expression tag | UNP P0DTC2 |
| F | 1181 | GLN | - | expression tag | UNP P0DTC2 |
| F | 1182 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1183 | PRO | - | expression tag | UNP P0DTC2 |
| F | 1184 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1185 | TRP | - | expression tag | UNP P0DTC2 |
| F | 1186 | SER | - | expression tag | UNP P0DTC2 |
| F | 1187 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1188 | PRO | - | expression tag | UNP P0DTC2 |
| F | 1189 | GLN | - | expression tag | UNP P0DTC2 |
| F | 1190 | PHE | - | expression tag | UNP P0DTC2 |
| F | 1191 | GLU | - | expression tag | UNP P0DTC2 |
| F | 1192 | LYS | - | expression tag | UNP P0DTC2 |
| F | 1193 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1194 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1195 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1196 | SER | - | expression tag | UNP P0DTC2 |
| F | 1197 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1198 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1199 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1200 | SER | - | expression tag | UNP P0DTC2 |
| F | 1201 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1202 | GLY | - | expression tag | UNP P0DTC2 |
| F | 1203 | SER | - | expression tag | UNP P0DTC2 |
| F | 1204 | SER | - | expression tag | UNP P0DTC2 |
| F | 1205 | ALA | - | expression tag | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:-----:|:-------:|:--------:|:------:|:-------:|:---------:|
| F | 1206 | TRP | - | expression tag | UNP P0DTC2 |
| F | 1207 | SER | - | expression tag | UNP P0DTC2 |
| F | 1208 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1209 | PRO | - | expression tag | UNP P0DTC2 |
| F | 1210 | GLN | - | expression tag | UNP P0DTC2 |
| F | 1211 | PHE | - | expression tag | UNP P0DTC2 |
| F | 1212 | GLU | - | expression tag | UNP P0DTC2 |
| F | 1213 | LYS | - | expression tag | UNP P0DTC2 |
| F | 1214 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1215 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1216 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1217 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1218 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1219 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1220 | HIS | - | expression tag | UNP P0DTC2 |
| F | 1221 | HIS | - | expression tag | UNP P0DTC2 |
| G | 19 | ILE | THR | variant | UNP P0DTC2 |
| G | 26 | GLN | PRO | conflict | UNP P0DTC2 |
| G | 27 | SER | ALA | conflict | UNP P0DTC2 |
| G | 83 | ALA | VAL | variant | UNP P0DTC2 |
| G | 142 | ASP | GLY | variant | UNP P0DTC2 |
| G | 146 | GLN | HIS | variant | UNP P0DTC2 |
| G | 183 | GLU | GLN | variant | UNP P0DTC2 |
| G | 213 | GLU | VAL | variant | UNP P0DTC2 |
| G | 252 | VAL | GLY | variant | UNP P0DTC2 |
| G | 339 | HIS | GLY | variant | UNP P0DTC2 |
| G | 346 | THR | ARG | variant | UNP P0DTC2 |
| G | 368 | ILE | LEU | variant | UNP P0DTC2 |
| G | 371 | PHE | SER | variant | UNP P0DTC2 |
| G | 373 | PRO | SER | variant | UNP P0DTC2 |
| G | 375 | PHE | SER | variant | UNP P0DTC2 |
| G | 376 | ALA | THR | variant | UNP P0DTC2 |
| G | 405 | ASN | ASP | variant | UNP P0DTC2 |
| G | 408 | SER | ARG | variant | UNP P0DTC2 |
| G | 417 | ASN | LYS | variant | UNP P0DTC2 |
| G | 440 | LYS | ASN | variant | UNP P0DTC2 |
| G | 445 | PRO | VAL | variant | UNP P0DTC2 |
| G | 446 | SER | GLY | variant | UNP P0DTC2 |
| G | 460 | LYS | ASN | variant | UNP P0DTC2 |
| G | 477 | ASN | SER | variant | UNP P0DTC2 |
| G | 478 | LYS | THR | variant | UNP P0DTC2 |
| G | 484 | ALA | GLU | variant | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| G | 486 | PRO | PHE | variant | UNP P0DTC2 |
| G | 490 | SER | PHE | variant | UNP P0DTC2 |
| G | 498 | ARG | GLN | variant | UNP P0DTC2 |
| G | 501 | TYR | ASN | variant | UNP P0DTC2 |
| G | 505 | HIS | TYR | variant | UNP P0DTC2 |
| G | 614 | GLY | ASP | variant | UNP P0DTC2 |
| G | 655 | TYR | HIS | variant | UNP P0DTC2 |
| G | 764 | LYS | ASN | variant | UNP P0DTC2 |
| G | 796 | TYR | ASP | variant | UNP P0DTC2 |
| G | 817 | PRO | PHE | conflict | UNP P0DTC2 |
| G | 892 | PRO | ALA | conflict | UNP P0DTC2 |
| G | 899 | PRO | ALA | conflict | UNP P0DTC2 |
| G | 942 | PRO | ALA | conflict | UNP P0DTC2 |
| G | 954 | HIS | GLN | variant | UNP P0DTC2 |
| G | 969 | LYS | ASN | variant | UNP P0DTC2 |
| G | 986 | PRO | LYS | variant | UNP P0DTC2 |
| G | 987 | PRO | VAL | variant | UNP P0DTC2 |
| G | 1141 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1142 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1143 | SER | - | expression tag | UNP P0DTC2 |
| G | 1144 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1145 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1146 | SER | - | expression tag | UNP P0DTC2 |
| G | 1147 | TYR | - | expression tag | UNP P0DTC2 |
| G | 1148 | ILE | - | expression tag | UNP P0DTC2 |
| G | 1149 | PRO | - | expression tag | UNP P0DTC2 |
| G | 1150 | GLU | - | expression tag | UNP P0DTC2 |
| G | 1151 | ALA | - | expression tag | UNP P0DTC2 |
| G | 1152 | PRO | - | expression tag | UNP P0DTC2 |
| G | 1153 | ARG | - | expression tag | UNP P0DTC2 |
| G | 1154 | ASP | - | expression tag | UNP P0DTC2 |
| G | 1155 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1156 | GLN | - | expression tag | UNP P0DTC2 |
| G | 1157 | ALA | - | expression tag | UNP P0DTC2 |
| G | 1158 | TYR | - | expression tag | UNP P0DTC2 |
| G | 1159 | VAL | - | expression tag | UNP P0DTC2 |
| G | 1160 | ARG | - | expression tag | UNP P0DTC2 |
| G | 1161 | LYS | - | expression tag | UNP P0DTC2 |
| G | 1162 | ASP | - | expression tag | UNP P0DTC2 |
| G | 1163 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1164 | GLU | - | expression tag | UNP P0DTC2 |
| G | 1165 | TRP | - | expression tag | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| G | 1166 | VAL | - | expression tag | UNP P0DTC2 |
| G | 1167 | LEU | - | expression tag | UNP P0DTC2 |
| G | 1168 | LEU | - | expression tag | UNP P0DTC2 |
| G | 1169 | SER | - | expression tag | UNP P0DTC2 |
| G | 1170 | THR | - | expression tag | UNP P0DTC2 |
| G | 1171 | PHE | - | expression tag | UNP P0DTC2 |
| G | 1172 | LEU | - | expression tag | UNP P0DTC2 |
| G | 1173 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1174 | ARG | - | expression tag | UNP P0DTC2 |
| G | 1175 | SER | - | expression tag | UNP P0DTC2 |
| G | 1176 | LEU | - | expression tag | UNP P0DTC2 |
| G | 1177 | GLU | - | expression tag | UNP P0DTC2 |
| G | 1178 | VAL | - | expression tag | UNP P0DTC2 |
| G | 1179 | LEU | - | expression tag | UNP P0DTC2 |
| G | 1180 | PHE | - | expression tag | UNP P0DTC2 |
| G | 1181 | GLN | - | expression tag | UNP P0DTC2 |
| G | 1182 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1183 | PRO | - | expression tag | UNP P0DTC2 |
| G | 1184 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1185 | TRP | - | expression tag | UNP P0DTC2 |
| G | 1186 | SER | - | expression tag | UNP P0DTC2 |
| G | 1187 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1188 | PRO | - | expression tag | UNP P0DTC2 |
| G | 1189 | GLN | - | expression tag | UNP P0DTC2 |
| G | 1190 | PHE | - | expression tag | UNP P0DTC2 |
| G | 1191 | GLU | - | expression tag | UNP P0DTC2 |
| G | 1192 | LYS | - | expression tag | UNP P0DTC2 |
| G | 1193 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1194 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1195 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1196 | SER | - | expression tag | UNP P0DTC2 |
| G | 1197 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1198 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1199 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1200 | SER | - | expression tag | UNP P0DTC2 |
| G | 1201 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1202 | GLY | - | expression tag | UNP P0DTC2 |
| G | 1203 | SER | - | expression tag | UNP P0DTC2 |
| G | 1204 | SER | - | expression tag | UNP P0DTC2 |
| G | 1205 | ALA | - | expression tag | UNP P0DTC2 |
| G | 1206 | TRP | - | expression tag | UNP P0DTC2 |
| G | 1207 | SER | - | expression tag | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| G | 1208 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1209 | PRO | - | expression tag | UNP P0DTC2 |
| G | 1210 | GLN | - | expression tag | UNP P0DTC2 |
| G | 1211 | PHE | - | expression tag | UNP P0DTC2 |
| G | 1212 | GLU | - | expression tag | UNP P0DTC2 |
| G | 1213 | LYS | - | expression tag | UNP P0DTC2 |
| G | 1214 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1215 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1216 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1217 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1218 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1219 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1220 | HIS | - | expression tag | UNP P0DTC2 |
| G | 1221 | HIS | - | expression tag | UNP P0DTC2 |
| C | 19 | ILE | THR | variant | UNP P0DTC2 |
| C | 26 | GLN | PRO | conflict | UNP P0DTC2 |
| C | 27 | SER | ALA | conflict | UNP P0DTC2 |
| C | 83 | ALA | VAL | variant | UNP P0DTC2 |
| C | 142 | ASP | GLY | variant | UNP P0DTC2 |
| C | 146 | GLN | HIS | variant | UNP P0DTC2 |
| C | 183 | GLU | GLN | variant | UNP P0DTC2 |
| C | 213 | GLU | VAL | variant | UNP P0DTC2 |
| C | 252 | VAL | GLY | variant | UNP P0DTC2 |
| C | 339 | HIS | GLY | variant | UNP P0DTC2 |
| C | 346 | THR | ARG | variant | UNP P0DTC2 |
| C | 368 | ILE | LEU | variant | UNP P0DTC2 |
| C | 371 | PHE | SER | variant | UNP P0DTC2 |
| C | 373 | PRO | SER | variant | UNP P0DTC2 |
| C | 375 | PHE | SER | variant | UNP P0DTC2 |
| C | 376 | ALA | THR | variant | UNP P0DTC2 |
| C | 405 | ASN | ASP | variant | UNP P0DTC2 |
| C | 408 | SER | ARG | variant | UNP P0DTC2 |
| C | 417 | ASN | LYS | variant | UNP P0DTC2 |
| C | 440 | LYS | ASN | variant | UNP P0DTC2 |
| C | 445 | PRO | VAL | variant | UNP P0DTC2 |
| C | 446 | SER | GLY | variant | UNP P0DTC2 |
| C | 460 | LYS | ASN | variant | UNP P0DTC2 |
| C | 477 | ASN | SER | variant | UNP P0DTC2 |
| C | 478 | LYS | THR | variant | UNP P0DTC2 |
| C | 484 | ALA | GLU | variant | UNP P0DTC2 |
| C | 486 | PRO | PHE | variant | UNP P0DTC2 |
| C | 490 | SER | PHE | variant | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:---:|:---:|:---:|:---:|:---:|:---:|
| C | 498 | ARG | GLN | variant | UNP P0DTC2 |
| C | 501 | TYR | ASN | variant | UNP P0DTC2 |
| C | 505 | HIS | TYR | variant | UNP P0DTC2 |
| C | 614 | GLY | ASP | variant | UNP P0DTC2 |
| C | 655 | TYR | HIS | variant | UNP P0DTC2 |
| C | 764 | LYS | ASN | variant | UNP P0DTC2 |
| C | 796 | TYR | ASP | variant | UNP P0DTC2 |
| C | 817 | PRO | PHE | conflict | UNP P0DTC2 |
| C | 892 | PRO | ALA | conflict | UNP P0DTC2 |
| C | 899 | PRO | ALA | conflict | UNP P0DTC2 |
| C | 942 | PRO | ALA | conflict | UNP P0DTC2 |
| C | 954 | HIS | GLN | variant | UNP P0DTC2 |
| C | 969 | LYS | ASN | variant | UNP P0DTC2 |
| C | 986 | PRO | LYS | variant | UNP P0DTC2 |
| C | 987 | PRO | VAL | variant | UNP P0DTC2 |
| C | 1141 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1142 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1143 | SER | - | expression tag | UNP P0DTC2 |
| C | 1144 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1145 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1146 | SER | - | expression tag | UNP P0DTC2 |
| C | 1147 | TYR | - | expression tag | UNP P0DTC2 |
| C | 1148 | ILE | - | expression tag | UNP P0DTC2 |
| C | 1149 | PRO | - | expression tag | UNP P0DTC2 |
| C | 1150 | GLU | - | expression tag | UNP P0DTC2 |
| C | 1151 | ALA | - | expression tag | UNP P0DTC2 |
| C | 1152 | PRO | - | expression tag | UNP P0DTC2 |
| C | 1153 | ARG | - | expression tag | UNP P0DTC2 |
| C | 1154 | ASP | - | expression tag | UNP P0DTC2 |
| C | 1155 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1156 | GLN | - | expression tag | UNP P0DTC2 |
| C | 1157 | ALA | - | expression tag | UNP P0DTC2 |
| C | 1158 | TYR | - | expression tag | UNP P0DTC2 |
| C | 1159 | VAL | - | expression tag | UNP P0DTC2 |
| C | 1160 | ARG | - | expression tag | UNP P0DTC2 |
| C | 1161 | LYS | - | expression tag | UNP P0DTC2 |
| C | 1162 | ASP | - | expression tag | UNP P0DTC2 |
| C | 1163 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1164 | GLU | - | expression tag | UNP P0DTC2 |
| C | 1165 | TRP | - | expression tag | UNP P0DTC2 |
| C | 1166 | VAL | - | expression tag | UNP P0DTC2 |
| C | 1167 | LEU | - | expression tag | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:-----:|:-------:|:--------:|:------:|:--------------:|:-------------:|
| C | 1168 | LEU | - | expression tag | UNP P0DTC2 |
| C | 1169 | SER | - | expression tag | UNP P0DTC2 |
| C | 1170 | THR | - | expression tag | UNP P0DTC2 |
| C | 1171 | PHE | - | expression tag | UNP P0DTC2 |
| C | 1172 | LEU | - | expression tag | UNP P0DTC2 |
| C | 1173 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1174 | ARG | - | expression tag | UNP P0DTC2 |
| C | 1175 | SER | - | expression tag | UNP P0DTC2 |
| C | 1176 | LEU | - | expression tag | UNP P0DTC2 |
| C | 1177 | GLU | - | expression tag | UNP P0DTC2 |
| C | 1178 | VAL | - | expression tag | UNP P0DTC2 |
| C | 1179 | LEU | - | expression tag | UNP P0DTC2 |
| C | 1180 | PHE | - | expression tag | UNP P0DTC2 |
| C | 1181 | GLN | - | expression tag | UNP P0DTC2 |
| C | 1182 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1183 | PRO | - | expression tag | UNP P0DTC2 |
| C | 1184 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1185 | TRP | - | expression tag | UNP P0DTC2 |
| C | 1186 | SER | - | expression tag | UNP P0DTC2 |
| C | 1187 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1188 | PRO | - | expression tag | UNP P0DTC2 |
| C | 1189 | GLN | - | expression tag | UNP P0DTC2 |
| C | 1190 | PHE | - | expression tag | UNP P0DTC2 |
| C | 1191 | GLU | - | expression tag | UNP P0DTC2 |
| C | 1192 | LYS | - | expression tag | UNP P0DTC2 |
| C | 1193 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1194 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1195 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1196 | SER | - | expression tag | UNP P0DTC2 |
| C | 1197 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1198 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1199 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1200 | SER | - | expression tag | UNP P0DTC2 |
| C | 1201 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1202 | GLY | - | expression tag | UNP P0DTC2 |
| C | 1203 | SER | - | expression tag | UNP P0DTC2 |
| C | 1204 | SER | - | expression tag | UNP P0DTC2 |
| C | 1205 | ALA | - | expression tag | UNP P0DTC2 |
| C | 1206 | TRP | - | expression tag | UNP P0DTC2 |
| C | 1207 | SER | - | expression tag | UNP P0DTC2 |
| C | 1208 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1209 | PRO | - | expression tag | UNP P0DTC2 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|:-----:|:-------:|:--------:|:------:|:--------------:|:-------------:|
| C | 1210 | GLN | - | expression tag | UNP P0DTC2 |
| C | 1211 | PHE | - | expression tag | UNP P0DTC2 |
| C | 1212 | GLU | - | expression tag | UNP P0DTC2 |
| C | 1213 | LYS | - | expression tag | UNP P0DTC2 |
| C | 1214 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1215 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1216 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1217 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1218 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1219 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1220 | HIS | - | expression tag | UNP P0DTC2 |
| C | 1221 | HIS | - | expression tag | UNP P0DTC2 |

- Molecule 2 is a protein called Processed angiotensin-converting enzyme 2.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|:---:|:-----:|:--------:|:-----:|:---:|:---:|:---:|:---:|:-------:|:-----:|
| | | | Total | C | N | O | S | | |
| 2 | D | 594 | 4845 | 3099 | 803 | 914 | 29 | 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.

• Molecule 1: Spike glycoprotein

Chain F:



• Molecule 1: Spike glycoprotein

Chain G:

• Molecule 1: Spike glycoprotein

Chain C:

68%   20%   13%

ARG ASP L849 F855 L858 M869 A876 P897 M900 Y904 I909 N914 Y917 I923 F927 Q935 L948 L959 L966 K969 S974 S975 V976 L977 N978 D979 R983 P986 I997 K1028 E1031 F1042 F1052 S1055

G1059 L1063 H1064 H1083 H1088 T1105 F1109 I1114 I1115 N1119 N1125 C1126 D1127 V1128 V1129 V1137 P1140 GLY GLY SER GLY SER TYR ILE PRO GLU ALA PRO ARG ASP GLY GLN ALA TYR VAL ARG LYS ASP GLU TRP VAL LEU LEU SER THR PHE LEU

GLY ARG SER LEU GLU VAL LEU PHE GLN GLY PRO GLY TRP SER HIS PRO GLN PHE GLU LYS GLY GLY GLY SER GLY GLY GLY SER GLY GLY SER ALA TRP SER HIS PRO GLN PHE GLU LYS HIS HIS HIS HIS HIS HIS HIS HIS

• Molecule 2: Processed angiotensin-converting enzyme 2

Chain D:

82%                    18%

S19 T20 I21 Q24 S47 W48 N49 T52 E56 M62 Y83 P84 Q96 A99 L100 Q101 L148 M152 W168 K174 Y183 V184 K187 N188 E189 M190 A191 R192 D198 D201 R204 G205 V212 R219 L222 V226 F230

I233 K234 P235 E238 H239 L240 G260 C261 L262 L267 M270 F274 W275 T276 P284 V293 M297 D303 A304 Q305 R306 E310 M323 T334 D335 N338 V339 D355 F356 R357 T362 T365 M366 D367 M376 Y385 L391 H401 I407

K419 L424 L440 F464 K475 K476 M480 K481 R482 V487 H493 D494 E495 T496 Y497 D509 I513 R514 Y515 Y516 T517 R518 Q522 F523 Q524 E527 C530 L539 C542 M557 L558 P565 W566 T567 E571 N572 V573 V574 G575 A576 K577

P583 Y587 F588 E589 P590 L591 G605 W606 S607 W610 S611 P612

# 4 Experimental information (i)

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 136454 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope | FEI TALOS ARCTICA | Depositor |
| Voltage (kV) | 200 | Depositor |
| Electron dose $(e^-/\text{Å}^2)$ | 52 | Depositor |
| Minimum defocus (nm) | 1200 | Depositor |
| Maximum defocus (nm) | 1800 | Depositor |
| Magnification | Not provided | |
| Image detector | GATAN K2 QUANTUM (4k x 4k) | Depositor |

# 5 Model quality ⓘ

## 5.1 Standard geometry ⓘ

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 | C | 0.19 | 0/8568 | 0.53 | 3/11658 (0.0%) |
| 1 | F | 0.18 | 0/8561 | 0.49 | 1/11648 (0.0%) |
| 1 | G | 0.18 | 0/8560 | 0.49 | 0/11647 |
| 2 | D | 0.20 | 0/4981 | 0.52 | 0/6767 |
| All | All | 0.19 | 0/30670 | 0.51 | 4/41720 (0.0%) |

There are no bond length outliers.

All (4) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|-----|-------|-----|------|-------|-----|-------------|----------|
| 1 | F | 559 | PHE | CB-CA-C | -6.44 | 108.12 | 115.79 |
| 1 | C | 909 | ILE | N-CA-C | -6.26 | 106.41 | 112.29 |
| 1 | C | 773 | GLU | N-CA-CB | 5.47 | 119.32 | 110.40 |
| 1 | C | 986 | PRO | N-CA-C | 5.33 | 117.21 | 110.70 |

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-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 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 | C | 8367 | 0 | 8181 | 151 | 0 |
| 1 | F | 8360 | 0 | 8174 | 134 | 0 |
| 1 | G | 8359 | 0 | 8168 | 125 | 0 |
| 2 | D | 4845 | 0 | 4625 | 62 | 0 |
| All | All | 29931 | 0 | 29148 | 452 | 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 8.

All (452) 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:F:431:GLY:HA3 | 1:F:513:LEU:O | 1.69 | 0.93 |
| 1:C:431:GLY:HA3 | 1:C:513:LEU:O | 1.73 | 0.88 |
| 1:C:81:ASN:HB3 | 1:C:138:ASP:HB3 | 1.71 | 0.72 |
| 1:F:1052:PHE:HB2 | 1:F:1063:LEU:HB2 | 1.72 | 0.72 |
| 1:G:80:ASP:H | 1:G:262:ALA:HB2 | 1.55 | 0.71 |
| 1:C:714:ILE:HD12 | 1:C:715:PRO:HD2 | 1.73 | 0.71 |
| 1:F:353:TRP:HE1 | 1:F:454:ARG:HH22 | 1.37 | 0.70 |
| 1:F:1019:ARG:HH12 | 1:F:1023:ASN:HB2 | 1.57 | 0.69 |
| 2:D:261:CYS:SG | 2:D:262:LEU:N | 2.65 | 0.69 |
| 1:F:98:SER:HA | 1:F:180:GLU:H | 1.58 | 0.68 |
| 1:G:731:MET:SD | 1:G:774:GLN:NE2 | 2.65 | 0.67 |
| 1:C:452:LEU:HD21 | 1:C:492:LEU:HD23 | 1.77 | 0.67 |
| 1:F:403:ARG:HH21 | 1:F:405:ASN:HD21 | 1.42 | 0.66 |
| 1:G:226:LEU:HG | 1:G:227:VAL:HG23 | 1.76 | 0.66 |
| 1:C:37:TYR:HB3 | 1:C:223:LEU:HD23 | 1.77 | 0.66 |
| 1:C:448:ASN:HB2 | 1:C:497:PHE:HB2 | 1.77 | 0.66 |
| 2:D:482:ARG:NH2 | 2:D:607:SER:O | 2.29 | 0.66 |
| 1:F:961:THR:OG1 | 1:G:762:GLN:NE2 | 2.29 | 0.66 |
| 1:C:1052:PHE:HB2 | 1:C:1063:LEU:HB2 | 1.77 | 0.66 |
| 1:F:993:ILE:HG13 | 1:F:996:LEU:HD21 | 1.79 | 0.65 |
| 1:C:457:ARG:HH22 | 1:C:461:LEU:HB2 | 1.62 | 0.64 |
| 1:F:80:ASP:H | 1:F:262:ALA:HB2 | 1.62 | 0.64 |
| 1:F:212:LEU:HD21 | 1:F:217:PRO:HB3 | 1.80 | 0.63 |
| 1:G:318:PHE:H | 1:G:593:GLY:HA3 | 1.62 | 0.63 |
| 1:G:143:VAL:H | 1:G:246:ARG:HG2 | 1.63 | 0.63 |
| 1:G:557:LYS:HD3 | 1:G:559:PHE:H | 1.63 | 0.63 |
| 1:C:80:ASP:H | 1:C:262:ALA:HB2 | 1.64 | 0.62 |
| 1:C:35:GLY:HA3 | 1:C:56:LEU:HD12 | 1.82 | 0.62 |
| 1:F:336:CYS:HB3 | 1:F:363:ALA:HB2 | 1.82 | 0.62 |
| 1:G:81:ASN:HB3 | 1:G:138:ASP:HB3 | 1.82 | 0.62 |
| 1:C:566:GLY:HA3 | 1:C:575:ALA:HB3 | 1.81 | 0.61 |
| 1:G:1086:LYS:NZ | 1:G:1087:ALA:O | 2.31 | 0.61 |
| 1:F:790:LYS:HZ3 | 1:C:704:SER:HB3 | 1.64 | 0.61 |
| 1:F:448:ASN:HB2 | 1:F:497:PHE:HB2 | 1.81 | 0.61 |
| 1:F:37:TYR:HB3 | 1:F:223:LEU:HD23 | 1.83 | 0.61 |
| 1:G:80:ASP:HB2 | 1:G:262:ALA:H | 1.66 | 0.61 |
| 1:G:752:LEU:O | 1:G:755:GLN:NE2 | 2.34 | 0.60 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:G:334:ASN:ND2 | 1:G:360:ASN:O | 2.35 | 0.60 |
| 1:C:979:ASP:O | 1:C:983:ARG:HB2 | 2.01 | 0.60 |
| 1:F:35:GLY:HA3 | 1:F:56:LEU:HD12 | 1.83 | 0.60 |
| 1:G:212:LEU:HD21 | 1:G:217:PRO:HB3 | 1.82 | 0.60 |
| 1:G:53:ASP:O | 1:G:272:PRO:HA | 2.02 | 0.60 |
| 1:G:1114:ILE:O | 1:G:1119:ASN:ND2 | 2.33 | 0.60 |
| 1:C:27:SER:OG | 1:C:64:TRP:O | 2.20 | 0.59 |
| 1:C:457:ARG:HH12 | 1:C:461:LEU:HD13 | 1.65 | 0.59 |
| 1:F:394:ASN:ND2 | 1:G:200:TYR:OH | 2.35 | 0.59 |
| 1:G:553:THR:HB | 1:G:586:ASP:HB2 | 1.85 | 0.59 |
| 1:C:14:GLN:HB2 | 1:C:158:ARG:HE | 1.67 | 0.59 |
| 1:C:244:LEU:HD23 | 1:C:246:ARG:HH22 | 1.68 | 0.59 |
| 2:D:184:VAL:HG22 | 2:D:464:PHE:HE1 | 1.68 | 0.59 |
| 1:C:146:GLN:HE21 | 1:C:249:LEU:HD13 | 1.68 | 0.59 |
| 1:C:742:ILE:HD11 | 1:C:997:ILE:HA | 1.85 | 0.59 |
| 1:C:948:LEU:HD21 | 1:C:1059:GLY:HA3 | 1.85 | 0.59 |
| 1:F:27:SER:OG | 1:F:64:TRP:O | 2.20 | 0.58 |
| 1:C:67:ALA:HA | 1:C:264:ALA:HB2 | 1.85 | 0.58 |
| 1:C:148:ASN:ND2 | 1:C:153:MET:SD | 2.76 | 0.58 |
| 1:C:804:GLN:NE2 | 1:C:935:GLN:OE1 | 2.33 | 0.58 |
| 1:F:989:ALA:O | 1:F:993:ILE:N | 2.36 | 0.58 |
| 1:G:120:VAL:HB | 1:G:127:VAL:HB | 1.85 | 0.58 |
| 1:G:37:TYR:OH | 1:G:195:LYS:NZ | 2.36 | 0.58 |
| 1:C:80:ASP:HB2 | 1:C:262:ALA:H | 1.68 | 0.58 |
| 1:G:67:ALA:HA | 1:G:264:ALA:HB2 | 1.85 | 0.57 |
| 1:G:736:VAL:O | 1:G:764:LYS:NZ | 2.37 | 0.57 |
| 1:C:729:VAL:HG21 | 1:C:781:VAL:HG11 | 1.86 | 0.57 |
| 1:G:1080:ALA:HB3 | 1:G:1132:ILE:HD12 | 1.86 | 0.57 |
| 1:G:27:SER:OG | 1:G:64:TRP:O | 2.22 | 0.57 |
| 2:D:571:GLU:HA | 2:D:575:GLY:H | 1.70 | 0.57 |
| 1:G:969:LYS:HZ3 | 1:G:974:SER:HA | 1.69 | 0.56 |
| 1:F:80:ASP:HB2 | 1:F:262:ALA:H | 1.69 | 0.56 |
| 1:C:442:ASP:O | 1:C:448:ASN:ND2 | 2.38 | 0.56 |
| 2:D:323:MET:HE1 | 2:D:376:MET:HB2 | 1.87 | 0.56 |
| 1:G:422:ASN:ND2 | 1:G:454:ARG:O | 2.39 | 0.56 |
| 1:C:195:LYS:HG2 | 1:C:197:ILE:HG12 | 1.86 | 0.56 |
| 2:D:148:LEU:HD11 | 2:D:152:MET:HE3 | 1.87 | 0.56 |
| 2:D:226:VAL:HG21 | 2:D:513:ILE:HD11 | 1.87 | 0.56 |
| 1:F:552:LEU:HD22 | 1:F:585:LEU:HD13 | 1.88 | 0.56 |
| 1:C:1125:ASN:ND2 | 1:C:1127:ASP:OD2 | 2.37 | 0.56 |
| 1:F:120:VAL:HB | 1:F:127:VAL:HB | 1.87 | 0.56 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:F:396:TYR:O | 1:F:513:LEU:HA | 2.05 | 0.56 |
| 1:G:335:LEU:HA | 1:G:362:VAL:H | 1.70 | 0.56 |
| 1:G:552:LEU:HD12 | 1:G:585:LEU:HD12 | 1.87 | 0.56 |
| 1:C:100:ILE:HG22 | 1:C:242:LEU:HD12 | 1.87 | 0.56 |
| 1:F:715:PRO:HD3 | 1:G:894:LEU:HD21 | 1.87 | 0.56 |
| 1:F:318:PHE:H | 1:F:593:GLY:HA3 | 1.71 | 0.56 |
| 1:C:722:VAL:HA | 1:C:1064:HIS:O | 2.05 | 0.56 |
| 1:C:969:LYS:HZ3 | 1:C:974:SER:HA | 1.71 | 0.56 |
| 1:G:475:ALA:HB1 | 2:D:24:GLN:HB2 | 1.88 | 0.55 |
| 2:D:267:LEU:HD11 | 2:D:487:VAL:HG11 | 1.87 | 0.55 |
| 1:C:302:THR:O | 1:C:304:LYS:NZ | 2.39 | 0.55 |
| 1:F:917:TYR:HB3 | 1:C:1129:VAL:HG23 | 1.88 | 0.55 |
| 1:C:419:ALA:O | 1:C:424:LYS:NZ | 2.39 | 0.55 |
| 2:D:96:GLN:HG2 | 2:D:391:LEU:HD22 | 1.88 | 0.55 |
| 2:D:230:PHE:HA | 2:D:233:ILE:HG22 | 1.88 | 0.55 |
| 1:F:457:ARG:NH1 | 1:F:467:ASP:OD2 | 2.40 | 0.55 |
| 1:C:966:LEU:O | 1:C:975:SER:OG | 2.25 | 0.55 |
| 2:D:83:TYR:O | 2:D:101:GLN:NE2 | 2.38 | 0.55 |
| 1:F:592:PHE:HB3 | 1:G:740:MET:HE1 | 1.88 | 0.55 |
| 1:F:1095:PHE:HB3 | 1:F:1102:TRP:HE1 | 1.71 | 0.55 |
| 1:F:566:GLY:HA3 | 1:F:575:ALA:HB3 | 1.88 | 0.55 |
| 2:D:56:GLU:N | 2:D:56:GLU:OE2 | 2.40 | 0.55 |
| 1:G:179:LEU:HD12 | 1:G:180:GLU:HB2 | 1.89 | 0.55 |
| 1:F:316:SER:OG | 1:F:317:ASN:N | 2.41 | 0.54 |
| 1:C:452:LEU:HD11 | 1:C:492:LEU:HB3 | 1.89 | 0.54 |
| 2:D:293:VAL:HG13 | 2:D:297:MET:HE2 | 1.89 | 0.54 |
| 1:G:1123:SER:OG | 1:C:914:ASN:ND2 | 2.39 | 0.54 |
| 1:C:112:SER:HB3 | 1:C:134:GLN:HG2 | 1.89 | 0.54 |
| 1:G:454:ARG:NH2 | 1:G:469:SER:O | 2.40 | 0.54 |
| 2:D:204:ARG:HA | 2:D:222:LEU:HD22 | 1.90 | 0.54 |
| 1:C:82:PRO:O | 1:C:237:ARG:NH2 | 2.40 | 0.54 |
| 1:C:329:PHE:O | 1:C:580:GLN:NE2 | 2.41 | 0.54 |
| 1:G:34:ARG:HH12 | 1:G:219:GLY:H | 1.54 | 0.54 |
| 1:C:14:GLN:OE1 | 1:C:158:ARG:NH2 | 2.39 | 0.54 |
| 1:C:118:LEU:HG | 1:C:129:LYS:HB2 | 1.89 | 0.54 |
| 1:C:212:LEU:HD21 | 1:C:217:PRO:HB3 | 1.89 | 0.54 |
| 1:F:353:TRP:HB2 | 1:F:466:ARG:HH22 | 1.73 | 0.53 |
| 2:D:476:LYS:O | 2:D:480:MET:HB2 | 2.08 | 0.53 |
| 1:C:300:LYS:HD3 | 1:C:306:PHE:HA | 1.89 | 0.53 |
| 1:F:992:GLN:OE1 | 1:F:995:ARG:NH2 | 2.41 | 0.53 |
| 1:F:106:PHE:HB3 | 1:F:235:ILE:HG12 | 1.91 | 0.53 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:F:315:THR:HG22 | 1:F:316:SER:H | 1.73 | 0.53 |
| 1:G:589:PRO:HG2 | 1:C:855:PHE:HD1 | 1.74 | 0.53 |
| 1:C:99:ASN:O | 1:C:102:ARG:NH2 | 2.41 | 0.53 |
| 1:C:277:LEU:HD21 | 1:C:285:ILE:HG12 | 1.89 | 0.53 |
| 1:C:617:CYS:O | 1:C:633:TRP:N | 2.42 | 0.53 |
| 1:C:1105:THR:OG1 | 1:C:1109:PHE:O | 2.27 | 0.53 |
| 1:F:280:ASN:OD1 | 1:F:284:THR:N | 2.42 | 0.53 |
| 1:F:788:ILE:HG13 | 1:F:876:ALA:HB2 | 1.91 | 0.53 |
| 1:G:559:PHE:HZ | 1:G:575:ALA:HB1 | 1.75 | 0.53 |
| 1:F:103:GLY:HA3 | 1:F:241:LEU:HB2 | 1.92 | 0.52 |
| 1:G:328:ARG:HH21 | 1:G:533:LEU:HB3 | 1.74 | 0.52 |
| 1:C:79:PHE:HB3 | 1:C:258:TRP:HB3 | 1.90 | 0.52 |
| 1:C:416:GLY:H | 1:C:419:ALA:HB3 | 1.74 | 0.52 |
| 1:C:611:LEU:HD12 | 1:C:650:LEU:HD12 | 1.90 | 0.52 |
| 2:D:168:TRP:CD1 | 2:D:270:MET:HE2 | 2.43 | 0.52 |
| 1:F:591:SER:O | 1:F:634:ARG:NH2 | 2.34 | 0.52 |
| 1:F:1093:GLY:HA3 | 1:F:1105:THR:O | 2.10 | 0.52 |
| 1:F:128:ILE:HB | 1:F:170:TYR:HB3 | 1.92 | 0.52 |
| 1:C:725:GLU:OE2 | 1:C:1064:HIS:NE2 | 2.42 | 0.52 |
| 1:G:34:ARG:NH1 | 1:G:219:GLY:O | 2.43 | 0.52 |
| 1:G:1029:MET:HE1 | 1:G:1053:PRO:HB3 | 1.91 | 0.52 |
| 1:C:147:LYS:HB2 | 1:C:155:SER:HA | 1.91 | 0.51 |
| 1:C:858:LEU:HD13 | 1:C:959:LEU:HD22 | 1.92 | 0.51 |
| 1:F:96:GLU:O | 1:F:190:ARG:NH2 | 2.43 | 0.51 |
| 1:F:1081:ILE:HB | 1:F:1088:HIS:HB2 | 1.92 | 0.51 |
| 1:C:897:PRO:HB2 | 1:C:900:MET:HG2 | 1.93 | 0.51 |
| 1:C:391:CYS:HA | 1:C:525:CYS:HB3 | 1.91 | 0.51 |
| 1:F:351:TYR:O | 1:F:454:ARG:NH1 | 2.44 | 0.51 |
| 1:G:99:ASN:OD1 | 1:G:190:ARG:NH1 | 2.41 | 0.51 |
| 1:C:55:PHE:HB2 | 1:C:275:PHE:CE2 | 2.46 | 0.51 |
| 1:C:1028:LYS:NZ | 1:C:1042:PHE:O | 2.44 | 0.51 |
| 1:F:1082:CYS:HB2 | 1:F:1134:ASN:HA | 1.93 | 0.51 |
| 1:G:449:TYR:OH | 1:G:498:ARG:NH2 | 2.43 | 0.51 |
| 1:C:141:LEU:HB3 | 1:C:158:ARG:HD2 | 1.93 | 0.51 |
| 2:D:99:ALA:HB3 | 2:D:391:LEU:HD11 | 1.92 | 0.51 |
| 2:D:338:ASN:OD1 | 2:D:339:VAL:N | 2.44 | 0.51 |
| 2:D:524:GLN:HG2 | 2:D:583:PRO:HG2 | 1.92 | 0.51 |
| 1:G:109:THR:HG21 | 1:G:113:LYS:HB3 | 1.93 | 0.51 |
| 1:C:350:VAL:HG21 | 1:C:418:ILE:HD12 | 1.93 | 0.51 |
| 1:F:591:SER:H | 1:F:634:ARG:HH12 | 1.59 | 0.50 |
| 1:C:82:PRO:O | 1:C:239:GLN:NE2 | 2.43 | 0.50 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:C:456:PHE:H | 1:C:491:PRO:HB3 | 1.76 | 0.50 |
| 1:F:280:ASN:ND2 | 1:F:284:THR:OG1 | 2.45 | 0.50 |
| 1:F:770:ILE:HD11 | 1:F:1012:LEU:HD13 | 1.93 | 0.50 |
| 1:G:605:SER:OG | 1:G:606:ASN:N | 2.45 | 0.50 |
| 1:G:1086:LYS:HE3 | 1:G:1122:VAL:HG13 | 1.93 | 0.50 |
| 1:C:355:ARG:NH2 | 1:C:465:GLU:O | 2.44 | 0.50 |
| 1:C:409:GLN:HA | 1:C:414:GLN:HE22 | 1.75 | 0.50 |
| 1:F:294:ASP:O | 1:F:297:SER:OG | 2.29 | 0.50 |
| 1:G:1116:THR:HG23 | 1:G:1118:ASP:H | 1.76 | 0.50 |
| 1:G:79:PHE:N | 1:G:259:THR:O | 2.43 | 0.50 |
| 1:G:1092:GLU:OE2 | 1:G:1107:ARG:NE | 2.38 | 0.50 |
| 1:G:1028:LYS:NZ | 1:G:1042:PHE:O | 2.45 | 0.50 |
| 1:C:102:ARG:HD3 | 1:C:122:ASN:HA | 1.93 | 0.50 |
| 1:C:432:CYS:SG | 1:C:433:VAL:N | 2.85 | 0.50 |
| 1:F:329:PHE:O | 1:F:580:GLN:NE2 | 2.42 | 0.50 |
| 1:C:65:PHE:HZ | 1:C:84:LEU:HD11 | 1.77 | 0.50 |
| 1:F:452:LEU:HD13 | 1:F:492:LEU:HD23 | 1.93 | 0.49 |
| 1:F:1089:PHE:O | 1:F:1120:THR:OG1 | 2.29 | 0.49 |
| 1:C:54:LEU:HD22 | 1:C:272:PRO:HB3 | 1.94 | 0.49 |
| 1:F:715:PRO:HA | 1:F:1072:GLU:HA | 1.94 | 0.49 |
| 1:G:145:TYR:HE1 | 1:G:152:TRP:HE1 | 1.60 | 0.49 |
| 1:C:316:SER:OG | 1:C:317:ASN:N | 2.44 | 0.49 |
| 1:C:299:THR:HG22 | 1:C:308:VAL:HG11 | 1.94 | 0.49 |
| 1:G:104:TRP:HB2 | 1:G:119:ILE:HB | 1.93 | 0.49 |
| 1:G:141:LEU:HD22 | 1:G:157:PHE:HA | 1.93 | 0.49 |
| 2:D:235:PRO:O | 2:D:238:GLU:HB3 | 2.12 | 0.49 |
| 1:G:985:ASP:N | 1:G:985:ASP:OD1 | 2.45 | 0.49 |
| 1:G:316:SER:OG | 1:G:317:ASN:N | 2.45 | 0.49 |
| 1:G:645:THR:HG23 | 1:G:648:GLY:H | 1.78 | 0.49 |
| 1:F:396:TYR:HB2 | 1:F:514:SER:O | 2.12 | 0.49 |
| 1:G:702:GLU:OE2 | 1:C:790:LYS:NZ | 2.45 | 0.49 |
| 1:C:53:ASP:O | 1:C:272:PRO:HA | 2.13 | 0.49 |
| 1:G:966:LEU:O | 1:G:975:SER:OG | 2.31 | 0.49 |
| 1:C:16:VAL:HB | 1:C:141:LEU:HD22 | 1.94 | 0.49 |
| 1:F:605:SER:OG | 1:F:606:ASN:N | 2.45 | 0.48 |
| 2:D:21:ILE:HG12 | 2:D:84:PRO:HD2 | 1.95 | 0.48 |
| 1:F:1037:SER:OG | 1:F:1043:CYS:SG | 2.68 | 0.48 |
| 1:G:212:LEU:HD12 | 1:G:214:ARG:H | 1.78 | 0.48 |
| 1:G:961:THR:HA | 1:G:964:LYS:HG2 | 1.95 | 0.48 |
| 1:C:663:ASP:OD1 | 1:C:663:ASP:N | 2.44 | 0.48 |
| 1:F:897:PRO:HB2 | 1:F:900:MET:HE1 | 1.96 | 0.48 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 2:D:49:ASN:HA | 2:D:52:THR:HG22 | 1.94 | 0.48 |
| 2:D:365:THR:HG22 | 2:D:367:ASP:H | 1.77 | 0.48 |
| 1:G:215:ASP:OD1 | 1:G:266:TYR:OH | 2.31 | 0.48 |
| 1:G:277:LEU:HD21 | 1:G:285:ILE:HD12 | 1.95 | 0.48 |
| 1:G:737:ASP:HA | 1:G:764:LYS:HZ1 | 1.77 | 0.48 |
| 1:C:54:LEU:HB3 | 1:C:270:LEU:HD23 | 1.96 | 0.48 |
| 1:C:310:LYS:HD3 | 1:C:664:ILE:HD11 | 1.96 | 0.48 |
| 1:F:357:ARG:NH2 | 1:F:358:ILE:O | 2.39 | 0.48 |
| 1:F:880:GLY:O | 1:F:884:SER:OG | 2.28 | 0.48 |
| 1:G:128:ILE:HB | 1:G:170:TYR:HB3 | 1.96 | 0.48 |
| 1:G:246:ARG:NH1 | 1:G:255:SER:OG | 2.47 | 0.48 |
| 1:G:1091:ARG:HH12 | 1:G:1119:ASN:HA | 1.79 | 0.48 |
| 2:D:515:TYR:HD2 | 2:D:518:ARG:HH21 | 1.61 | 0.48 |
| 1:G:131:CYS:HA | 1:G:166:CYS:HB3 | 1.96 | 0.48 |
| 1:C:788:ILE:HG13 | 1:C:876:ALA:HB2 | 1.94 | 0.48 |
| 2:D:284:PRO:HG3 | 2:D:440:LEU:HD13 | 1.96 | 0.48 |
| 1:G:466:ARG:HD2 | 1:G:468:ILE:HD11 | 1.94 | 0.48 |
| 1:C:791:THR:HG21 | 1:C:806:LEU:HD11 | 1.95 | 0.47 |
| 2:D:205:GLY:HA2 | 2:D:219:ARG:HG2 | 1.96 | 0.47 |
| 1:F:391:CYS:HA | 1:F:525:CYS:HB3 | 1.95 | 0.47 |
| 1:F:442:ASP:O | 1:F:448:ASN:ND2 | 2.47 | 0.47 |
| 1:F:722:VAL:HA | 1:F:1064:HIS:O | 2.14 | 0.47 |
| 1:C:553:THR:HB | 1:C:586:ASP:HB2 | 1.95 | 0.47 |
| 1:F:364:ASP:N | 1:F:364:ASP:OD1 | 2.46 | 0.47 |
| 1:F:740:MET:HE2 | 1:C:319:ARG:HH12 | 1.79 | 0.47 |
| 1:G:869:MET:SD | 1:G:869:MET:N | 2.73 | 0.47 |
| 1:G:1103:PHE:CD2 | 1:G:1112:PRO:HB3 | 2.49 | 0.47 |
| 1:C:353:TRP:H | 1:C:466:ARG:HH22 | 1.61 | 0.47 |
| 1:C:555:SER:HB2 | 1:C:584:ILE:HB | 1.96 | 0.47 |
| 1:C:659:SER:HB3 | 1:C:698:SER:HB3 | 1.96 | 0.47 |
| 2:D:573:VAL:HG13 | 2:D:574:VAL:HG23 | 1.96 | 0.47 |
| 1:C:103:GLY:HA3 | 1:C:241:LEU:HB2 | 1.96 | 0.47 |
| 1:C:147:LYS:HE3 | 1:C:156:GLU:H | 1.80 | 0.47 |
| 2:D:260:GLY:HA3 | 2:D:610:TRP:HE3 | 1.79 | 0.47 |
| 1:F:808:ASP:OD2 | 1:F:811:LYS:N | 2.48 | 0.47 |
| 1:G:152:TRP:CD1 | 1:G:245:HIS:HE2 | 2.33 | 0.47 |
| 1:G:353:TRP:O | 1:G:466:ARG:NE | 2.46 | 0.47 |
| 1:G:566:GLY:HA3 | 1:G:575:ALA:HB3 | 1.96 | 0.47 |
| 1:C:122:ASN:ND2 | 1:C:125:ASN:O | 2.48 | 0.47 |
| 1:C:139:PRO:HB2 | 1:C:241:LEU:HD11 | 1.97 | 0.47 |
| 1:C:294:ASP:O | 1:C:297:SER:OG | 2.31 | 0.47 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:C:343:ASN:HB3 | 1:C:371:PHE:HZ | 1.80 | 0.47 |
| 2:D:226:VAL:HG13 | 2:D:516:TYR:CZ | 2.50 | 0.47 |
| 1:F:77:LYS:HG3 | 1:F:78:ARG:H | 1.80 | 0.47 |
| 1:F:357:ARG:HH22 | 1:F:395:VAL:H | 1.63 | 0.47 |
| 2:D:385:TYR:OH | 2:D:401:HIS:NE2 | 2.40 | 0.47 |
| 1:G:708:SER:HB3 | 1:G:711:SER:HB3 | 1.97 | 0.47 |
| 2:D:335:ASP:OD1 | 2:D:335:ASP:N | 2.48 | 0.47 |
| 1:F:966:LEU:O | 1:F:975:SER:OG | 2.32 | 0.47 |
| 1:G:1107:ARG:HD3 | 1:C:904:TYR:CZ | 2.50 | 0.47 |
| 2:D:187:LYS:NZ | 2:D:509:ASP:OD1 | 2.34 | 0.47 |
| 1:F:699:LEU:HD21 | 1:G:869:MET:HB2 | 1.98 | 0.46 |
| 2:D:183:TYR:CE1 | 2:D:187:LYS:HD2 | 2.51 | 0.46 |
| 1:F:759:PHE:HA | 1:F:762:GLN:HE22 | 1.80 | 0.46 |
| 1:C:473:TYR:HD2 | 1:C:488:CYS:HA | 1.80 | 0.46 |
| 1:F:936:ASP:O | 1:F:940:SER:HB3 | 2.16 | 0.46 |
| 1:C:364:ASP:OD2 | 1:C:365:TYR:N | 2.48 | 0.46 |
| 1:C:786:LYS:HA | 1:C:786:LYS:HD3 | 1.70 | 0.46 |
| 2:D:212:VAL:HG21 | 2:D:565:PRO:HG3 | 1.97 | 0.46 |
| 2:D:238:GLU:OE2 | 2:D:605:GLY:N | 2.44 | 0.46 |
| 1:F:120:VAL:HG12 | 1:F:122:ASN:HD22 | 1.80 | 0.46 |
| 1:F:897:PRO:HA | 1:C:707:TYR:HE1 | 1.81 | 0.46 |
| 1:F:1091:ARG:NH1 | 1:F:1118:ASP:O | 2.45 | 0.46 |
| 1:G:357:ARG:HH21 | 1:G:396:TYR:HE1 | 1.64 | 0.46 |
| 2:D:567:THR:HB | 2:D:577:LYS:HE2 | 1.96 | 0.46 |
| 1:F:210:ILE:HG21 | 1:F:217:PRO:HG2 | 1.98 | 0.46 |
| 1:F:326:ILE:HG23 | 1:F:531:THR:HG23 | 1.98 | 0.46 |
| 1:G:192:PHE:HA | 1:G:204:TYR:O | 2.14 | 0.46 |
| 1:G:712:ILE:O | 1:G:1074:ASN:HA | 2.14 | 0.46 |
| 1:F:401:VAL:HG22 | 1:F:509:ARG:HD3 | 1.96 | 0.46 |
| 1:G:54:LEU:HD22 | 1:G:272:PRO:HB3 | 1.98 | 0.46 |
| 1:C:328:ARG:HG2 | 1:C:579:PRO:HD2 | 1.97 | 0.46 |
| 1:F:296:LEU:HB3 | 1:F:608:VAL:HG11 | 1.97 | 0.46 |
| 1:F:384:PRO:HA | 1:F:387:LEU:HD23 | 1.97 | 0.46 |
| 1:C:574:ASP:HA | 1:C:587:ILE:HB | 1.97 | 0.46 |
| 1:F:894:LEU:HD13 | 1:C:715:PRO:HD3 | 1.98 | 0.45 |
| 1:G:785:VAL:HG22 | 1:G:787:GLN:H | 1.80 | 0.45 |
| 1:G:1091:ARG:NH1 | 1:G:1119:ASN:HA | 2.31 | 0.45 |
| 1:F:342:PHE:HB3 | 1:F:371:PHE:CE2 | 2.51 | 0.45 |
| 1:G:50:SER:HB2 | 1:G:276:LEU:HB2 | 1.98 | 0.45 |
| 1:G:574:ASP:HA | 1:G:587:ILE:HB | 1.97 | 0.45 |
| 1:F:56:LEU:HD11 | 1:F:91:TYR:CG | 2.52 | 0.45 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:F:328:ARG:HG2 | 1:F:579:PRO:HD2 | 1.98 | 0.45 |
| 1:G:970:PHE:HE1 | 1:C:756:TYR:HA | 1.80 | 0.45 |
| 1:G:788:ILE:HG13 | 1:G:876:ALA:HB2 | 1.99 | 0.45 |
| 1:C:110:LEU:HB3 | 1:C:135:PHE:HB2 | 1.98 | 0.45 |
| 2:D:198:ASP:HB3 | 2:D:201:ASP:H | 1.81 | 0.45 |
| 1:F:100:ILE:HG22 | 1:F:242:LEU:HD12 | 1.97 | 0.45 |
| 1:C:318:PHE:H | 1:C:593:GLY:HA3 | 1.82 | 0.45 |
| 2:D:355:ASP:OD2 | 2:D:357:ARG:NH2 | 2.49 | 0.45 |
| 2:D:527:GLU:HB3 | 2:D:539:LEU:HD11 | 1.98 | 0.45 |
| 1:G:722:VAL:HG12 | 1:G:930:ALA:HB1 | 1.98 | 0.45 |
| 1:G:1039:ARG:NE | 1:C:1031:GLU:OE2 | 2.49 | 0.45 |
| 1:C:591:SER:H | 1:C:634:ARG:HH12 | 1.65 | 0.45 |
| 2:D:267:LEU:HB3 | 2:D:275:TRP:HE1 | 1.82 | 0.45 |
| 1:F:725:GLU:OE1 | 1:F:1064:HIS:NE2 | 2.48 | 0.45 |
| 1:F:1129:VAL:HG22 | 1:G:917:TYR:HB3 | 1.98 | 0.45 |
| 1:G:420:ASP:OD1 | 1:G:420:ASP:N | 2.50 | 0.45 |
| 1:C:177:MET:HG2 | 1:C:178:ASP:H | 1.81 | 0.45 |
| 1:F:215:ASP:OD1 | 1:F:266:TYR:OH | 2.33 | 0.45 |
| 1:G:215:ASP:HB3 | 1:G:216:LEU:H | 1.59 | 0.45 |
| 2:D:47:SER:HA | 2:D:62:MET:HE1 | 1.98 | 0.45 |
| 1:C:128:ILE:HB | 1:C:170:TYR:HB3 | 1.99 | 0.45 |
| 1:C:1083:HIS:HB3 | 1:C:1088:HIS:HE2 | 1.81 | 0.45 |
| 2:D:334:THR:OG1 | 2:D:335:ASP:N | 2.49 | 0.45 |
| 1:F:102:ARG:HD3 | 1:F:122:ASN:HA | 1.98 | 0.44 |
| 1:F:333:THR:HG22 | 1:F:362:VAL:HG21 | 1.99 | 0.44 |
| 1:G:420:ASP:HA | 1:G:424:LYS:HE2 | 1.99 | 0.44 |
| 1:C:96:GLU:OE2 | 1:C:100:ILE:N | 2.50 | 0.44 |
| 2:D:240:LEU:HD21 | 2:D:591:LEU:HD21 | 1.99 | 0.44 |
| 1:G:393:THR:O | 1:G:523:THR:OG1 | 2.35 | 0.44 |
| 1:G:906:PHE:HB3 | 1:G:911:VAL:HB | 1.99 | 0.44 |
| 1:C:326:ILE:HG23 | 1:C:531:THR:HG23 | 1.99 | 0.44 |
| 1:F:786:LYS:HA | 1:F:786:LYS:HD3 | 1.82 | 0.44 |
| 1:C:53:ASP:OD1 | 1:C:53:ASP:N | 2.47 | 0.44 |
| 1:C:146:GLN:NE2 | 1:C:249:LEU:HB2 | 2.32 | 0.44 |
| 1:C:1115:ILE:HG22 | 1:C:1137:VAL:HG23 | 2.00 | 0.44 |
| 1:F:336:CYS:HB2 | 1:F:361:CYS:HB2 | 1.78 | 0.44 |
| 1:F:457:ARG:HH22 | 1:F:461:LEU:HD13 | 1.81 | 0.44 |
| 1:F:559:PHE:HB3 | 1:F:560:LEU:H | 1.51 | 0.44 |
| 1:C:424:LYS:HD3 | 1:C:424:LYS:HA | 1.84 | 0.44 |
| 1:F:1028:LYS:NZ | 1:F:1042:PHE:O | 2.51 | 0.44 |
| 1:G:567:ARG:HD2 | 1:G:571:ASP:HA | 2.00 | 0.44 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:G:1129:VAL:HG22 | 1:G:1132:ILE:HD11 | 1.99 | 0.44 |
| 1:C:805:ILE:HD13 | 1:C:1052:PHE:CE2 | 2.53 | 0.44 |
| 1:F:113:LYS:HG3 | 1:F:114:THR:HG23 | 1.98 | 0.44 |
| 1:F:815:ARG:HB3 | 1:F:819:GLU:HB3 | 2.00 | 0.44 |
| 2:D:260:GLY:HA2 | 2:D:482:ARG:NH2 | 2.32 | 0.44 |
| 1:C:179:LEU:HD12 | 1:C:180:GLU:HB2 | 1.99 | 0.43 |
| 1:C:744:GLY:H | 1:C:977:LEU:HD13 | 1.83 | 0.43 |
| 1:C:819:GLU:OE2 | 1:C:1055:SER:N | 2.51 | 0.43 |
| 2:D:419:LYS:HB2 | 2:D:424:LEU:HD23 | 1.99 | 0.43 |
| 1:F:68:ILE:H | 1:F:78:ARG:HH22 | 1.66 | 0.43 |
| 1:C:311:GLY:HA2 | 1:C:664:ILE:HG23 | 1.99 | 0.43 |
| 2:D:557:MET:HE2 | 2:D:558:LEU:HD12 | 1.98 | 0.43 |
| 1:F:159:VAL:HG23 | 1:F:160:TYR:CD2 | 2.53 | 0.43 |
| 1:F:342:PHE:HB3 | 1:F:371:PHE:HE2 | 1.82 | 0.43 |
| 1:F:959:LEU:O | 1:F:962:LEU:HB3 | 2.18 | 0.43 |
| 1:G:375:PHE:N | 1:G:435:ALA:O | 2.52 | 0.43 |
| 2:D:174:LYS:HA | 2:D:174:LYS:HD2 | 1.87 | 0.43 |
| 1:F:81:ASN:HB3 | 1:F:138:ASP:HB3 | 2.01 | 0.43 |
| 1:F:756:TYR:HB3 | 1:F:759:PHE:CD1 | 2.54 | 0.43 |
| 1:G:80:ASP:OD1 | 1:G:81:ASN:N | 2.52 | 0.43 |
| 1:C:383:SER:OG | 1:C:386:LYS:NZ | 2.46 | 0.43 |
| 1:G:411:ALA:HB3 | 1:G:414:GLN:HB2 | 2.00 | 0.43 |
| 1:C:80:ASP:OD1 | 1:C:81:ASN:N | 2.50 | 0.43 |
| 1:C:294:ASP:OD1 | 1:C:294:ASP:N | 2.51 | 0.43 |
| 1:C:506:GLN:OE1 | 1:C:507:PRO:HD2 | 2.18 | 0.43 |
| 1:C:616:ASN:HA | 1:C:644:GLN:HE22 | 1.84 | 0.43 |
| 1:C:1114:ILE:O | 1:C:1119:ASN:ND2 | 2.52 | 0.43 |
| 2:D:274:PHE:HB3 | 2:D:276:THR:HG22 | 2.00 | 0.43 |
| 1:F:474:GLN:OE1 | 1:F:481:ASN:N | 2.48 | 0.43 |
| 1:G:203:ILE:HB | 1:G:227:VAL:HB | 2.00 | 0.43 |
| 2:D:187:LYS:HA | 2:D:190:MET:HE2 | 2.00 | 0.43 |
| 2:D:476:LYS:O | 2:D:480:MET:CB | 2.66 | 0.43 |
| 1:F:102:ARG:HH11 | 1:F:122:ASN:HA | 1.83 | 0.42 |
| 1:F:456:PHE:HB2 | 1:F:491:PRO:HA | 2.00 | 0.42 |
| 1:C:436:TRP:NE1 | 1:C:509:ARG:HB2 | 2.34 | 0.42 |
| 1:F:33:THR:OG1 | 1:F:219:GLY:O | 2.36 | 0.42 |
| 1:F:760:CYS:HA | 1:F:763:LEU:HB2 | 2.01 | 0.42 |
| 1:G:950:ASP:OD1 | 1:G:950:ASP:N | 2.51 | 0.42 |
| 1:C:106:PHE:HB3 | 1:C:235:ILE:HD12 | 2.01 | 0.42 |
| 1:F:444:LYS:HG2 | 1:F:446:SER:H | 1.84 | 0.42 |
| 1:G:448:ASN:HB3 | 1:G:497:PHE:H | 1.85 | 0.42 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:C:280:ASN:OD1 | 1:C:284:THR:N | 2.53 | 0.42 |
| 1:C:424:LYS:HE3 | 1:C:460:LYS:HD2 | 2.00 | 0.42 |
| 2:D:589:GLU:HG2 | 2:D:590:PRO:HD3 | 2.01 | 0.42 |
| 1:F:40:ASP:OD2 | 1:F:44:ARG:NH2 | 2.52 | 0.42 |
| 1:C:149:ASN:HB3 | 1:C:153:MET:HE3 | 2.00 | 0.42 |
| 1:C:560:LEU:H | 1:C:563:GLN:HB3 | 1.84 | 0.42 |
| 1:C:724:THR:HG22 | 1:C:1063:LEU:HD23 | 2.00 | 0.42 |
| 1:F:55:PHE:HB2 | 1:F:275:PHE:CE2 | 2.54 | 0.42 |
| 1:F:535:LYS:NZ | 1:F:552:LEU:O | 2.35 | 0.42 |
| 1:G:985:ASP:HB2 | 1:G:987:PRO:HD2 | 2.02 | 0.42 |
| 1:F:349:SER:OG | 1:F:350:VAL:N | 2.51 | 0.42 |
| 1:G:334:ASN:O | 1:G:362:VAL:N | 2.53 | 0.42 |
| 1:G:998:THR:HA | 1:G:1001:LEU:HG | 2.02 | 0.42 |
| 1:C:334:ASN:HD21 | 1:C:361:CYS:HA | 1.85 | 0.42 |
| 1:C:357:ARG:NH2 | 1:C:396:TYR:OH | 2.41 | 0.42 |
| 1:G:1129:VAL:HG23 | 1:C:917:TYR:HB3 | 2.01 | 0.42 |
| 1:F:343:ASN:HB3 | 1:F:371:PHE:HZ | 1.84 | 0.42 |
| 1:G:819:GLU:OE2 | 1:G:1055:SER:N | 2.52 | 0.42 |
| 1:C:349:SER:OG | 1:C:350:VAL:N | 2.51 | 0.42 |
| 1:F:68:ILE:HB | 1:F:78:ARG:NH1 | 2.35 | 0.42 |
| 1:F:457:ARG:NE | 1:F:459:SER:O | 2.52 | 0.42 |
| 1:F:707:TYR:HE1 | 1:G:897:PRO:HA | 1.85 | 0.42 |
| 1:F:714:ILE:HD13 | 1:F:714:ILE:HA | 1.89 | 0.42 |
| 1:G:564:GLN:HB2 | 1:G:577:ARG:HB2 | 2.02 | 0.42 |
| 2:D:482:ARG:NH1 | 2:D:606:TRP:HB2 | 2.35 | 0.42 |
| 1:G:86:PHE:N | 1:G:236:THR:O | 2.43 | 0.42 |
| 1:C:138:ASP:OD1 | 1:C:138:ASP:N | 2.51 | 0.42 |
| 2:D:407:ILE:HG23 | 2:D:522:GLN:HB2 | 2.01 | 0.42 |
| 1:C:438:SER:HB3 | 1:C:509:ARG:HG2 | 2.01 | 0.41 |
| 2:D:188:ASN:OD1 | 2:D:192:ARG:NH1 | 2.53 | 0.41 |
| 1:C:94:SER:HB2 | 1:C:265:TYR:HA | 2.00 | 0.41 |
| 2:D:539:LEU:HD22 | 2:D:587:TYR:HB2 | 2.00 | 0.41 |
| 1:G:64:TRP:HE1 | 1:G:264:ALA:HB1 | 1.86 | 0.41 |
| 1:G:877:LEU:HD23 | 1:G:877:LEU:HA | 1.90 | 0.41 |
| 1:C:326:ILE:O | 1:C:541:PHE:HA | 2.19 | 0.41 |
| 1:G:436:TRP:HE1 | 1:G:509:ARG:NH2 | 2.19 | 0.41 |
| 1:G:960:ASN:HA | 1:G:963:VAL:HG12 | 2.02 | 0.41 |
| 1:F:293:LEU:HG | 1:F:294:ASP:H | 1.85 | 0.41 |
| 1:F:324:GLU:HG2 | 1:F:539:VAL:HG23 | 2.02 | 0.41 |
| 1:F:462:LYS:HA | 1:F:462:LYS:HD3 | 1.94 | 0.41 |
| 1:C:923:ILE:O | 1:C:927:PHE:N | 2.43 | 0.41 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 2:D:493:HIS:NE2 | 2:D:497:TYR:HB2 | 2.36 | 0.41 |
| 1:F:77:LYS:N | 1:F:257:GLY:O | 2.54 | 0.41 |
| 1:F:517:LEU:HD23 | 1:F:517:LEU:HA | 1.91 | 0.41 |
| 1:F:716:THR:HG22 | 1:F:1110:TYR:HB3 | 2.03 | 0.41 |
| 1:G:605:SER:OG | 1:G:607:GLN:OE1 | 2.39 | 0.41 |
| 1:C:37:TYR:OH | 1:C:195:LYS:NZ | 2.39 | 0.41 |
| 1:C:226:LEU:HG | 1:C:227:VAL:HG23 | 2.03 | 0.41 |
| 1:C:428:ASP:OD1 | 1:C:428:ASP:N | 2.53 | 0.41 |
| 1:G:747:THR:O | 1:G:750:SER:OG | 2.33 | 0.41 |
| 1:G:767:LEU:HA | 1:G:770:ILE:HG22 | 2.02 | 0.41 |
| 1:C:151:SER:OG | 1:C:152:TRP:N | 2.44 | 0.41 |
| 1:C:353:TRP:O | 1:C:466:ARG:NH1 | 2.53 | 0.41 |
| 1:C:869:MET:SD | 1:C:869:MET:N | 2.89 | 0.41 |
| 1:F:40:ASP:OD1 | 1:F:40:ASP:N | 2.51 | 0.41 |
| 1:F:722:VAL:HG12 | 1:F:930:ALA:HB1 | 2.03 | 0.41 |
| 1:F:68:ILE:O | 1:F:78:ARG:NH2 | 2.55 | 0.40 |
| 1:F:317:ASN:HA | 1:F:594:GLY:H | 1.86 | 0.40 |
| 1:F:473:TYR:O | 1:F:474:GLN:NE2 | 2.55 | 0.40 |
| 1:F:616:ASN:HA | 1:F:644:GLN:HE22 | 1.85 | 0.40 |
| 1:G:341:VAL:HG22 | 1:G:356:LYS:HD3 | 2.04 | 0.40 |
| 1:G:347:PHE:CE2 | 1:G:509:ARG:HD2 | 2.56 | 0.40 |
| 1:G:530:SER:OG | 1:G:531:THR:N | 2.54 | 0.40 |
| 1:G:878:LEU:HA | 1:G:881:THR:HG22 | 2.03 | 0.40 |
| 1:C:191:GLU:HG2 | 1:C:206:LYS:HB3 | 2.03 | 0.40 |
| 2:D:267:LEU:HB3 | 2:D:275:TRP:NE1 | 2.36 | 0.40 |
| 2:D:475:LYS:NZ | 2:D:495:GLU:OE1 | 2.53 | 0.40 |
| 1:F:424:LYS:H | 1:F:461:LEU:HD23 | 1.86 | 0.40 |
| 1:C:78:ARG:HE | 1:C:261:GLY:HA3 | 1.86 | 0.40 |
| 2:D:530:CYS:HB3 | 2:D:542:CYS:HB3 | 1.90 | 0.40 |
| 1:F:29:THR:OG1 | 1:F:30:ASN:N | 2.53 | 0.40 |
| 1:F:37:TYR:OH | 1:F:195:LYS:NZ | 2.37 | 0.40 |
| 1:F:104:TRP:HB2 | 1:F:119:ILE:HB | 2.03 | 0.40 |
| 1:G:455:LEU:HD22 | 1:G:493:GLN:HE22 | 1.87 | 0.40 |
| 1:G:738:CYS:HB3 | 1:G:760:CYS:HB2 | 1.89 | 0.40 |
| 1:G:738:CYS:H | 1:G:764:LYS:HZ3 | 1.67 | 0.40 |
| 1:C:747:THR:O | 1:C:750:SER:OG | 2.31 | 0.40 |
| 1:G:993:ILE:O | 1:G:997:ILE:HG12 | 2.22 | 0.40 |
| 1:C:129:LYS:NZ | 1:C:169:GLU:HA | 2.36 | 0.40 |
| 2:D:306:ARG:HH12 | 2:D:310:GLU:HG2 | 1.85 | 0.40 |
| 1:F:777:ASN:HD21 | 1:F:1019:ARG:HD2 | 1.86 | 0.40 |
| 1:F:1083:HIS:O | 1:F:1086:LYS:HG2 | 2.21 | 0.40 |

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| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 1:G:113:LYS:HG3 | 1:G:114:THR:HG23 | 2.03 | 0.40 |
| 1:G:905:ARG:O | 1:G:1036:GLN:NE2 | 2.52 | 0.40 |
| 1:C:17:ASN:ND2 | 1:C:138:ASP:OD1 | 2.38 | 0.40 |
| 1:C:636:TYR:HB3 | 1:C:637:SER:H | 1.77 | 0.40 |
| 2:D:304:ALA:HA | 2:D:362:THR:HG21 | 2.03 | 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 PDB entries followed by that with respect to all EM entries.

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 | C | 1053/1221 (86%) | 947 (90%) | 106 (10%) | 0 | 100 | 100 |
| 1 | F | 1052/1221 (86%) | 959 (91%) | 92 (9%) | 1 (0%) | 48 | 82 |
| 1 | G | 1052/1221 (86%) | 960 (91%) | 91 (9%) | 1 (0%) | 48 | 82 |
| 2 | D | 592/594 (100%) | 565 (95%) | 26 (4%) | 1 (0%) | 44 | 78 |
| All | All | 3749/4257 (88%) | 3431 (92%) | 315 (8%) | 3 (0%) | 50 | 82 |

All (3) Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 2 | D | 303 | ASP |
| 1 | F | 248 | TYR |
| 1 | G | 443 | SER |

### 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 PDB entries followed by that with respect to all EM entries.

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 | C | 935/1056 (88%) | 935 (100%) | 0 | 100 | 100 |
| 1 | F | 934/1056 (88%) | 934 (100%) | 0 | 100 | 100 |
| 1 | G | 934/1056 (88%) | 933 (100%) | 1 (0%) | 92 | 95 |
| 2 | D | 525/525 (100%) | 525 (100%) | 0 | 100 | 100 |
| All | All | 3328/3693 (90%) | 3327 (100%) | 1 (0%) | 100 | 100 |

All (1) residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
| --- | --- | --- | --- |
| 1 | G | 895 | GLN |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

| Mol | Chain | Res | Type |
| --- | --- | --- | --- |
| 1 | F | 115 | GLN |
| 1 | F | 121 | ASN |
| 1 | F | 211 | ASN |
| 1 | F | 271 | GLN |
| 1 | F | 542 | ASN |
| 1 | F | 606 | ASN |
| 1 | F | 853 | GLN |
| 1 | F | 925 | ASN |
| 1 | F | 949 | GLN |
| 1 | G | 115 | GLN |
| 1 | G | 211 | ASN |
| 1 | G | 321 | GLN |
| 1 | G | 414 | GLN |
| 1 | G | 762 | GLN |
| 1 | G | 774 | GLN |
| 1 | G | 856 | ASN |
| 1 | G | 1048 | HIS |
| 1 | G | 1108 | ASN |
| 1 | C | 115 | GLN |
| 1 | C | 122 | ASN |
| 1 | C | 164 | ASN |
| 1 | C | 607 | GLN |
| 1 | C | 1010 | GLN |
| 1 | C | 1083 | HIS |

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| Mol | Chain | Res | Type |
|-----|-------|------|------|
| 1 | C | 1101 | HIS |
| 1 | C | 1106 | GLN |
| 2 | D | 277 | ASN |
| 2 | D | 287 | GLN |
| 2 | D | 580 | ASN |

### 5.3.3 RNA ⓘ

There are no RNA molecules 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 oligosaccharides in this entry.

## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 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.