# wwPDB NMR Structure Validation Summary Report ⓘ

Mar 25, 2024 – 12:08 PM JST

| | | |
|---|---|---|
| PDB ID | : | 8X8T |
| BMRB ID | : | 36619 |
| Title | : | NMR structure of p75NTR juxtamembrane domain in complex with RhoGDI N-terminal domain containing a phosphorylation-mimicking S34D mutation |
| Authors | : | Lin, Z.; Li, Z. |
| Deposited on | : | 2023-11-28 |

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

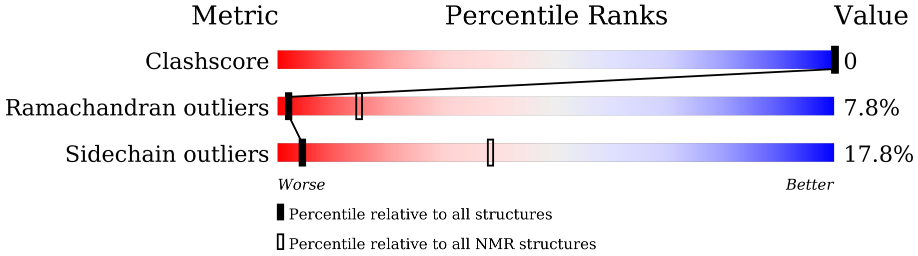
| | | |
|---|---|---|
| Cyrange | : | Kirchner and Güntert (2011) |
| NmrClust | : | Kelley et al. (1996) |
| MolProbity | : | 4.02b-467 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| wwPDB-RCI | : | v_1n_11_5_13_A (Berjanski et al., 2005) |
| PANAV | : | Wang et al. (2010) |
| wwPDB-ShiftChecker | : | v1.2 |
| BMRB Restraints Analysis | : | v1.2 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.36 |

# 1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
*SOLUTION NMR*

The overall completeness of chemical shifts assignment is 74%.

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) | NMR archive (#Entries) |
|---|---|---|
| Clashscore | 158937 | 12864 |
| Ramachandran outliers | 154571 | 11451 |
| Sidechain outliers | 154315 | 11428 |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the experimental data. The red, orange, yellow and green segments indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria. A cyan segment indicates the fraction of residues that are not part of the well-defined cores, and 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 | A | 61 |  72% 13% 15% |
| 2 | B | 62 |  56% 10% 34% |

# 2 Ensemble composition and analysis ⓘ

This entry contains 10 models. Model 2 is the overall representative, medoid model (most similar to other models). The authors have identified model 1 as representative, based on the following criterion: *lowest energy*.

The following residues are included in the computation of the global validation metrics.

| **Well-defined (core) protein residues** | | | |
|---|---|---|---|
| **Well-defined core** | **Residue range (total)** | **Backbone RMSD (Å)** | **Medoid model** |
| 1 | A:8-A:59, B:285-B:325 (93) | 1.20 | 2 |

Ill-defined regions of proteins are excluded from the global statistics.

Ligands and non-protein polymers are included in the analysis.

The models can be grouped into 3 clusters and 1 single-model cluster was found.

| **Cluster number** | **Models** |
|---|---|
| 1 | 2, 3, 6, 10 |
| 2 | 4, 5, 8 |
| 3 | 1, 9 |
| Single-model clusters | 7 |

# 3 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 1849 atoms, of which 899 are hydrogens and 0 are deuteriums.

- Molecule 1 is a protein called Rho GDP-dissociation inhibitor 1.

| Mol | Chain | Residues | Atoms | | | | | Trace |
|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | |
| 1 | A | 61 | 942 | 293 | 459 | 82 | 108 | 0 |

There are 3 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | 0 | GLY | - | expression tag | UNP P52565 |
| A | 1 | SER | - | expression tag | UNP P52565 |
| A | 34 | ASP | SER | engineered mutation | UNP P52565 |

- Molecule 2 is a protein called Tumor necrosis factor receptor superfamily member 16.

| Mol | Chain | Residues | Atoms | | | | | | Trace |
|---|---|---|---|---|---|---|---|---|---|
| | | | Total | C | H | N | O | S | |
| 2 | B | 62 | 907 | 275 | 440 | 92 | 99 | 1 | 0 |

There are 2 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| B | 271 | GLY | - | expression tag | UNP P08138 |
| B | 272 | SER | - | expression tag | UNP P08138 |

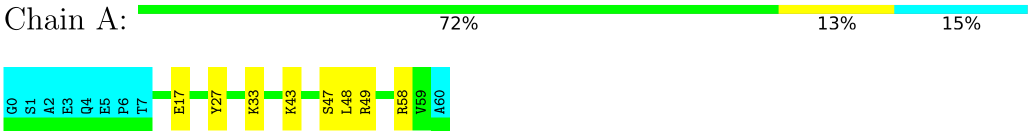
# 4 Residue-property plots (i)

## 4.1 Average score per residue in the NMR ensemble

These plots are provided for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic is the same as shown in the summary in section 1 of this report. The second graphic shows the sequence where residues are colour-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 outliers are shown as green connectors. Residues which are classified as ill-defined in the NMR ensemble, are shown in cyan with an underline colour-coded according to the previous scheme. Residues which were present in the experimental sample, but not modelled in the final structure are shown in grey.

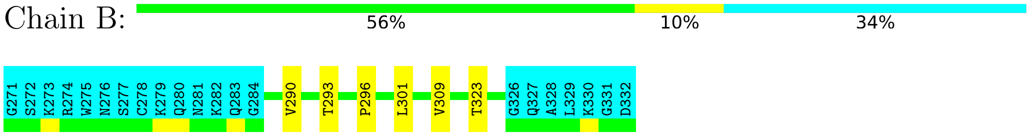
- Molecule 1: Rho GDP-dissociation inhibitor 1

Chain A:



- Molecule 2: Tumor necrosis factor receptor superfamily member 16

Chain B:

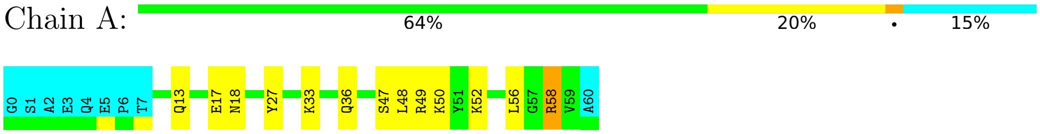


## 4.2 Residue scores for the representative (medoid) model from the NMR ensemble

The representative model is number 2. Colouring as in section 4.1 above.

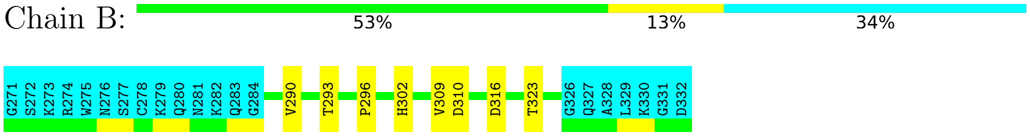
- Molecule 1: Rho GDP-dissociation inhibitor 1

Chain A:



- Molecule 2: Tumor necrosis factor receptor superfamily member 16

Chain B:



# 5 Refinement protocol and experimental data overview ⓘ

The models were refined using the following method: *torsion angle dynamics*.

Of the 100 calculated structures, 10 were deposited, based on the following criterion: *structures with the lowest energy*.

The following table shows the software used for structure solution, optimisation and refinement.

| **Software name** | **Classification** | **Version** |
|---|---|---|
| Amber | refinement | |
| CYANA | structure calculation | |

The following table shows chemical shift validation statistics as aggregates over all chemical shift files. Detailed validation can be found in section 7 of this report.

| Chemical shift file(s) | working_cs.cif |
|---|---|
| Number of chemical shift lists | 1 |
| Total number of shifts | 1143 |
| Number of shifts mapped to atoms | 1143 |
| Number of unparsed shifts | 0 |
| Number of shifts with mapping errors | 0 |
| Number of shifts with mapping warnings | 0 |
| Assignment completeness (well-defined parts) | 74% |

# 6 Model quality (i)

## 6.1 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 (average) 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 | 0.71±0.01 | 0±0/426 ( 0.0± 0.0%) | 1.01±0.04 | 1±1/574 ( 0.1± 0.2%) |
| 2 | B | 0.64±0.01 | 0±0/315 ( 0.0± 0.0%) | 0.97±0.04 | 0±0/432 ( 0.0± 0.1%) |
| All | All | 0.68 | 0/7410 ( 0.0%) | 0.99 | 8/10060 ( 0.1%) |

There are no bond-length outliers.

All unique angle outliers are listed below. They are sorted according to the Z-score of the worst occurrence in the ensemble.

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) | Models | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Worst | Total |
| 1 | A | 49 | ARG | NE-CZ-NH1 | 8.30 | 124.45 | 120.30 | 2 | 3 |
| 2 | B | 288 | ARG | NE-CZ-NH1 | 5.92 | 123.26 | 120.30 | 5 | 2 |
| 1 | A | 58 | ARG | NE-CZ-NH1 | 5.35 | 122.97 | 120.30 | 5 | 2 |
| 1 | A | 49 | ARG | NE-CZ-NH2 | -5.14 | 117.73 | 120.30 | 2 | 1 |

There are no chirality outliers.

There are no planarity outliers.

## 6.2 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 each 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 averaged over the ensemble.

| Mol | Chain | Non-H | H(model) | H(added) | Clashes |
|---|---|---|---|---|---|
| All | All | 7280 | 6860 | 6860 | - |

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 -.

There are no clashes.

## 6.3 Torsion angles ⓘ

### 6.3.1 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 NMR 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 | A | 52/61 (85%) | 38±1 (73±2%) | 11±2 (21±3%) | 3±1 (5±2%) | 3 | 23 |
| 2 | B | 41/62 (66%) | 24±2 (60±4%) | 12±2 (30±5%) | 4±2 (11±5%) | 1 | 8 |
| All | All | 930/1230 (76%) | 626 (67%) | 231 (25%) | 73 (8%) | 2 | 14 |

5 of 23 unique Ramachandran outliers are listed below. They are sorted by the frequency of occurrence in the ensemble.

| Mol | Chain | Res | Type | Models (Total) |
|---|---|---|---|---|
| 1 | A | 47 | SER | 10 |
| 2 | B | 290 | VAL | 8 |
| 1 | A | 43 | LYS | 7 |
| 2 | B | 296 | PRO | 7 |
| 2 | B | 289 | PRO | 5 |

### 6.3.2 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 NMR 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 | A | 45/51 (88%) | 36±2 (80±4%) | 9±2 (20±4%) | 3 | 33 |
| 2 | B | 37/53 (70%) | 32±1 (85±2%) | 6±1 (15±2%) | 6 | 44 |
| All | All | 820/1040 (79%) | 674 (82%) | 146 (18%) | 4 | 38 |

5 of 45 unique residues with a non-rotameric sidechain are listed below. They are sorted by the frequency of occurrence in the ensemble.

| Mol | Chain | Res | Type | Models (Total) |
|---|---|---|---|---|
| 1 | A | 17 | GLU | 10 |
| 1 | A | 48 | LEU | 10 |

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| Mol | Chain | Res | Type | Models (Total) |
|---|---|---|---|---|
| 2 | B | 323 | THR | 9 |
| 1 | A | 33 | LYS | 9 |
| 1 | A | 27 | TYR | 8 |

### 6.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 6.4 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 6.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 6.7 Other polymers ⓘ

There are no such molecules in this entry.

## 6.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

# 7 Chemical shift validation (i)

The completeness of assignment taking into account all chemical shift lists is 74% for the well-defined parts and 73% for the entire structure.

## 7.1 Chemical shift list 1

File name: working_cs.cif

Chemical shift list name: *assigned_chemical_shifts_1*

### 7.1.1 Bookkeeping (i)

The following table shows the results of parsing the chemical shift list and reports the number of nuclei with statistically unusual chemical shifts.

| | |
|---|---|
| Total number of shifts | 1143 |
| Number of shifts mapped to atoms | 1143 |
| Number of unparsed shifts | 0 |
| Number of shifts with mapping errors | 0 |
| Number of shifts with mapping warnings | 0 |
| Number of shift outliers (ShiftChecker) | 0 |

### 7.1.2 Chemical shift referencing (i)

The following table shows the suggested chemical shift referencing corrections.

| **Nucleus** | **# values** | **Correction ± precision, *ppm*** | **Suggested action** |
|---|---|---|---|
| $^{13}C_{\alpha}$ | 118 | 0.15 ± 0.15 | None needed (< 0.5 ppm) |
| $^{13}C_{\beta}$ | 112 | 0.00 ± 0.25 | None needed (< 0.5 ppm) |
| $^{13}C'$ | 0 | — | None (insufficient data) |
| $^{15}N$ | 105 | -1.28 ± 0.22 | Should be applied |

### 7.1.3 Completeness of resonance assignments (i)

The following table shows the completeness of the chemical shift assignments for the well-defined regions of the structure. The overall completeness is 74%, i.e. 900 atoms were assigned a chemical shift out of a possible 1210. 0 out of 11 assigned methyl groups (LEU and VAL) were assigned stereospecifically.

| | **Total** | $^{1}$**H** | $^{13}$**C** | $^{15}$**N** |
|---|---|---|---|---|
| Backbone | 340/454 (75%) | 168/182 (92%) | 90/186 (48%) | 82/86 (95%) |
| Sidechain | 560/710 (79%) | 374/452 (83%) | 175/229 (76%) | 11/29 (38%) |

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| | **Total** | $^{1}$**H** | $^{13}$**C** | $^{15}$**N** |
|---|---|---|---|---|
| Aromatic | 0/46 (0%) | 0/24 (0%) | 0/18 (0%) | 0/4 (0%) |
| Overall | 900/1210 (74%) | 542/658 (82%) | 265/433 (61%) | 93/119 (78%) |

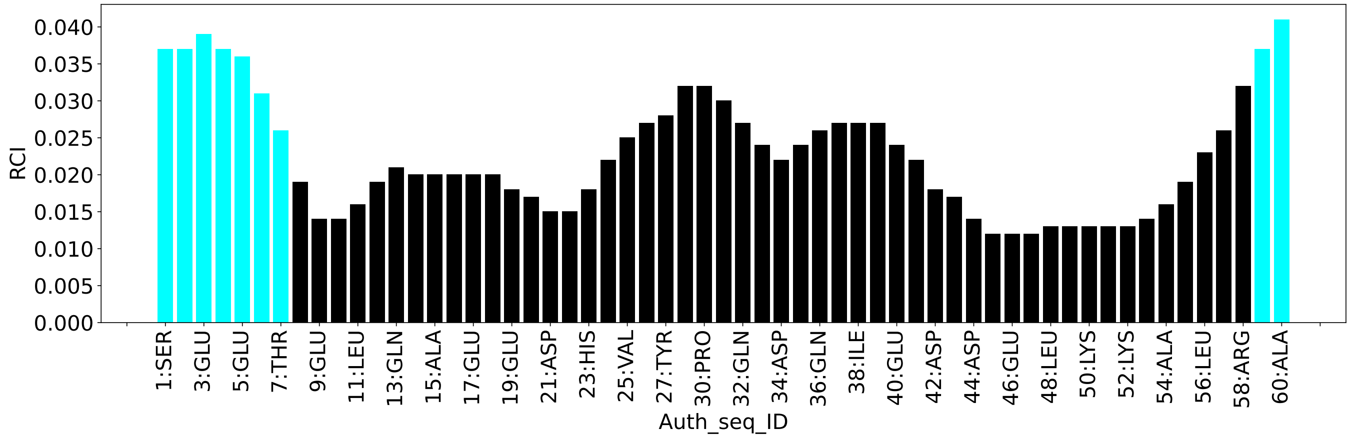
### 7.1.4 Statistically unusual chemical shifts ⓘ

There are no statistically unusual chemical shifts.

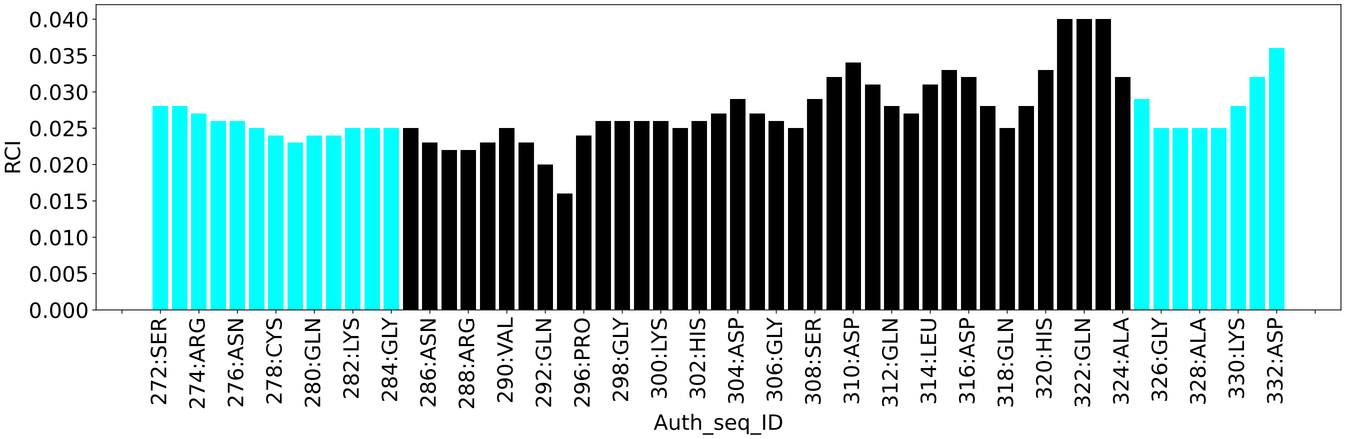
### 7.1.5 Random Coil Index (RCI) plots ⓘ

The image below reports *random coil index* values for the protein chains in the structure. The height of each bar gives a probability of a given residue to be disordered, as predicted from the available chemical shifts and the amino acid sequence. A value above 0.2 is an indication of significant predicted disorder. The colour of the bar shows whether the residue is in the well-defined core (black) or in the ill-defined residue ranges (cyan), as described in section 2 on ensemble composition.If well-defined core and ill-defined regions are not identified then it is shown as gray bars.

Random coil index (RCI) for chain A:



Random coil index (RCI) for chain B:


RCI
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
272:SER
274:ARG
276:ASN
278:CYS
280:GLN
282:LYS
284:GLY
286:ASN
288:ARG
290:VAL
292:GLN
296:PRO
298:GLY
300:LYS
302:HIS
304:ASP
306:GLY
308:SER
310:ASP
312:GLN
314:LEU
316:ASP
318:GLN
320:HIS
322:GLN
324:ALA
326:GLY
328:ALA
330:LYS
332:ASP
Auth_seq_ID

# 8 NMR restraints analysis ⓘ

## 8.1 Conformationally restricting restraints ⓘ

The following table provides the summary of experimentally observed NMR restraints in different categories. Restraints are classified into different categories based on the sequence separation of the atoms involved.

| Description | Value |
|---|---|
| Total distance restraints | 1398 |
| Intra-residue (\|i-j\|=0) | 687 |
| Sequential (\|i-j\|=1) | 471 |
| Medium range (\|i-j\|>1 and \|i-j\|<5) | 179 |
| Long range (\|i-j\|≥5) | 13 |
| Inter-chain | 48 |
| Hydrogen bond restraints | 0 |
| Disulfide bond restraints | 0 |
| Total dihedral-angle restraints | 0 |
| Number of unmapped restraints | 0 |
| Number of restraints per residue | 11.4 |
| Number of long range restraints per residue[1] | 0.1 |

[1] Long range hydrogen bonds and disulfide bonds are counted as long range restraints while calculating the number of long range restraints per residue

## 8.2 Residual restraint violations ⓘ

This section provides the overview of the restraint violations analysis. The violations are binned as small, medium and large violations based on its absolute value. Average number of violations per model is calculated by dividing the total number of violations in each bin by the size of the ensemble.

### 8.2.1 Average number of distance violations per model ⓘ

Distance violations less than 0.1 Å are not included in the calculation.

| Bins (Å) | Average number of violations per model | Max (Å) |
|---|---|---|
| 0.1-0.2 (Small) | 48.8 | 0.2 |
| 0.2-0.5 (Medium) | 63.4 | 0.5 |
| >0.5 (Large) | 27.2 | 2.1 |

### 8.2.2 Average number of dihedral-angle violations per model ⓘ

Dihedral-angle violations less than 1° are not included in the calculation.There are no dihedral-angle violations

# 9 Distance violation analysis

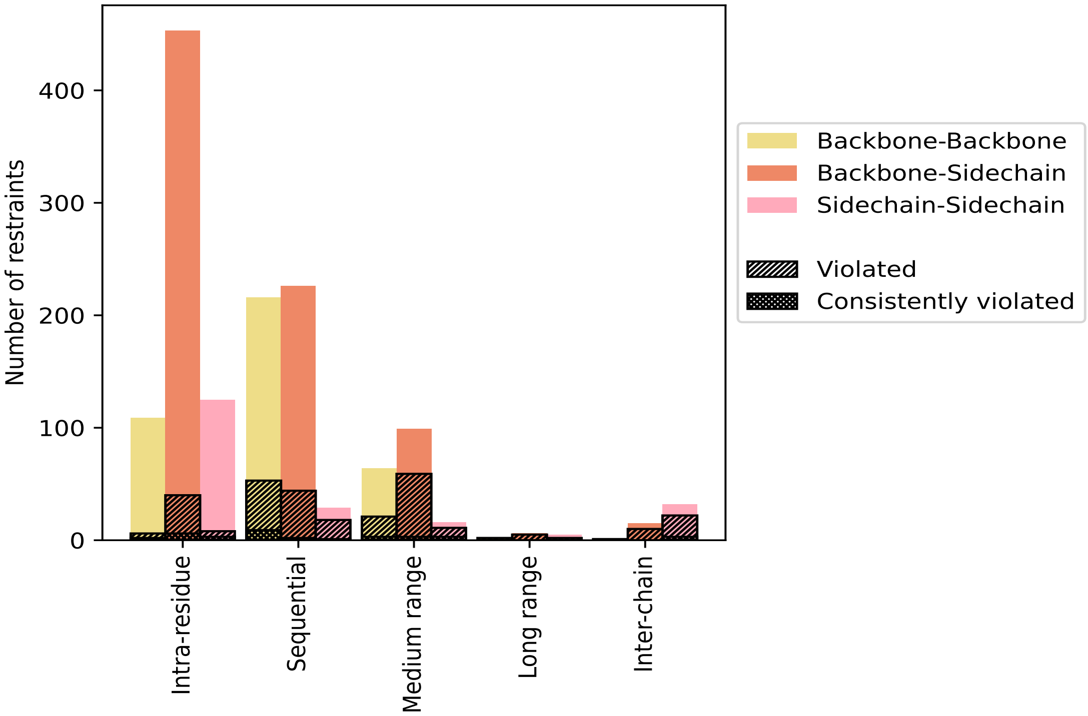
## 9.1 Summary of distance violations

The following table shows the summary of distance violations in different restraint categories based on the sequence separation of the atoms involved. Each category is further sub-divided into three sub-categories based on the atoms involved. Violations less than 0.1 Å are not included in the statistics.

| Restraints type | Count | %[1] | Violated[3] | | | Consistently Violated[4] | | |
|---|---|---|---|---|---|---|---|---|
| | | | Count | %[2] | %[1] | Count | %[2] | %[1] |
| Intra-residue (\|i-j\|=0) | 687 | 49.1 | 54 | 7.9 | 3.9 | 11 | 1.6 | 0.8 |
| Backbone-Backbone | 109 | 7.8 | 6 | 5.5 | 0.4 | 2 | 1.8 | 0.1 |
| Backbone-Sidechain | 453 | 32.4 | 40 | 8.8 | 2.9 | 6 | 1.3 | 0.4 |
| Sidechain-Sidechain | 125 | 8.9 | 8 | 6.4 | 0.6 | 3 | 2.4 | 0.2 |
| Sequential (\|i-j\|=1) | 471 | 33.7 | 115 | 24.4 | 8.2 | 12 | 2.5 | 0.9 |
| Backbone-Backbone | 216 | 15.5 | 53 | 24.5 | 3.8 | 9 | 4.2 | 0.6 |
| Backbone-Sidechain | 226 | 16.2 | 44 | 19.5 | 3.1 | 2 | 0.9 | 0.1 |
| Sidechain-Sidechain | 29 | 2.1 | 18 | 62.1 | 1.3 | 1 | 3.4 | 0.1 |
| Medium range (\|i-j\|>1 & \|i-j\|<5) | 179 | 12.8 | 91 | 50.8 | 6.5 | 9 | 5.0 | 0.6 |
| Backbone-Backbone | 64 | 4.6 | 21 | 32.8 | 1.5 | 3 | 4.7 | 0.2 |
| Backbone-Sidechain | 99 | 7.1 | 59 | 59.6 | 4.2 | 3 | 3.0 | 0.2 |
| Sidechain-Sidechain | 16 | 1.1 | 11 | 68.8 | 0.8 | 3 | 18.8 | 0.2 |
| Long range (\|i-j\|≥5) | 13 | 0.9 | 9 | 69.2 | 0.6 | 0 | 0.0 | 0.0 |
| Backbone-Backbone | 2 | 0.1 | 2 | 100.0 | 0.1 | 0 | 0.0 | 0.0 |
| Backbone-Sidechain | 6 | 0.4 | 5 | 83.3 | 0.4 | 0 | 0.0 | 0.0 |
| Sidechain-Sidechain | 5 | 0.4 | 2 | 40.0 | 0.1 | 0 | 0.0 | 0.0 |
| Inter-chain | 48 | 3.4 | 33 | 68.8 | 2.4 | 3 | 6.2 | 0.2 |
| Backbone-Backbone | 1 | 0.1 | 1 | 100.0 | 0.1 | 0 | 0.0 | 0.0 |
| Backbone-Sidechain | 15 | 1.1 | 10 | 66.7 | 0.7 | 0 | 0.0 | 0.0 |
| Sidechain-Sidechain | 32 | 2.3 | 22 | 68.8 | 1.6 | 3 | 9.4 | 0.2 |
| Hydrogen bond | 0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 |
| Disulfide bond | 0 | 0.0 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 |
| Total | 1398 | 100.0 | 302 | 21.6 | 21.6 | 35 | 2.5 | 2.5 |
| Backbone-Backbone | 392 | 28.0 | 83 | 21.2 | 5.9 | 14 | 3.6 | 1.0 |
| Backbone-Sidechain | 799 | 57.2 | 158 | 19.8 | 11.3 | 11 | 1.4 | 0.8 |
| Sidechain-Sidechain | 207 | 14.8 | 61 | 29.5 | 4.4 | 10 | 4.8 | 0.7 |

[1] percentage calculated with respect to the total number of distance restraints, [2] percentage calculated with respect to the number of restraints in a particular restraint category, [3] violated in at least one model, [4] violated in all the models

### 9.1.1 Bar chart : Distribution of distance restraints and violations ⓘ



Violated and consistently violated restraints are shown using different hatch patterns in their respective categories. The hydrogen bonds and disulfied bonds are counted in their appropriate category on the x-axis

## 9.2 Distance violation statistics for each model ⓘ

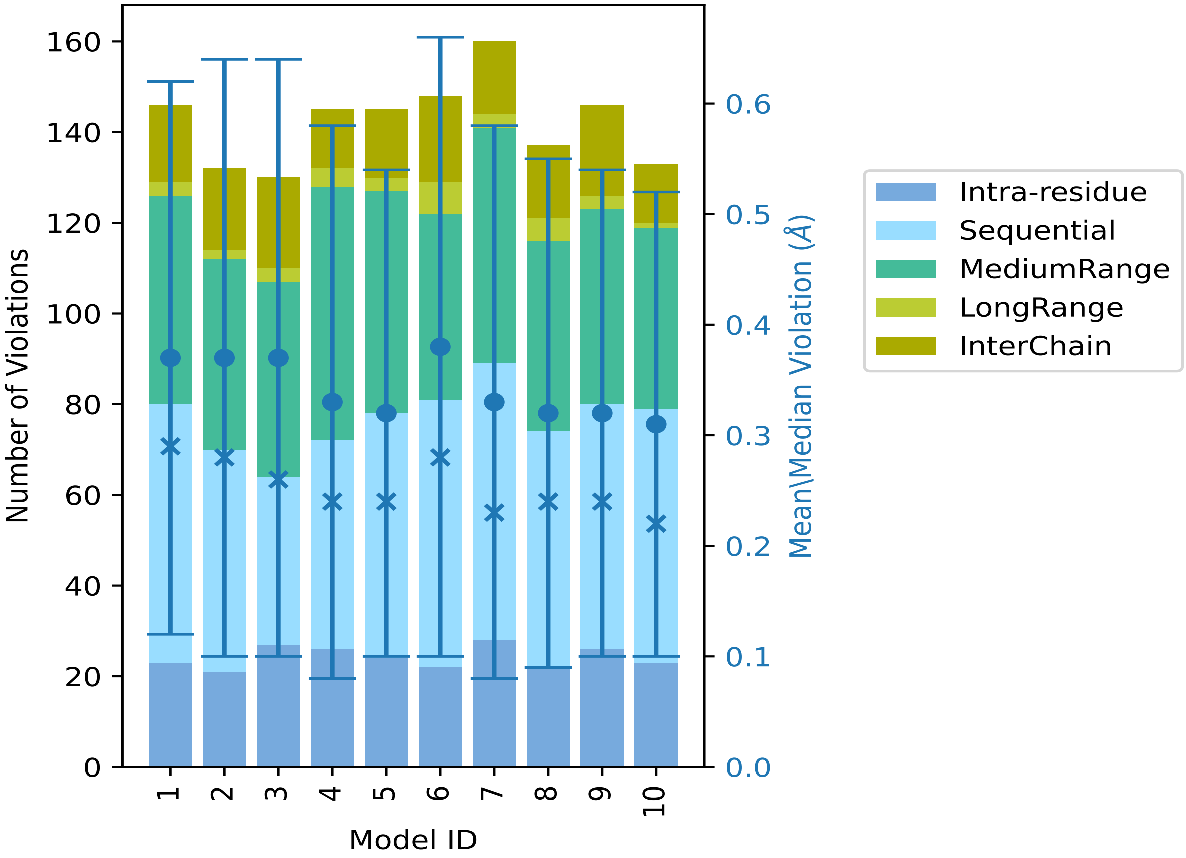
The following table provides the distance violation statistics for each model in the ensemble. Violations less than 0.1 Å are not included in the statistics.

| **Model ID** | **Number of violations** | | | | | | **Mean (Å)** | **Max (Å)** | **SD$^6$ (Å)** | **Median (Å)** |
|---|---|---|---|---|---|---|---|---|---|---|
| | IR$^1$ | SQ$^2$ | MR$^3$ | LR$^4$ | IC$^5$ | Total | | | | |
| 1 | 23 | 57 | 46 | 3 | 17 | 146 | 0.37 | 1.3 | 0.25 | 0.29 |
| 2 | 21 | 49 | 42 | 2 | 18 | 132 | 0.37 | 1.66 | 0.27 | 0.28 |
| 3 | 27 | 37 | 43 | 3 | 20 | 130 | 0.37 | 1.7 | 0.27 | 0.26 |
| 4 | 26 | 46 | 56 | 4 | 13 | 145 | 0.33 | 1.8 | 0.25 | 0.24 |
| 5 | 24 | 54 | 49 | 3 | 15 | 145 | 0.32 | 1.03 | 0.22 | 0.24 |
| 6 | 22 | 59 | 41 | 7 | 19 | 148 | 0.38 | 1.33 | 0.28 | 0.28 |
| 7 | 28 | 61 | 52 | 3 | 16 | 160 | 0.33 | 2.1 | 0.25 | 0.23 |
| 8 | 22 | 52 | 42 | 5 | 16 | 137 | 0.32 | 1.17 | 0.23 | 0.24 |
| 9 | 26 | 54 | 43 | 3 | 20 | 146 | 0.32 | 1.52 | 0.22 | 0.24 |
| 10 | 23 | 56 | 40 | 1 | 13 | 133 | 0.31 | 1.16 | 0.21 | 0.22 |

[1] Intra-residue restraints, [2] Sequential restraints, [3] Medium range restraints, [4] Long range restraints,

[5]Inter-chain restraints, [6]Standard deviation

### 9.2.1 Bar graph : Distance Violation statistics for each model ⓘ



The mean(dot),median(x) and the standard deviation are shown in blue with respect to the y axis on the right

## 9.3 Distance violation statistics for the ensemble ⓘ

Violation analysis may find that some restraints are violated in few models and some are violated in most of models. The following table provides this information as number of violated restraints for a given fraction of the ensemble. In total, 1096(IR:633, SQ:356, MR:88, LR:4, IC:15) restraints are not violated in the ensemble.

| Number of violated restraints | | | | | | Fraction of the ensemble | |
|---|---|---|---|---|---|---|---|
| IR[1] | SQ[2] | MR[3] | LR[4] | IC[5] | Total | Count[6] | % |
| 14 | 31 | 17 | 2 | 5 | 69 | 1 | 10.0 |
| 12 | 16 | 11 | 1 | 4 | 44 | 2 | 20.0 |
| 4 | 7 | 2 | 2 | 4 | 19 | 3 | 30.0 |
| 4 | 9 | 13 | 1 | 4 | 31 | 4 | 40.0 |

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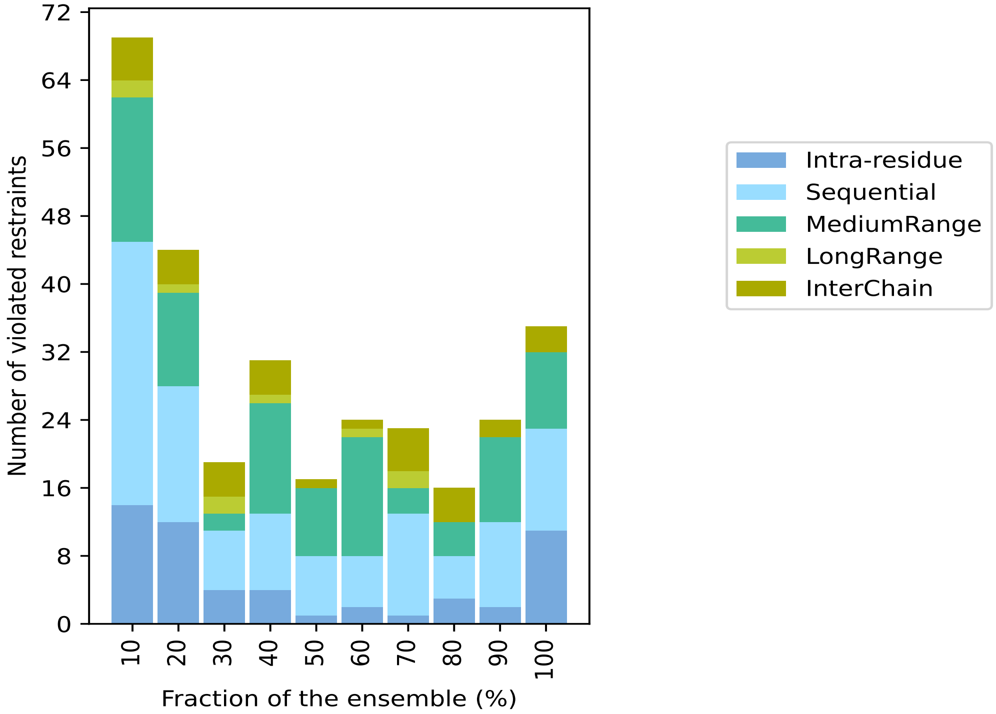
| Number of violated restraints | | | | | | Fraction of the ensemble | |
|---|---|---|---|---|---|---|---|
| IR[1] | SQ[2] | MR[3] | LR[4] | IC[5] | Total | Count[6] | % |
| 1 | 7 | 8 | 0 | 1 | 17 | 5 | 50.0 |
| 2 | 6 | 14 | 1 | 1 | 24 | 6 | 60.0 |
| 1 | 12 | 3 | 2 | 5 | 23 | 7 | 70.0 |
| 3 | 5 | 4 | 0 | 4 | 16 | 8 | 80.0 |
| 2 | 10 | 10 | 0 | 2 | 24 | 9 | 90.0 |
| 11 | 12 | 9 | 0 | 3 | 35 | 10 | 100.0 |

[1] Intra-residue restraints, [2] Sequential restraints, [3] Medium range restraints, [4] Long range restraints, [5] Inter-chain restraints, [6] Number of models with violations

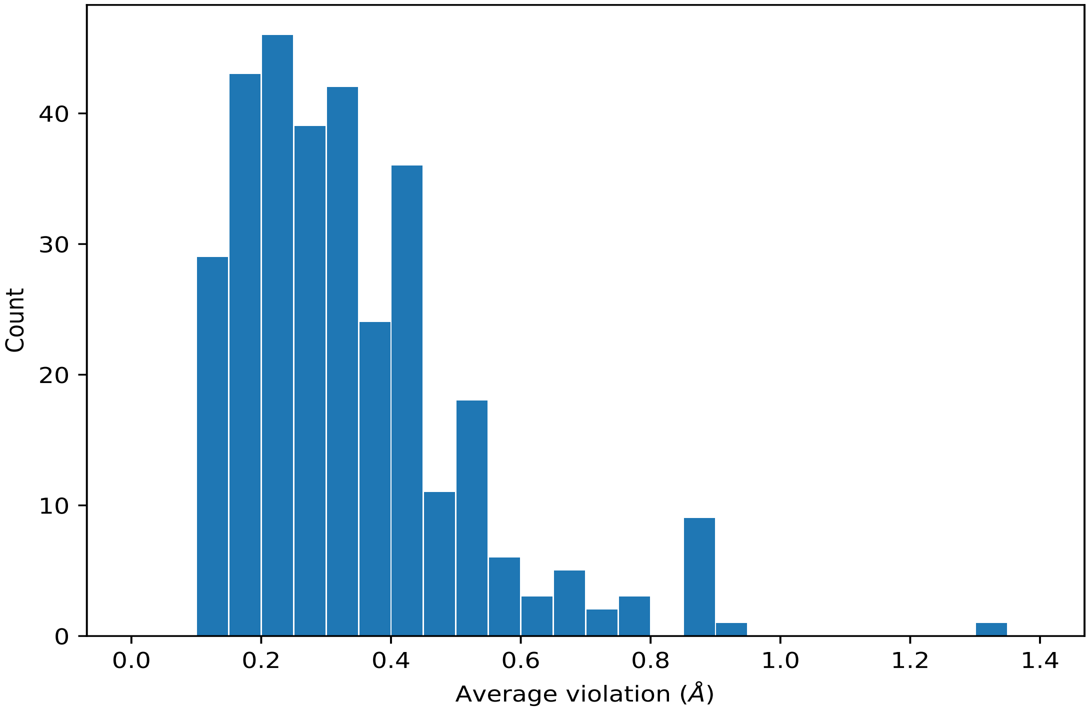
### 9.3.1 Bar graph : Distance violation statistics for the ensemble ⓘ



## 9.4 Most violated distance restraints in the ensemble ⓘ

### 9.4.1 Histogram : Distribution of mean distance violations ⓘ

The following histogram shows the distribution of the average value of the violation. The average is calculated for each restraint that is violated in more than one model over all the violated models in the ensemble



### 9.4.2 Table: Most violated distance restraints ⓘ

The following table provides the mean and the standard deviation of the violations for the 10 worst performing restraints, sorted by number of violated models and the mean violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

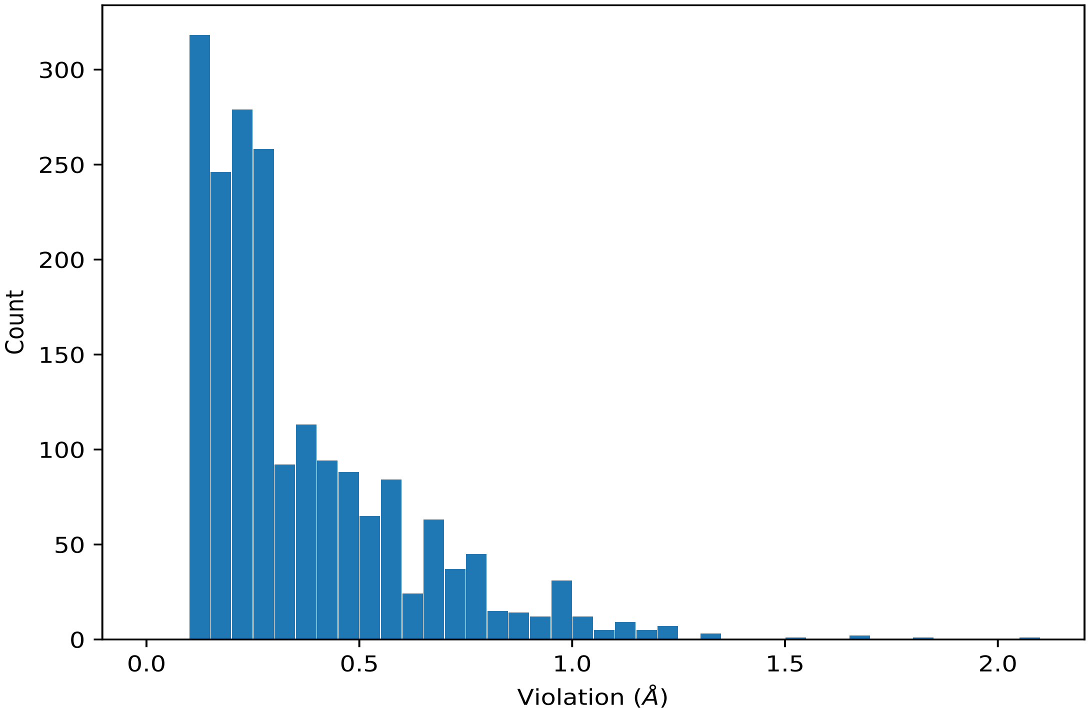
| Key | Atom-1 | Atom-2 | Models[1] | Mean (Å) | SD[1] (Å) | Median (Å) |
|---|---|---|---|---|---|---|
| (1,1382) | 2:317:B:GLN:HB2 | 1:35:A:ILE:HB | 10 | 1.31 | 0.46 | 1.24 |
| (1,1088) | 2:308:B:SER:H | 2:310:B:ASP:H | 10 | 0.92 | 0.12 | 0.96 |
| (1,536) | 1:48:A:LEU:HD11 | 1:45:A:ASP:HB3 | 10 | 0.85 | 0.11 | 0.82 |
| (1,536) | 1:48:A:LEU:HD12 | 1:45:A:ASP:HB3 | 10 | 0.85 | 0.11 | 0.82 |
| (1,536) | 1:48:A:LEU:HD13 | 1:45:A:ASP:HB3 | 10 | 0.85 | 0.11 | 0.82 |
| (1,1093) | 2:310:B:ASP:H | 2:309:B:VAL:HB | 10 | 0.66 | 0.08 | 0.68 |
| (1,205) | 1:20:A:GLU:HB3 | 1:21:A:ASP:HB3 | 10 | 0.65 | 0.2 | 0.57 |
| (1,969) | 2:299:B:GLU:HB2 | 2:301:B:LEU:H | 10 | 0.64 | 0.27 | 0.53 |
| (1,1177) | 2:314:B:LEU:HD21 | 2:315:B:HIS:H | 10 | 0.54 | 0.19 | 0.51 |
| (1,1177) | 2:314:B:LEU:HD22 | 2:315:B:HIS:H | 10 | 0.54 | 0.19 | 0.51 |
| (1,1177) | 2:314:B:LEU:HD23 | 2:315:B:HIS:H | 10 | 0.54 | 0.19 | 0.51 |
| (1,149) | 1:17:A:GLU:HG3 | 1:14:A:ILE:HG13 | 10 | 0.46 | 0.13 | 0.47 |
| (1,150) | 1:14:A:ILE:HG13 | 1:17:A:GLU:HG3 | 10 | 0.46 | 0.13 | 0.47 |
| (1,501) | 1:45:A:ASP:HB3 | 1:42:A:ASP:HA | 10 | 0.42 | 0.2 | 0.43 |

[1] Number of violated models, [2] Standard deviation

## 9.5 All violated distance restraints ⓘ

### 9.5.1 Histogram : Distribution of distance violations ⓘ

The following histogram shows the distribution of the absolute value of the violation for all violated restraints in the ensemble.



### 9.5.2 Table : All distance violations ⓘ

The following table provides the 10 worst performing restraints, sorted by the violation value. The Key (restraint list ID, restraint ID) is the unique identifier for a given restraint. Rows with same key represent combinatorial or ambiguous restraints and are counted as a single restraint.

| Key | Atom-1 | Atom-2 | Model ID | Violation (Å) |
|---|---|---|---|---|
| (1,1382) | 2:317:B:GLN:HB2 | 1:35:A:ILE:HB | 7 | 2.1 |
| (1,1382) | 2:317:B:GLN:HB2 | 1:35:A:ILE:HB | 4 | 1.8 |
| (1,1382) | 2:317:B:GLN:HB2 | 1:35:A:ILE:HB | 3 | 1.7 |
| (1,750) | 2:274:B:ARG:HD3 | 2:273:B:LYS:HD3 | 2 | 1.66 |
| (1,1382) | 2:317:B:GLN:HB2 | 1:35:A:ILE:HB | 9 | 1.52 |
| (1,1341) | 2:330:B:LYS:HE2 | 2:331:B:GLY:H | 6 | 1.33 |
| (1,1382) | 2:317:B:GLN:HB2 | 1:35:A:ILE:HB | 2 | 1.31 |
| (1,370) | 1:33:A:LYS:HB2 | 1:37:A:GLU:H | 1 | 1.3 |
| (1,815) | 2:288:B:ARG:H | 2:285:B:ALA:HA | 1 | 1.24 |
| (1,347) | 1:31:A:ALA:HB1 | 1:34:A:ASP:H | 6 | 1.22 |

# 10 Dihedral-angle violation analysis ⓘ

No dihedral-angle restraints found