*Safe Drinking Water Act 2011*

Background

Small exempt rainwater supplies

in low risk premises

Drinking Water Risk Management Plan

*Safe Drinking Water Act 2011*

The *Safe Drinking Water Act 2011* (the Act) and Safe Drinking Water Regulations 2012 (the Regulations) commenced in South Australia on 1 March 2013. The Act and Regulations provide for the exemption of rainwater supplied at certain low risk premises such as accommodation, recreational church and council premises. The requirement for the preparation and implementation of a risk management plan (RMP) under the Act does not apply to exempt premises however the adoption of a RMP is considered best practice, particularly maintenance requirements.

**What is a drinking water risk management plan?**

A drinking water RMP is a document that identifies hazards and associated risks that may affect drinking water quality. A RMP also documents preventative measures that have been identified to reduce or eliminate these risks and the day-to-day operational requirements for managing the system.

**What types of premises are suitable for exemption?**

Under the Act, exemptions are available for rainwater collected at any place of a prescribed kind. The Regulations define a place of a prescribed kind as being:

* premises at which short term accommodation is offered or provided in the course of a business or for fee or reward, e.g. hotels, motels, bed and breakfasts, caravan parks
* premises that are used for an event or recreational or community activity, e.g. function, community, sporting or recreational centre
* premises used by a church
* a public building under the care, control or management of a Minister, other agency or a council

Exemption from the Act is subject to a notice relating to the use of the water being provided which includes signage displayed at all taps supplying rainwater for drinking and notice of the provision of rainwater in all promotional material for the premises including application forms and information material.

A place of a prescribed kind does not include regulated care (e.g. hospitals, aged care), education (preschools and schools) or food (e.g. restaurants, cafes) premises. These premises are not suitable for exemption and must comply with the requirements of the Act including the development and implementation of a RMP including an approved monitoring program and incident identification and notification protocol.

**What can use this RMP?**

Adoption of this RMP is suitable for drinking water providers who supply water from a small, basic system (e.g. supply sourced from a single or interconnected rainwater tanks) in a low risk premise including:

bed and breakfasts / farmstays community centres

caravan parks sporting centres

holiday rentals convention centres

resorts church premises

hotels / motels council premises

Contents

[About this document 4](#_Toc353357905)

[Document control and review 5](#_Toc353357906)

[Key contacts 6](#_Toc353357907)

[Section 1: Description of drinking water supply system 7](#_Toc353357908)

[Section 2: Management of drinking water supply 8](#_Toc353357909)

[Section 3: Monitoring Program – Operational monitoring (inspection and maintenance) 13](#_Toc353357910)

[Section 4: Monitoring Program – Verification of drinking water quality 16](#_Toc353357911)

[Section 5: Treatment options for rainwater 16](#_Toc353357912)

[Additional information 20](#_Toc353357914)

[Appendix A: Operational monitoring record sheets 21](#_Toc353357915)

[Appendix B: Verification monitoring record sheets 24](#_Toc353357916)

[Appendix C: Determining the size of installed tanks for chlorination 25](#_Toc353357917)

[Appendix D: Chlorination doses 26](#_Toc353357918)

About this document

**Section 1** requires a description of the drinking water supply system including a flow chart/diagram.

**Section 2, Table 1** outlines significant hazards and risks that have the potential to impact on the quality of the drinking water provided. Appropriate preventative measures are provided to reduce the likelihood of occurrence and the impact on users of the supply.

**Section 2, Table 2** requires the identification of any further significant hazards and risks specific to your drinking water supply. Appropriate preventative measures are required to reduce the likelihood of occurrence and the impact on users of the supply.

**Section 3, Tables 3a** and **3b** identify operational monitoring requirements and provide an inspection and maintenance plan for a small, basic rainwater supply provided for drinking purposes. This section is the first component of the monitoring program. Clear guidance is given as to the inspection/maintenance requirements and appropriate corrective action where necessary. Appendix A has blank operational monitoring record sheets which include spaces to record the name of the person undertaking the inspection, the date the inspection occurred and details of any corrective action undertaken.

**Section 4, Table 4** is the second component of the monitoring program and outlines the testing requirements for a small, basic rainwater supply. Regular, routine testing is not required for exempt premises. Section 4 provides advice on appropriate remedial action following the detection of *E.coli* in the event that testing is undertaken. Appendix B has blank verification monitoring sheets with a blank space to record the date sampling was undertaken and to record sampling results and any corrective actions taken.

**Section 5** provides information on treatment of rainwater supplies, specifically filtration, ultraviolet (UV) light irradiation, chlorination and boiling.

Contact details can be recorded in the **Key Contacts** section on page 6 where applicable.

Document control and review

Regular review is an important part of the risk management process as it allows any changes that may have occurred with the system to be captured. This RMP should be reviewed on a regular basis.

|  |  |
| --- | --- |
| Prepared by |  |
| Date prepared |  |
| Version number |  |
| Next revision date |  |

Key contacts

**Business details**

List relevant contact details for the premise where this RMP is in use:

|  |  |
| --- | --- |
| Business name |  |
| Contact person |  |
| Contact details  e.g. Phone numbers, email, website |  |
| Address |  |
| Operator (responsible person) |  |
| Operator contact details |  |

**Other important contacts**

|  |  |
| --- | --- |
| **Name** | **Phone Number** |
| Department for Health and Ageing  Water Quality Unit | 8226 7100 |
| Local Council  Name: |  |
| Water Testing Laboratory  Name: |  |
| Water Treatment Company  Name: |  |
| Tank Cleaning Company  Name: |  |
| Water Carting Company  Name: |  |

Section 1: Description of drinking water supply system

Provide a description of the drinking water supply. This should include a flow chart or diagram showing the following components of the water supply system:

Water source, i.e. location of catchment area and rainwater tank(s) including capacity

Pump(s)

Treatment (if any)

Pipework

Sample points

Additional information including potential sources of contamination should also be included:

For example, identify any overhanging branches, the presence of dangerous plants, lead flashing on roofs, white pipework, un-roofed tanks, etc.

The flow chart/diagram can be included at Figure 1 or additional pages can be inserted.

**Figure 1: Description of drinking water system**

|  |
| --- |
|  |

Section 2: Management of drinking water supply

Table 1 outlines significant hazards and risks in rainwater supplies that have the potential to impact on the quality of the drinking water provided. Appropriate preventative measures are required to reduce the likelihood of occurrence and the impacts on the users of the supply.

**Table 1: Hazardous events and risks**

| **Hazardous event** | **Hazard type – Health or aesthetic** | **Risk** | **Preventative Measure** |
| --- | --- | --- | --- |
| Animal access to tank and/or faecal contamination from birds and small animals | Health | Illness due to ingestion of harmful pathogens | Tree branches should be pruned to reduce access to roof catchment and tank  Keep roof catchment area well maintained  Install a first flush device  Inlets, overflows and other openings should be protected to prevent entry by small animals and birds  Maintain the tank in good condition  Consider use of treatment devices such as UV disinfection |
| Faecal contamination due to surface water ingress into below ground tank | Health | Illness due to ingestion of harmful pathogens | Ensure tank is protected from surface water or subsurface flows  Ensure tank walls are intact |
| Mosquitoes | Health | Nuisance and possible transmission of arbovirus (e.g. Ross River virus) | Protect all inlets, overflows and other openings with mosquito-proof mesh |
| Lead flashing, lead-based paint, preserved/treated timber or bitumen-based products on roof or gutter catchment | Health | Illness due to ingestion of chemicals  Increase in turbidity/colour/taste of water | Lead flashing or preserved/treated timber should be painted over, replaced or excluded from the catchment area  Rainwater should not be collected from bitumen-treated roofs |
| Leaching of compounds due to inappropriate tank materials and coatings | Health or aesthetic | Illness due to ingestion of chemicals  Tastes and odour issues | Ensure that materials comply with AS/NZS 4020 – Products for use in contact with drinking water or are of food grade quality. Seek evidence of compliance from the manufacturer. |
| Backflow from household plumbing devices or water storages can contaminate drinking water systems | Health or aesthetic | Illness from ingestion of harmful pathogens.  Health or aesthetic impact of chemicals | Where mains water is also connected, backflow prevention devices should be installed in accordance with the plumbing code (AS/NZS 3500) |
| Anaerobic growth in accumulated sediment at the bottom of tank | Aesthetic | Odour issues:  Sulphide/rotten egg/sewage odours, particularly during warmer weather | Tank should be regularly inspected and cleaned to prevent accumulated sediment |
| Slimes and stagnant water in pipework | U-bends or underground pipework that can hold stagnant water should be avoided where possible. If not drainage points should be installed on pipework |
| Accumulated material on roofs and gutters (including pollen) | Aesthetic | Taste and odour issues:  Musty or vegetable type taste and odours, colouration of water | Overhanging branches should be pruned  Gutters should be cleaned out regularly  Leaf protection devices should be installed on gutters  Install a first flush device |
| Algal growth due to light penetration into tank or pipework | Aesthetic | Taste and odour issues:  Musty, vegetable or fishy type taste and odours | Tank roof should be intact and impervious to light  Pipework including inlets to tanks should be impervious to light (i.e. metal, dark plastic or painted a dark colour) |
| Accumulated damp leaves in gutter | Aesthetic | Coloured water | Gutters should be kept clean and leaf protection devices installed on gutters |
| Hydrocarbon contamination from wood-fire flues | Aesthetic | Tastes and odour issues | Install flues in accordance with Australian Standards  Operate heaters in accord with the manufacturer’s instructions  Use appropriate types of wood for fuel, e.g. do not use treated pine |
| Unpleasant tastes  Bitter taste (concrete tanks)  Metallic taste (galvanised tanks)  Plastic taste (plastic tanks)  Detergent taste associated with newly painted roof | Aesthetic | New tank | Use water from first fill for non-drinking purposes such as garden watering or toilet flushing. Taste will reduce with subsequent fills and age |
| Aesthetic | Newly painted roof | Avoid collected water from first 2-3 rain events after painting roof. Taste will improve with paint age |

**Identification of additional hazards, risks and preventative measures**

Table 1 identifies a range of common hazards and associated risks and preventative measures for rainwater supplies. This list is not exhaustive and further hazards may apply to your drinking water system. A thorough risk assessment of the drinking water supply system should be undertaken from the source water (e.g. roof catchment area and rainwater tank) through to the customer tap. Once identified, additional hazards should be recorded in the table below along with associated risks and preventative measures that have been identified to overcome these risks.

**Table 2: Additional hazardous events and risks**

|  |  |  |  |
| --- | --- | --- | --- |
| **Hazardous event** | **Hazard type – Health or aesthetic** | **Risk** | **Preventative Measure** |
|  |  |  |  |
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Section 3: Monitoring Program – Operational monitoring (inspection and maintenance)

Inspection of the following areas should occur **at least every 6 months**. Inspection dates should be recorded along with any maintenance undertaken as per examples shown in table 3a (in red). Blank operational monitoring record sheets are provided in Appendix A.

**Table 3a: Operational monitoring (6 monthly)**

| **Area** | **Inspection** | **Corrective Actions** | **Date:**  **27/07/12**  **Name:**  **Joe Bloggs** |
| --- | --- | --- | --- |
| Gutters | Inspect for presence of accumulated debris such as leaf and other plant material | Clean and repair as necessary  If large amounts of leaf material or other debris are present, the frequency of inspection and cleaning may need to be increased | ✓ |
| Roof | Inspect for presence of accumulated debris such as leaf and other plant material | Clear any accumulated matter from the roof and prune overhanging branches | ✓ |
| Tank inlets and overflows  Insect proofing  Leaf filters | Inspect for accumulated material or damage | Clean and repair as necessary | ✓  Damaged insect screen on inlet replaced 28/07/12 |
| Tank & tank roof | Check structural integrity of tank including roof and access cover | Repair any holes or gaps as necessary | ✓ |
| Tank  Tank (cont) | Internal inspection to check for evidence of access by animals, birds or insects | If present, identify and close access points  Remove bird /animal carcass and empty and clean tank. Chlorinate if emptying/cleaning tank is not possible | ✓ |
| Internal inspection for presence of mosquitoes or larvae | If present, seal access points/ repair mosquito-proof screens to prevent escape of mosquitoes and further entry  If larvae present, treat tanks with a small amount of kerosene or medicinal paraffin (used as a last resort - seek further guidance before carrying out this treatment) | ✓ |
| Internal inspection to check for algal growth | If there is evidence of algal growth (green), find and close the points of light access and replace any pipework which allows light penetration | ✓ |
| Chlorination | Ensure adequate supplies of chlorine for emergency chlorination  Check use-by dates of supplies | Dispose of out of date chlorine and replace as required | ✓ |
| Pipework | Check for structural integrity | Repair pipework as necessary | ✓ |
| Filters  (if present) | Maintain as per manufacturer’s recommendations to avoid problems associated with clogging and microbial growth | Clean filters as required  Replace or repair filters as required | ✓ |
| UV treatment  (if present) | Maintain as per manufacturer’s recommendations  Where UV unit does not include an alarm, minimum weekly checking is required to ensure unit is operational\*  Check that UV lamps have been replaced as required and that sleeves have been cleaned (more frequent maintenance may be indicated for some products) | Clean sleeves and replace lamps as necessary | ✓ |

In addition to the 6 monthly inspection and maintenance actions, the rainwater tank should be inspected every 2 years for the presence of accumulated sediment. See Appendix A for the blank monitoring sheet.

**Table 3b: Operational monitoring (2 yearly)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Area** | **Inspection** | **Corrective Action** | **Date:**  **27/07/12** |
| Tank | Internal inspection to check for accumulated sediment | If the bottom of the tank is covered with sediment the tank should be cleaned | X  Tank cleaned  April 11 |

Section 4: Monitoring Program – Verification of drinking water quality

Regular water quality monitoring is not required for exempt premises. Rainwater quality can change rapidly. One-off testing will only give an indication of the water quality on the particular day the sample was taken, not the overall or long-term water quality. If there are concerns over the quality of the rainwater or contamination is suspected, chlorination of tank water could be a suitable alternative to testing.

In the event that water quality testing is undertaken, *E.coli* is the best indicator of faecal contamination. Results from testing can be recorded in terms of compliance / exceedance#. Blank verification monitoring sheets are provided in Appendix B. Copies of monitoring results should be kept with the RMP.

Immediate remedial action should be implemented following the detection of *E.coli*. Further advice is provided below. Contact the Department for Health and Ageing if you have concerns over the quality of your rainwater or would like to further discuss the detection of *E.coli* in your rainwater supply.

**Table 4: Verification monitoring**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample Point** | **Monitoring** | **Frequency** | **Corrective Action** | **Date:**  **27/03/12** |
| Point of use  (i.e. after UV light disinfection if present) | Water quality testing for faecal indicator *E.coli*  *E.coli* should not be detected in a minimum 100 mL sample of drinking water | *E.coli* – as required | The detection of *E.coli* indicates that maintenance and/or treatment is inadequate and requires immediate investigation  The rainwater tank should be disinfected with chlorine  If UV disinfection is provided operation of the UV system should be investigated and remedial action implemented as necessary | ✓  No *E.coli* detected |

**# 🗸 Compliance achieved, no *E. coli* detected**

**X Exceedance, *E. coli* detected**

**Immediate remedial action following the detection of *E.coli*:**

1. Undertake an inspection of the catchment area, storage tank and distribution system to assess for any potential sources of contamination
2. Implement any immediate remedial action as required, e.g. removal of dead animal from tank
3. Disinfect the storage tank with chlorine following the information under the ‘emergency chlorination’ heading in section 5
4. Ensure chlorinated water is flushed through all pipework
5. Document corrective actions (example provided below) in the verification monitoring sheets (as provided in Appendix B)

|  |  |  |
| --- | --- | --- |
| **Date** | **Issue** | **Remedial action** |
| 17.12.12 | Sample collected 10.12.12 returned result of 6 *E.coli*/100 mL | Inspection of rainwater tank and roof area revealed dead possum in tank  Possum removed and tank chlorinated  Taps run on full to allow chlorinated water through pipework  Access cover replaced and new latch attached to prevent further animal access |

Section 5: Treatment options for rainwater

**Filtration**

Filtration is commonly used to remove sediment or suspended particles from water. Depending on the type of filter, contaminants such as chemicals, algal toxins, bacteria and viruses can also be removed through filtration. Water supplies that have high levels of sediment present (e.g. surface water) may require additional treatment (coagulation) prior to filtration. Points of use filters (e.g. carbon or ceramic filtration units) are commonly installed to improve the taste and odour of water.

Rainwater supplies sourced from a well maintained roof and catchment area should not require filtration. Where filters are in use, they must be operated, maintained and replaced as per the manufacturer’s recommendations to avoid problems associated with microbial growth. Filters that are not maintained correctly may not work effectively and may have adverse impacts on water quality.

**Ultraviolet (UV) light irradiation**

UV light irradiation can be used to provide continuous assurance of water quality; however this is not a mandatory requirement. UV light systems require relatively low maintenance and have the advantage of not involving the addition of chemicals. The UV light system can be installed in pipework delivering water from a tank to a dwelling or selectively to taps used to supply water for drinking and food preparation.

If UV light irradiation is used, it is important that a sensor is installed to indicate when the device is operational. Most UV lamps will need to be replaced between nine and twelve months.

Further information regarding installation and cost of UV systems can be obtained through contacting a water treatment company (look in the Yellow Pages® under ‘Water Treatment & Equipment’).

**Emergency chlorination**

Regular manual chlorination of rainwater held in tanks is generally only recommended as a remedial action. The effectiveness of chlorine is short-lived and it will only act on the water in the tank at the time of dosing. Fresh run-off into the tank after chlorination will probably not be disinfected.

To achieve effective disinfection, it is necessary to add sufficient chlorine to provide a free chlorine residual of at least 0.5mg/L after a contact time of 30 minutes. This can be measured using a suitable chlorine test kit, e.g. a swimming pool kit. As a general guide to achieve a chlorine dose of approximately 5mg/L you will need to add:

40ml of liquid sodium hypochlorite (12.5% available chlorine) per 1000L of water

7g of granular calcium hypochlorite (70% available chlorine) per 1000L of water

See Appendix C for further guidance on determining the size of rainwater tanks for chlorination. For specific amounts of chlorine for various volumes of water see Appendix D.

Calcium hypochlorite should be dissolved in water, in a clean plastic bucket, in the open air, before adding it to the tank. Always add the disinfectant to the water rather than vice versa. When adding the chlorine to the tank, spread it as widely across the surface as possible to promote mixing and let it stand for at least one hour before use. Pipework should be flushed with the chlorinated water.

Sodium and calcium hypochlorite can be purchased from large supermarkets, hardware stores or swimming pool stockists. The chlorine will not make the water unsafe to drink but you may notice a distinct taste and odour that should disappear in 10 to 14 days. Boiling the water will remove most of the taste and odour associated with chlorine.

**Boiling**

While rainwater should be safe for most people to drink, at times the microbial quality may not be as high as reticulated water supplies. People with lower immune responses, such as the very young or very old, cancer patients, people with diabetes, organ transplants or those who are HIV positive should consider boiling rainwater prior to consumption. Boiling should also be considered if gastric upsets e.g. vomiting and diarrhoea occur. Boiling also provides a disinfection option for water provided to the public as an assurance of safety.

Bringing water to a boil will disinfect rainwater. Boiling does not have to be maintained for any length of time – kettles with automatic shut-offs are suitable for this purpose. Boiling the water will kill any harmful bacteria, viruses or protozoa including *Giardia* and *Cryptosporidium*. The water can then be cooled and stored in a clean container until use. The taste of boiled water can be improved by pouring it back and forth from one clean container to another or letting it stand for a few hours to increase the dissolved oxygen concentration.

Care should be taken when boiling water, particularly large quantities, to avoid the risk of scalding.

Additional information

To establish a more comprehensive drinking water risk management plan, access the Community Water Planner at <http://www.communitywaterplanner.gov.au>.

Copies of the *Safe Drinking Water Act 2011* and Regulations are available on the SA Health website at <http://www.sahealth.sa.gov.au/safedrinkingwateract>.

Information regarding rainwater tank maintenance is available from the SA Health website at <http://www.health.sa.gov.au/pehs/Default.aspx> (follow the links to Environmental Health then Drought Package).

Information in this document has been reproduced in part from ‘*Guidance on the use of rainwater tanks’* by enHealth Council which can be accessed at <http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-publicat-document-metadata-env_rainwater.htm> for more detailed guidance.

Appendix A: Operational monitoring record sheets

**Operational monitoring: 6 monthly record sheet** (use with Section 3)

| **Area** | **Inspection** | **Date** | **Date** | **Date** | **Date** |
| --- | --- | --- | --- | --- | --- |
| **Name** | **Name** | **Name** | **Name** |
| Gutters | Inspect for presence of accumulated debris such as leaf and other plant material |  |  |  |  |
| Roof | Inspect for presence of accumulated debris such as leaf and other plant material |  |  |  |  |
| Tank inlets & overflows, Insect proofing, Leaf filters | Inspect for accumulated material or damage |  |  |  |  |
| Tank & tank roof | Check structural integrity of tank including roof and access cover |  |  |  |  |
| Tank | Internal inspection to check for evidence of access by animals, birds or insects |  |  |  |  |
| Internal inspection for presence of mosquitoes or larvae |  |  |  |  |
| Internal inspection to check for algal growth |  |  |  |  |
| Chlorination | Ensure adequate supplies of chlorine for emergency chlorination  Check use-by dates of supplies |  |  |  |  |
| Pipework | Check for structural integrity |  |  |  |  |
| Filters  (if present) | Maintain as per manufacturer’s recommendations to avoid problems associated with clogging and microbial growth |  |  |  |  |
| UV treatment  (if present) | Maintain as per manufacturer’s recommendations  Where UV unit does not include an alarm, minimum weekly checking is required to ensure unit is operational\*  Check that UV lamps have been replaced as required and that sleeves have been cleaned (more frequent maintenance may be indicated for some products) |  |  |  |  |

\*Documentation should be kept to demonstrate how often the UV unit is checked – a separate weekly checklist can be developed and kept with the RMP.

**Operational monitoring: 2 yearly record sheet** (use with Section 3)

|  |  |  |
| --- | --- | --- |
| **Date** | **Name** | **Inspection** |
| Internal inspection to check for accumulated sediment |
|  |  |  |
|  |  |  |
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|  |  |  |
|  |  |  |
|  |  |  |
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Appendix B: Verification monitoring record sheets

**Microbiological monitoring** (use with Section 4)

| **Date** | **Name** | **Sample location** | **Result (org/100mL)** | **Corrective Actions** |
| --- | --- | --- | --- | --- |
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Appendix C: Determining the size of installed tanks for chlorination

To calculate the volume of a rectangular tank, use the formula:

Volume (in litres) = depth (cm) x width (cm) x length (cm) ÷ 1000

To calculate the volume of a cylindrical tank either use the formula:

Volume (in litres) = π x diameter2 (cm2) x depth (cm) ÷ 4000

(π = 22 ÷ 7)

**OR** use one of the following methods:

Diameter (cm)

water depth

(cm)

**FORMULA 1**: Volume (in litres) = 0.8 x water depth (cm) x diameter2 (cm2) ÷ 1000

**FORMULA 2**: Volume (in litres) = 0.08 x water depth (cm) x circumference2 (cm2) ÷ 1000

Circumference (cm)

Use a string or tape to measure circumference

Water depth

(cm)

Only calculate the volume of water in the tank and not the volume of the tank

Appendix D: Chlorination doses

|  |  |  |
| --- | --- | --- |
| **Chlorine Concentration** | **5 mg/L** | |
| **Tank Volume (L)** | **12.5% liquid Sodium Hypochlorite** | **70% granular Calcium Hypochlorite** |
| **mL** | **g** |
| 1000 | 40 | 7 |
| 2000 | 80 | 14 |
| 3000 | 120 | 21 |
| 4000 | 160 | 28 |
| 5000 | 200 | 35 |
| 6000 | 240 | 42 |
| 7000 | 280 | 49 |
| 8000 | 320 | 56 |
| 9000 | 360 | 63 |
| 10000 | 400 | 70 |
| 11000 | 440 | 77 |
| 12000 | 480 | 84 |
| 13000 | 520 | 91 |
| 14000 | 560 | 98 |
| 15000 | 600 | 105 |
| 16000 | 640 | 112 |
| 17000 | 680 | 119 |
| 18000 | 720 | 126 |
| 19000 | 760 | 133 |
| 20000 | 800 | 140 |