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Contacting Veeam Software

At Veeam Software we value feedback from our customers. It is important not only to help you quickly with your technical issues, but it is our mission to listen to your input and build products that incorporate your suggestions.

Customer Support

Should you have a technical concern, suggestion or question, visit the Veeam Customer Support Portal at www.veeam.com/support.html to open a case, search our knowledge base, reference documentation, manage your license or obtain the latest product release.

Company Contacts

For the most up-to-date information about company contacts and offices location, visit www.veeam.com/contacts.html.

Online Support

If you have any questions about Veeam products, you can use the following resources:

- Full documentation set: www.veeam.com/documentation-guides-datasheets.html
- Community forum at forums.veeam.com
Tape Devices Support

Veeam provides native tape support that is fully integrated into Veeam Backup & Replication. You can administer all operations on tapes from your Veeam console.

Long-term archiving and compliance are listed as primary reasons for using tape. Tape appears to be one of the most widely used media for offsite backup. Using backup to tape, you can implement the ‘3-2-1’ backup approach (3 copies, 2 types of media, 1 offsite location) considered as a best practice for data protection and disaster recovery. Veeam Backup & Replication offers support for tape devices and allows you to archive your data to tape and restore it from tape whenever needed.

Storing data to tapes provides you with the same data managing options as disk repositories. In particular, you can store full and incremental backups, apply user-defined retention settings to the archived data, select restore points and so on. Compared to disk storage, tape archive requires more time to retrieve files for restore if the tapes are stored offsite.
Supported Devices and Configuration

Veeam Backup & Replication supports Linear Tape-Open tape libraries starting from generation 3 (LTO3) or later:

- Physical libraries, standalone drives and virtual tape libraries.
- Partitions of the physical or virtual tape libraries presented to the Veeam backup server.

Within a library partition, only one generation of LTO drives are supported.

Limitations

VMware does not support tape drives connected directly to ESXi 5.5 and later. For more information, see VMware vSphere Release Notes.

Veeam Backup & Replication will potentially work with such a configuration, but if there is a hardware-related issue, Veeam Support will not provide help to solve it. This functionality is vendor-supported.

For more details and recommendations on configuring vendor-supported tape drives and media changers on ESXi, refer to VMware documentation at this VMware KB article.

Affecting 3rd Party Tape Solutions

Veeam Backup & Replication does not support sharing tape devices with 3rd party tape-recording software. If you plan to run both Veeam Backup & Replication and 3rd party tape-recording software (for example, in your evaluation lab), consider that Veeam Backup & Replication by default will periodically lock the drive to perform rescan, preventing other software from recording.

To share a tape device, configure a partition of the tape library that will be used only by Veeam Backup & Replication.

Mind the following limitations:

- Do not connect partitions presented to the 3rd party tape software to a Veeam tape server.
- Do not install any 3rd party tape-recording software or software components on Veeam tape server.

Driver Installation Mode

Veeam Backup & Replication supports both exclusive and non-exclusive driver installation.

NOTE:

If you use standalone tape drives, it is recommended to install drivers in non-exclusive mode.

Path Failover

Veeam Backup & Replication supports path failover for tape devices with multiple drives that manage multiple paths over multiple SANs.
Industry Format

Veeam Backup & Replication uses the MTF (Microsoft Tape Format) industry format to write data to tape.

Supported Connection Types

You can connect the tape device directly or remotely.

- Direct connection:
  - Fibre Channel (FC)
  - Serial Attached SCSI (SAS)
  - SCSI

- Remote connection:
  - iSCSI
  - Switched FC fabric

Data Block Size

Drives use hardware dependent block sizes to read/write the tape data. Generally, the drives support a range of block sizes and report this range to Veeam Backup & Replication.

If you use a tape library with multiple drives or you use multiple standalone drives, Veeam Backup & Replication uses a unified block size to write data to tapes. 256k data block size is used if all drives can support it. If any drive can support only a smaller block size, for example, 64k, then Veeam Backup & Replication uses the largest block supported by all drives. To understand block sizes supported by drives, Veeam Backup & Replication collects the block size ranges reported by each drive and compares them. Note that the reported range is additionally limited by storage controllers settings used in your infrastructure. You can check the resulting range of block sizes supported by Veeam Backup & Replication for a particular drive in the Drives properties. For more information, see Working with Drives.

**NOTE:**

If you connect the tape devices via HBA, Veeam Backup & Replication uses the block size configured for the HBA.

The block size is unified for:

- All drives in one library (if the drives support different block sizes)
- All standalone drives connected to one tape server.

To read data from tape, Veeam Backup & Replication requires that the tape is written with the block size from the supported range (shown in the drive properties).

Mind the block size range when working with the following tapes:

- Tapes with Veeam backups written by another tape library,
- Tapes with Veeam backups written on another tape server,
- Tapes written with other data transfer configuration settings,
• Tapes written on a 3rd party device.

**IMPORTANT!**

You can restore from tapes written with block size that match the block size range set for the tape device.

**Unknown Medium Changers**

Veeam supports medium changers that have no Microsoft Windows drivers available. Make sure that such device is recognized as an unknown medium changer in the Microsoft Device Manager list.

It is recommended that you use tape devices with original equipment manufacturer (OEM) drivers.
Tape Environment

To administer tape backup and restore procedures, you must add the tape server to your Veeam Backup & Replication console. Adding the tape server to the backup infrastructure makes possible to transfer data between the disk storage and the tape archive.

The tape backup and restore process involves the following components:

Veeam Backup Server

The Veeam backup server is the server running Veeam Backup & Replication. It is the core component in the backup infrastructure. The Veeam backup server tasks include the following operations:

- Recognizing all tape devices that are connected to it and managing all drives, slots and tapes.
- Administering tape archiving: scheduling and triggering tape jobs and initiating restore tasks.
- Communicating with the Veeam backup database.

Tape Device

When connected to the Veeam backup server, tape devices provide reading and writing capabilities, while all administration is performed by the Veeam backup server. You can connect multiple tape devices.

Tape Servers

To connect to the tape devices, Veeam Backup & Replication uses tape servers.

The tape server is a backup infrastructure component transferring data between data source and tape device. The tape server runs Veeam Data Mover service that creates a communication point over which the data between the tape device and backup repositories or file servers is transferred.

The tape server deployment is fully automated: to create a tape server, you must assign the tape server role to a necessary server in the backup infrastructure. You can create a dedicated tape server or assign the tape server role to the Veeam backup server.
Veeam Backup Database

Veeam Backup & Replication catalogs information about all archived data and stores this information in the Veeam backup database.

The registered tapes stay in the database until you remove the information about them. You can always view details for each tape, for example, information about backups written to it, even if the tape is not inserted in the library.

The catalog lets quickly detect location of the required items on tape. The catalog correlates the archived files and their restore points to the names of the corresponding tapes, both online or offline, and the names of the media sets within which the data was written. When you start restoring data, Veeam Backup & Replication prompts for the tapes you need to bring online. As a result, you can restore data from tape much quicker when necessary.

Veeam Backup & Replication uses the following catalogs for storing the tape-related data:

- **Tape Catalog** stores information about files/folders archived to tape media with file to tape jobs, as well as backup files produced by backup to tape jobs. The content of the Tape Catalog can be examined in the Files view.

- **Backup Catalog** stores information about machines whose backups are archived to tape media with backup to tape jobs. The content of the Backup Catalog can be examined under the **Backups > Tape** node in the Backup & Replication view.

Backup Repositories and File Servers

When retrieving data to back up, or restoring data to disk, Veeam Backup & Replication can connect to any machine that has been added as a managed server to the Veeam Backup & Replication console.
Tape Devices Deployment

To connect tape devices to Veeam Backup & Replication, you need to deploy a tape server. Tape servers are network appliances that connect tape libraries to the Veeam backup server and manage traffic between tape devices and Veeam backup server. The connected tape devices are recognized by the Veeam Backup & Replication automatically.

Data Movers

With Veeam Backup & Replication, the data transfer during archiving and restore processes is enabled with Veeam Data Mover services. The Data Movers run on tape servers and other components of backup infrastructure. They receive tasks from the Veeam backup server and communicate to each other to transfer the data.

The Data Movers are light-weight services that take a few seconds to deploy. Deployment is fully automated: when you assign a tape server role to a server, Veeam Backup & Replication installs the necessary components on this server and starts the required services on it.
Connecting Tape Devices

To deploy a tape device, you must perform the following steps:

1. Choose a machine that will act as the tape server. You can choose between the following options:
   - Use the Veeam backup server as the tape server. This variant is sufficient for small environments with low traffic workloads.
   - Deploy a dedicated tape server. As a tape server, you can use any Microsoft Windows server, physical or virtual, accessible by Veeam Backup & Replication. A dedicated tape server is recommended for installations with intense data transferring. A dedicated tape server allows you to manage remote tape libraries.

2. Connect the tape device to the machine that will perform the role of the tape server. You can connect the tape device in two ways:
   - Directly over Fibre Channel (FC), Serial Attached SCSI (SAS), SCSI
   - Remotely with iSCSI (you can use Microsoft iSCSI initiator to establish the connection).

3. Install an appropriate device driver on the tape server.

4. If the medium changer driver is not available, check that the tape device uses native SCSI commands.

   Open the **Tape Infrastructure** view, expand the **Libraries** node and select the needed library. Click **Properties** on the ribbon. You can also right-click the necessary library in the working area and select **Properties**. Select the **Use native SCSI commands instead of Windows driver** check box.

   ![HP MSL G3 Series S30 Properties](image)

**IMPORTANT!**

Only media changers can use SCSI commands. Tape drives must use native OEM drivers.
5. Add the tape server to Veeam Backup & Replication. For more information, see Adding Tape Servers. Veeam Backup & Replication will automatically scan connected tape devices and display all discovered tape libraries and tape drives under the Libraries node in the Tape Infrastructure view. Afterward, the auto-discovery process will be performed periodically every 3 minutes.

You can connect multiple tape devices to each tape server. The connected tape devices will appear as list under the Libraries node in the Tape Infrastructure view.

Veeam Backup & Replication allows deploying multiple tape servers. However, if you have multiple Veeam backup servers, you cannot connect one tape server to several Veeam backup servers simultaneously.

**TIP:**

If you have several Veeam backup servers, you can easily reconnect a tape server to another Veeam backup server without reconfiguring the tape device: Veeam backup server will recognize the library settings automatically. Note that when you reconnect the tape server, the tape jobs will not run with another Veeam backup server unless you copy the configuration.

**Reconnecting Tape Devices to Another Tape Server**

You can reconnect your tape devices to another tape server. For example, you can reconnect the tape devices from the Veeam backup server to a dedicated tape server. To do this, choose a tape server and perform steps for connecting tape devices above. When you add the new tape server to Veeam Backup & Replication, Veeam Backup & Replication will recognize the tape devices and all tape device settings.
Getting Started with Tapes

After you have connected tape devices, you need to complete the following steps:

1. Load tapes to the tape device (if not yet loaded) and run the importing procedure for them.
2. Create one or more media pool or GFS media pool that will be used as targets for tape jobs.
3. Configure one or more media vaults to conveniently organize offline tapes.
4. Configure and run backup to tape or file to tape jobs.
5. Restore virtual machines to infrastructure or both virtual and physical machines to repository, or restore files from tape.
Tape Servers

When you have deployed a tape server and connected the tape device to it, you need to add the tape server to the Veeam backup server. To do so, you must assign the role of the tape server to a Windows server that is already added to the list of managed servers.
Adding Tape Servers

To add a tape server, follow the next steps:
Step 1. Launch New Tape Server Wizard

To launch the **New Tape Server** wizard:

1. Open the **Tape Infrastructure** view.

2. Do one of the following:
   - In the inventory pane, right-click **Tape Servers** and select **Add tape server**.
   - In the inventory pane, select **Tape Servers** and click **Add Tape Server** on the ribbon.
   - In the inventory pane, select the **Tape Infrastructure** node and click **Add Tape Server** in the working area.
Step 2. Choose Server

At the Server step of the wizard, choose a physical or virtual server to which the tape devices are connected and that you want to add as the tape server.

1. From the Choose server list, select the server that you want to add as the tape server.
   - If the devices are connected to the Veeam backup server, select This server. The tape server role will be assigned to the backup server.
   - If the devices are connected to a separated server, enter the server name or IP address. The tape server must run Microsoft Windows. If the server is not added to Veeam Backup & Replication yet, you can click Add New to open the New Windows Server wizard.

2. In the Description field, provide a description for future reference.
Step 3. Configure Traffic Throttling Rules

At the Traffic step of the wizard, configure throttling rules to limit the outbound traffic rate for the tape server. Throttling rules will help you manage bandwidth usage and minimize the impact of tape jobs on network performance. For more information, see the Veeam Backup & Replication User Guide, section Enabling Traffic Throttling.

The list of throttling rules contains only those rules that are applicable to the tape server you are adding. The rule is applied to the tape server if its IP address falls under the source IP range of the rule. To view the rule settings, select it in the list and click the View button on the right.

You can also open global throttling settings and modify them directly from the wizard by clicking Manage network traffic throttling rules at the bottom of the window.
Step 4. Review Components

At the **Review** step of the wizard, Veeam Backup & Replication will display the list of components required for work of the tape server:

- Veeam Transport
- Veeam Tape service

If any of them is missing, Veeam Backup & Replication will automatically install them on the selected server.
Step 5. Assess Results

At the **Apply** step of the wizard, Veeam Backup & Replication will add the tape server to the backup infrastructure in the real time mode.

If Veeam Backup & Replication detects an unknown media changer, the message will appear in the **Message** area.

![New Tape Server dialog box](image)
Step 6. Finish Working with Wizard

At the Summary step of the wizard, finalize the procedure of the tape server configuration. Review details of the added tape server.

To inventory tape libraries connected to the tape server, select the Start tape libraries inventory when I click Finish check box. Veeam Backup & Replication will start the inventory process when you finish working with the wizard. If you do not enable this option, you will have to inventory tape libraries manually. For more information, see Inventorying Tapes.
Removing Tape Servers

To remove a tape server:

1. Open the **Tape Infrastructure** view.
2. Select the **Servers** node in the inventory pane.
3. Select the tape server in the working area and click **Remove Tape Server** on the ribbon. You can also right-click the necessary tape server in the working area and select **Remove**.

When you remove a tape server, Veeam Backup & Replication unassigns the tape server role from it, so it is no longer used as a tape server. The actual server remains connected to Veeam Backup & Replication.

Limitations for Removing Tape Servers

You cannot remove a tape server while tape jobs are running. Before you remove the tape server, stop all tape jobs.
Updating Tape Servers

Every time you launch Veeam Backup & Replication, it automatically checks if the components installed on managed servers are up to date. You will be unable to work with tape libraries that are connected to the outdated servers.

If there is a later version of a component available (usually, if you have upgraded Veeam Backup & Replication), the Components Update window will be displayed, prompting you to update components on managed tape servers.

You can also open the Components Update window by doing one of the following:

- Open the main menu and select Upgrade from the main menu.
- Open the Tape Infrastructure view, select the Servers node and click Upgrade on the ribbon.
- Open the Tape Infrastructure view, right-click the necessary tape server in the working area and select Upgrade.

If components on all managed servers are up to date, the Upgrade item will be disabled.

The Components Update section lists tape servers that have outdated components deployed. To see the current and the latest available versions for deployed components, select a server in the list and click Details. Select check boxes next to servers for which you want to upgrade components and click Apply.
Rescanning Tape Servers

Veeam Backup & Replication automatically rescans the tape servers every 3 minutes. During the rescan, Veeam Backup & Replication updates the list of managed tape devices. You can perform manual rescan of a tape server, for example, if you want to implement the changes made to the tape infrastructure immediately.

To rescan a tape server:

1. Open the **Tape Infrastructure** view.
2. To rescan all tape servers, right-click the **Servers** node and select **Rescan**.
3. To rescan a selected tape server, select the **Servers** node in the inventory pane. Select the necessary server in the working area and click **Rescan** on the ribbon. You can also right-click the necessary server in working area and select **Rescan**.
Modifying Tape Servers

To edit settings of an added tape server:

1. Open the Tape Infrastructure view.
2. Select the Servers node in the inventory pane.
3. Select the necessary server in the working area and click Edit Tape Server on the ribbon. You can also right-click the necessary server in working area and select Properties.
4. Then edit the tape server settings as required.
Tape Libraries

All tape libraries and standalone tape drives managed by Veeam Backup & Replication are shown in a list under the Libraries node in the Tape Infrastructure view. All connected devices are discovered automatically during the rescan procedure. When you add a new tape device to the tape server, it appears in your console after rescanning.

To view properties of a tape device, open the Tape Infrastructure view, expand the Libraries node and select the needed item. Click Properties on the ribbon. You can also right-click the necessary device in the working area and select Properties.

Select the Perform drive cleaning automatically check box if you want Veeam Backup & Replication to manage the tape library drive cleaning. For more information about automated drives cleaning, see Automated Drive Cleaning.

Select the Use native SCSI commands instead of Windows driver check box if your library is an unknown media changer. For more information about unknown media changers, see Supported Devices and Configuration.
Rescanning Tape Devices

You can rescan a selected tape library or standalone tape drive to update its network status.

To rescan a tape device:

1. Open the **Tape Infrastructure** view.
2. Select the **Libraries** node in the inventory pane.
3. Select a necessary item in the working area and click **Rescan Library** on the ribbon. You can also right-click the necessary device in the working area and select **Rescan**.
Renaming Tape Devices

The Veeam backup console shows all tape libraries and standalone tape drives under the list of libraries. By default, the connected devices are shown with their production model names. For clearer visibility, you can rename them.

To rename a tape device:

1. Open the **Tape Infrastructure** view.
2. Select the **Libraries** node in the inventory pane.
3. Select a necessary item in the working area and click **Rename Library** on the ribbon. You can also right-click the necessary device in the working area and select **Rename**.
Removing Tape Devices

If you want to stop using a tape library or standalone tape drive, you can remove it from your Veeam backup console.

Mind the following limitations:

- Only devices in the offline status can be removed. To remove a tape device, you need to physically disconnect it from the tape server first. Otherwise, the tape device will be discovered during the next rescan and reappear in the Libraries list. Alternatively, you can remove the tape server to which the tape device is connected.

- You cannot remove the tape device that is used in a media pool. Remove the device from all media pools first.

To remove a tape device:

1. Disconnect the tape device or the tape server.
2. Open the Tape Infrastructure view.
3. Select the Libraries node in the inventory pane.
4. Select a necessary item in the working area and click Remove Library on the ribbon. You can also right-click the necessary device in the working area and select Remove Library.
5. In the displayed dialog box, click OK to confirm deletion.

TIP:

If you remove the tape server, the tape devices remain connected to it. You can connect the tape server back to your console. In this case, Veeam Backup & Replication will recognize all tape devices that were previously added to it with tapes and media pools (in case they remain in the Veeam database).

You can also connect the tape server to another Veeam backup server. Veeam Backup & Replication will recognize the tape devices automatically, however you will need to create the media pools anew.
Replacing Tape Devices

You may want to stop using a tape library or a standalone tape drive, for example, because of breakdown or low efficiency, and replace it with a new tape device. To replace the device seamlessly and continue using the tapes within the same media pool, follow the instructions below.

To replace a tape device:

1. Connect the new tape device to the tape server. For more information, see Connecting Tape Devices.

2. Add the tape device to the media pool to which the old tape device was added. Open the media pool settings and go to the Tapes step of the wizard. For more information, see Modifying Media Pools. If the old tape device was added to several media pools, add the new tape device to the same media pools.

3. Remove the old tape device from the media pools. If the old tape device was added to several media pools, remove the tape device from all of these media pools.

4. Disconnect the old tape device from the tape server.

5. Remove the old tape device from Veeam Backup & Replication. For more information, see Removing Tape Libraries.

6. Make sure that you do not remove the offline tapes from Veeam Backup & Replication.

7. Offload the tapes from the old tape device and load them to the new tape device.

8. Rescan the tape device.

As a result, the tapes remain in the same media pools and the data is intact.
Loading Tapes

When you need to add free tapes, or if you need to restore data from offline tapes, you need to load these tapes into your tape device.

When you load tapes into the tape device, Veeam does not recognize them automatically. To start using tapes, you need to introduce them to the Veeam Backup & Replication by running the importing procedure (Tape Infrastructure view > Libraries node > right-click LibraryName > Import tapes). The importing procedure conveys the tapes from the mail slot to the library working slots, scans them and sends information about them to Veeam backup database. After importing, Veeam Backup & Replication can use the tapes to read or write data.

Importing runs differently for tapes that are registered in the local Veeam backup database and those that are not. Choose an appropriate procedure for the following tapes:

- Loading Empty Tapes
- Loading Tapes Written on This Backup Server
- Loading Tapes Written on Another Veeam Server

Related Topics

Loading Tapes Written with 3rd-Party Backup Solution

Loading Empty Tapes

To load empty tapes, perform the following steps:

1. Load the tapes into the mail slot or directly into the tape library magazine.
2. If you loaded the tapes to the mail slot, import the tapes. To do this, open the Tape Infrastructure view, expand the Libraries node and select the library to which you have loaded the tapes. Click Import Tapes on the ribbon. You can also right-click the necessary library in the working area and select Import Tapes.
3. If you loaded tapes into the tape library magazine, rescan the tape library. To do this, click Rescan Library on the ribbon. You can also right-click the necessary library in the working area and select Rescan.
4. The tapes will appear in the Unrecognized media pool.
5. Right-click the tapes and select Inventory tape.
6. The tapes will be moved to the Free media pool.

If you want to refill the free tape resources in your tape device, you can overwrite tapes containing outdated Veeam archives. For more information, see Importing Tapes Written on This Backup Server.

TIP:

To understand which of the tapes can be overwritten, you can check their expiration date. In the Tape Infrastructure view, open the Media Pools node and select the media pool that you want to replenish. Check the Expires in field in the working area. You can sort the tapes by the expiration date and get the list of tapes that can be reused.
Loading Tapes Written on This Backup Server

If the tapes that you load were written on the same Veeam backup server, the Veeam backup database has information about them. The procedure is different for tape libraries depending on whether they support barcodes or not.

Loading Tapes with Barcodes

To load tapes with barcodes written in the same tape library:

1. Load the tapes into the mail slot or directly into the tape library magazine.
2. If you loaded the tapes to the mail slot, import the tapes. To do this, open the Tape Infrastructure view, expand the Libraries node and select the library to which you have loaded the tapes. Click Import Tapes on the ribbon. You can also right-click the necessary library in the working area and select Import Tapes.
3. If you loaded tapes into the tape library magazine, rescan the tape library. To do this, click Rescan Library on the ribbon. You can also right-click the necessary library in the working area and select Rescan.
4. Veeam Backup & Replication will automatically move the tapes to their parent media pools. You can start working with them.

Moving Tapes with Barcodes Between Libraries

We strongly recommend that you do not move tapes with barcodes written in one library to another library, as that can result in various errors and return messages about barcode duplicates.

If you cannot avoid moving tapes with barcodes between the libraries, make sure you perform all the following steps:

1. Unload the tapes from the mail slot or from the magazine of the tape library.
2. Rescan the library that you remove the tapes from. To do this, open the Tape Infrastructure view, expand the Libraries node and select the library that you remove the tapes from. Click Rescan Library on the ribbon. You can also right-click the necessary library in the working area and select Rescan.
3. Remove the tapes from the catalog. To do this, navigate to the list of tapes either under the Media Pools node or under the Libraries > LibraryName node > Media > Offline node. Select offline tapes you want to remove from the catalog and click Remove from Catalog on the ribbon. Alternatively, you can right-click selected tapes and choose Remove from Catalog from the shortcut menu. In the opened dialog box, click Yes to confirm removal.
4. Load the tapes into the mail slot or directly into the magazine of the tape library that you move the tapes to.
5. Catalog the loaded tapes in the new library. To do this, navigate to the list of tapes either under the Media Pools node or under the Libraries > LibraryName node > Media node. Select the necessary tapes in the list and click Catalog on the ribbon. Alternatively, you can right-click the selected tapes and choose Catalog Tape.
6. Veeam Backup & Replication adds the tapes to the new library. You can start working with them.

Loading Tapes without Barcodes

To load tapes without barcodes:

1. Load the tapes into the mail slot or directly into the tape library magazine.
2. If you loaded the tapes to the mail slot, import the tapes. To do this, open the Tape Infrastructure view, expand the Libraries node and select the library to which you have loaded the tapes. Click Import Tapes on the ribbon. You can also right-click the necessary library in the working area and select Import Tapes.

3. If you loaded tapes into the tape library magazine, rescan the tape library. To do this, click Rescan Library on the ribbon. You can also right-click the necessary library in the working area and select Rescan.

4. The tapes will appear in the Unrecognized media pool.

5. Right-click the tapes and select Inventory tape.

6. Veeam Backup & Replication will move the tapes to their parent media pools. You can start working with them.

Note that if the tapes are expired, they will be overwritten by tape rotation scheme set for the tapes' parent media pool.

Loading Tapes Written on Another Veeam Server

Veeam Backup & Replication supports restoring data from tapes that were recorded on another Veeam backup server. To read data from such tapes, Veeam Backup & Replication must first catalog the tapes and store the information about them to the Veeam backup database.

To load tapes written on another Veeam backup server, follow the next steps:

1. Load the tapes into the mail slot or directly into the tape library magazine.

2. If you loaded the tapes to the mail slot, import the tapes. To do this, open the Tape Infrastructure view, expand the Libraries node and select the library to which you have loaded the tapes. Click Import Tapes on the ribbon. You can also right-click the necessary library in the working area and select Import Tapes.

3. If you loaded tapes into the tape library magazine, rescan the tape library. To do this, click Rescan Library on the ribbon. You can also right-click the necessary library in the working area and select Rescan.

4. The tapes will appear in the Unrecognized media pool.

5. Right-click the tapes you want to import and select Catalog Tape.

6. The tapes will be moved to the Imported media pool. The Imported media pool will be created automatically. When the tapes are imported, you can view and restore data written to them.

Loading Tapes Written with 3rd-Party Backup Solution

Veeam Backup & Replication does not support backups written with another backup solution even if they are written in the supported format.

IMPORTANT!
You cannot restore data written with 3rd-party tape recording solutions.

If the tapes written with another backup solution contain valuable data, do not run any procedures against them, for example, inventory or catalog. Veeam Backup & Replication recognizes such tapes as writable and may use them for Veeam tape jobs.

If you do not need the data on these tapes, you can erase them and use for writing data with Veeam Backup & Replication.
To erase and re-use tapes containing non-Veeam data:

1. Load the tapes into the mail slot or directly into the tape library magazine.

2. If you loaded the tapes to the mail slot, import the tapes. To do this, open the Tape Infrastructure view, expand the Libraries node and select the library to which you have loaded the tapes. Click Import Tapes on the ribbon. You can also right-click the necessary library in the working area and select Import Tapes.

3. If you loaded tapes into the tape library magazine, rescan the tape library. To do this, click Rescan Library on the ribbon. You can also right-click the necessary library in the working area and select Rescan.

4. The tapes will appear in the Unrecognized media pool.

5. Select tapes you want to erase and click Erase on the ribbon. Alternatively, you can right-click selected tapes and choose Erase Tape. Choose Short erase and click OK. For more information, see Erasing Tapes.

6. The tapes will be moved to the Free media pool.
Inventorying Tapes

When you load new tapes in your tape device for the first time, these tapes are presented to Veeam Backup & Replication as **Unrecognized**. To identify unrecognized tapes, you need to run tape inventory job against them.

Tape inventory job is a relatively fast process of reading metadata written on tape with the aim of detecting name of the media set and the sequence number for the tape. Tape inventory jobs helps Veeam Backup & Replication identify empty tapes and detect non-empty tapes belonging to specific media set.

You can perform tape inventory for a whole tape library or run the job against selected tapes only.

**Inventorying Tape Libraries**

To inventory a whole tape library:

1. Open the **Tape Infrastructure** view.
2. Expand the **Libraries** node and select the library you want to inventory.
3. Click **Inventory Library** on the ribbon. Alternatively, you can right-click the tape library and select **Inventory Library** from the shortcut menu. Veeam Backup & Replication will perform inventory for all online tapes in the library.

**Inventorying Tapes**

To inventory selected tapes:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media**.
3. Select the necessary tapes in the list and click **Inventory** on the ribbon. Alternatively, you can right-click the selected tapes and choose **Inventory Tape**.

The inventory log will display job session results. To access the inventory session details, you can open the **History** view and locate the necessary session under the **Jobs > Tape** node.

**Inventory Results**

After the inventory, Veeam Backup & Replication places tapes in predefined pools:

- Empty tapes are moved to the **Free** pool. You can use these tapes for archiving backups and files.
- Tapes that contain data written on another Veeam backup server remain in the **Unrecognized** pool. Veeam Backup & Replication displays the detected media set name and sequence number for these tapes. If you want to restore data from a specific media set, you need to run the tape catalog job for all tapes in this media set.
Cataloging Tapes

Cataloging tapes is required for tapes that contain some data but are not registered in the Veeam database. For example, cataloging is required for tapes that were written on another Veeam backup server. After the cataloging procedure, you can restore data from the tapes.

When a catalog job is performed, Veeam Backup & Replication first performs tape inventory, reads the information about backup contents on tape from the tape catalog information, scans tape contents and updates the database with details of new detected backup sets.

You can perform tape catalog job for a whole tape library or for selected tapes.

Cataloging Tape Libraries

To catalog a whole tape library:

1. Open the **Tape Infrastructure** view.
2. Expand the **Libraries** node and select the library you want to catalog.
3. Click **Catalog Library** on the ribbon. Alternatively, you can right-click the tape library and select **Catalog Library**.

Cataloging Tapes

To catalog selected tapes:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media**.
3. Select the necessary tapes in the list and click **Catalog** on the ribbon. Alternatively, you can right-click the selected tapes and choose **Catalog Tape**.

The catalog log will display job session results. To access the catalog session details, you can open the **History** view and locate the necessary session under the **Jobs > Tape** node.

Cataloging Tips

Rescanning of tapes during the catalog job may take a lot of time. To speed up the cataloging process, you might do one of the following:

- First, run inventory job to identify tape media sets and decide which tapes you want to catalog. Run the catalog job only against tapes in the necessary media set.
- If you work with a tape library, you can run the catalog job against the whole media set at once.
- If you work with a standalone drive, start cataloging from the last tape in the media set (as this tape usually stores on tape catalog information).
System Requirements for Large Number of Files on Tape

If the tape backup contains a large quantity of files, for example, more than 1,000,000 files in 1,000 folders, you must provide the following system resources:

- Backup server: 1.3 GB RAM per each 1,000,000 files
- Tape server: 800 MB RAM per each 1,000,000 files.
Automated Drive Cleaning

You can instruct Veeam Backup & Replication to automatically clean the tape library drives.

Assigning the automated cleaning to Veeam Backup & Replication prevents possible overlapping of cleaning tasks and tape jobs. Such overlapping may cause tape jobs failures.

To instruct Veeam Backup & Replication to automatically clean the drives:

1. Open the Tape Infrastructure view.
2. Expand the Libraries node and select the needed library. Click Properties on the ribbon. You can also right-click the necessary library in the working area and select Properties.
3. In the Properties window, select the Perform drive cleaning automatically option.

**IMPORTANT!**

If you enable the automated drive cleaning option in Veeam Backup & Replication, make sure that you disabled the drive cleaning tasks on your tape library device.

**How It Works**

Veeam Backup & Replication cleans the drives at the beginning of backup to tape jobs or file to tape job run. The cleaning is not performed during other tape operations such as, for example, cataloging or export.

To clean the drives automatically, Veeam Backup & Replication performs the following actions:

1. The tape library alerts Veeam Backup & Replication on a drive that requires cleaning.
2. Veeam Backup & Replication waits for a tape job to start.
3. When the tape job locks necessary drives for writing data, Veeam Backup & Replication checks which of them requires cleaning.
4. Veeam Backup & Replication ejects the tape from the drive, inserts a cleaning tape and performs the cleaning.

5. Veeam Backup & Replication ejects the cleaning tape and inserts the tape that was reserved for the tape job.

6. The tape job writes the data on tape.

The cleaning process usually takes several minutes.

The cleaning tapes are located in the **Unrecognized** media pool. The worn-out cleaning tapes are moved to the **Retired** media pool automatically.

If a tape job locks multiple drives simultaneously for parallel processing, and one or more drives require cleaning, all drives wait until the cleaning is finished. After cleaning, all drives start writing simultaneously.

The automated drive cleaning does not affect creation of media sets.

**Limitations for Automated Drive Cleaning**

Mind the following limitations for automated drive cleaning:

- You cannot enable the automated drive cleaning on standalone tape drives.
- You cannot start the drive cleaning manually with Veeam Backup & Replication. The drive cleaning is fully automated.
Tape Drives

Drives of each connected library or standalone tape device are displayed in the Tape Infrastructure view under the Libraries > LibraryName > Drives.

To view the drives properties, select Drives under the needed library. View the list and a short description of the drives in the working area. To view detailed information on a drive or to change its settings, click Properties on the ribbon. You can also right-click the necessary drive in the working area and select Properties.

To set block size for the drive manually, select a value from the Block size list in the drive properties.

**NOTE:**
Veeam Backup & Replication uses uniform block size. Drive that is set manually to a particular block size may fail to read tape that was written with another block size. For more information on tape block size, see Supported Devices and Configuration.

To disable a drive, clear the Enabled option in the drive properties. To set the drive into working mode again, select the Enable option. You can disable a drive, for example, for maintenance. When you disable a drive, the library does not use this drive for read/write operations. If the library has multiple drives, other drives will be used for the read/write operations.

![Drive Properties](image)
Tapes

All tapes managed by Veeam Backup & Replication belong to one of media pools. Generally, the new tapes are in the **Free** media pool. Tapes that were written by tape jobs stay in the media pools that are targets to these tape jobs.

If you offload tapes from you tape device, their status changes to Offline, but they stay visible in the console.

Tape media in Veeam Backup & Replication are displayed in the **Tape Infrastructure** view, either under the **Media Pools** or under the **Libraries > LibraryName** > **Media**. You can work with both online and offline tapes:

- Tapes that are currently loaded to the tape device are available under the **Online** node.
- Tapes that have been unloaded from the tape device are shown under the **Offline** node.

**NOTE:**

Before you start to use tapes loaded into the mail slot and tapes recently created in the virtual tape library (VTL), import them. To do that, open the **Tape Infrastructure** view, in the inventory pane click the **Libraries** node, select the required library, right-click it and select **Import tapes**.

All tapes are grouped to service or user-created media pools available under the **Tape Infrastructure** > **Media Pools** node. You can also view tapes under the **Tape Infrastructure** > **Libraries** > **LibraryName** > **Media**.

Veeam Backup & Replication can use only online tapes for backup to tape and file to tape jobs. If you work with a standalone tape drive and all its tapes are offline, Veeam Backup & Replication will display a message informing that you need to insert a tape into the drive. At the same time, Veeam Backup & Replication will hint what tape has been recently used for archiving.

You can insert any tape into the tape drive:

- If the tape you have inserted is registered in the Veeam backup database and the current media set can still be used, Veeam Backup & Replication will continue writing to this media set and append the new content to the content recently written on the tape.
- If the tape you have inserted is not registered in the Veeam backup database, it will be processed as follows:
  - A new empty tape will be placed to the **Free** media pool and used for writing data.
  - A tape containing any data written on another Veeam backup server or with another tape backup solution will be placed to the **Unrecognized** media pool. You need to catalog such tapes.
Viewing Tape Properties

You can view properties of each tape registered in Veeam database. The tapes may be online or offline. The Properties window shows location, capacity, name and other properties of the selected tape.

Tape Capacity

The capacity of the tape is identified by the tape device where the tape is located. You can also view the capacity of a tape in your tape device console (or in the Microsoft Windows Device Manager for tapes that are in drives).

Tape Name

The name of the tape is generated automatically during tape importing. If your tape device supports barcodes, Veeam Backup & Replication will use the barcodes to identify the tapes and display the barcode as the Name property of the tape. If a tape does not have a barcode, Veeam Backup & Replication will automatically create the tape name using the pattern 'Tape N'.

IMPORTANT!

"CLN" and "CLR" prefixes are reserved for cleaning tapes. Veeam Backup & Replication regards tapes with such prefixes as cleaning tapes.

Make sure that the regular tapes intended for writing data do not have barcodes starting with "CLN" or "CLR". If they do, rename the tapes and inventory the tape library.

If necessary, you can change the name of a tape:

1. Open the Tape Infrastructure view.
2. Navigate to the list of tapes either under the Media Pools or under the Libraries > LibraryName node > Media > Online/Offline.
3. Select the tape you want to rename and click Properties on the ribbon. Alternatively, you can right-click the tape and choose Properties.
4. Change tape name and description as required.
5. Click OK to save changes.

NOTE:

If you manage several tape libraries on the same Veeam backup server and use barcodes to identify tapes in these libraries, make sure that all barcodes are unique. If some tapes have identical barcodes, Veeam Backup & Replication may fail to manage them correctly.

Tape Usage Statistics

Tapes wear off gradually every time they are rewritten. When a tape reaches the maximum times of reuse (set by manufacturer), the tape becomes retired. Veeam Backup & Replication automatically moves retired tapes to the Retired media pool. For more information, see Service Media Pools.
Veeam Backup & Replication creates tape usage statistics for each tape based on read and write activity and the size of the tape. When Veeam Backup & Replication selects a tape for a job, it considers the tape usage statistics among other criteria. For a job, a tape with minimal usage is selected.

You can view the tape usage statistics in the Wear field of the **Tape Properties** window.
Viewing Data on Tapes

To view data contents that is currently stored on tape:

1. Open the **Tape Infrastructure** view.

2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media > Online**.

3. Select the necessary tape and click **Properties** on the ribbon. Alternatively, you can right-click the tape and choose **Properties**.

4. Open the **Files** tab.
Removing Tapes from Catalog

If you do not want to store information about a tape and contents on this tape in Veeam Backup & Replication database, you can remove the tape from the catalog. For example, you can perform removal from catalog if a physical tape no longer exists, and the tape should no longer be displayed among media in the Veeam Backup & Replication console.

You can remove only tapes that are offline.

To remove one or more tapes from the catalog:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media > Offline**.
3. Select offline tapes you want to remove from the catalog and click **Remove from Catalog** on the ribbon. Alternatively, you can right-click selected tapes and choose **Remove from Catalog** from the shortcut menu.
4. In the opened dialog box, click **Yes** to confirm removal.

**IMPORTANT!**

You cannot remove protected tapes from the catalog. To remove such tapes, you need to switch the protection off first.
Erasing Tapes

If you do not need the contents stored on tape, you can erase tapes. Veeam Backup & Replication supports two options for erasing data:

- **Short erase (fast)** – use this option to speed up the erase process. The short erase operation does not physically erase data written on the tape. It simply loads the tape to the drive and wipes the tape header. Note that short erase is not supported by some tape devices.

- **Long erase (slow)** – use this option to clear all data written to tape. The long erase operation loads the tape to the drive, rewinds the tape and physically erases all data written to the tape.

To erase tapes:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media > Online**.
3. Select tapes you want to erase and click **Erase** on the ribbon. Choose the type of erase and click **OK**. Alternatively, you can right-click selected tapes and choose **Erase Tape**. Next, choose how the tape should be erased and click **OK**.

**IMPORTANT!**

You cannot erase protected tapes. To erase such tapes, you need to switch the protection off first.
Marking Tapes as Free

Instead of erasing tapes, you can mark tapes as free. During this operation, Veeam Backup & Replication deletes from backup and tape catalogs information about backup contents stored on tape. Data written to tape remains intact.

To mark tapes as free:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media > Online**.
3. Select tapes you want to mark as free and click **Mark as Free** on the ribbon. Alternatively, you can right-click selected tapes and choose **Mark as Free** from the shortcut menu.
4. In the displayed dialog box, click **Yes**.

After a tape is marked as free, Veeam Backup & Replication removes from the catalog information about contents on this tape.

**IMPORTANT!**

You cannot mark protected tapes as free. To mark such tapes as free, you need to switch the protection off first.

You cannot mark WORM tapes as free either.
Ejecting Tapes

Ejecting moves the tape that is currently in drive to a library slot. The tape stays in the library and is online. Ejecting prevents tapes, for example, from being occasionally overwritten.

You can eject a tape, or eject a drive. Eject command is enabled only for tapes that are in drives or for drives with loaded tapes.

To eject a tape:

1. Open the Tape Infrastructure view.
2. Navigate to the list of tapes either under the Media Pools or under the Libraries > LibraryName > Media > Online.
3. Select a tape located in drive that you want to eject and click Eject on the ribbon. Alternatively, you can right-click selected tape and choose Eject Tape.

To eject a drive:

1. Open the Tape Infrastructure view.
2. Navigate to the Libraries > LibraryName > Drives.
3. Select a drive from where you want to eject the tape and click Eject Tape on the ribbon. Alternatively, you can right-click selected tape and choose Eject.

TIP:

You can instruct your tape jobs to eject tape from drive after the job completes. To do so, navigate to the Options step of backup to tape job or file to tape job and select the Eject media upon job completion check box.
Exporting Tapes

If you want to take the tapes out of the tape device, you need to export them first. Exporting ejects the tapes from the slots in the tape device and moves them to the I/E slot (or Mail slot). When they are in the I/E slot, you can take them from the library and, for example, carry to a storing location.

**NOTE:**

Export is available only for the devices that support corresponding operations and include I/E slot.

To export a tape:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media > Online**.
3. Select a tape you want to export and click **Export** on the ribbon. Alternatively, you can right-click selected tape and choose **Export Tape** from the shortcut menu.

**TIP:**

You can instruct your tape jobs to export tapes automatically. To do so, navigate to the **Options** step of backup to tape job or file to tape job and select the **Export current media set upon job completion** check box.
Tapes Availability and Write-Protection

Before archiving data to tape media, Veeam Backup & Replication detects available tapes in the target media pool. Unavailable tapes are filtered out and are not used for writing data. A tape may be unavailable for one of the following reasons:

- The tape cannot be used according to the retention policy set for the media pool.
- The tape is offline.
- The tape has the write-protect switch set.

If your tape is write-protected and you want to write data to this tape, you must eject the tape from the drive and drag the write protection switch off. After you insert the tape back to the drive, you must inventory the tape to mark it as writable in the Veeam Backup & Replication database.
WORM Tapes

Veeam Backup & Replication supports WORM (Write Once Read Many) tapes for archiving backups to tape.

WORM Media Pools

As the WORM tapes cannot be overwritten, you need to treat them differently when using with Veeam Backup & Replication. These tapes cannot have retention period, and for this reason you cannot place them to the same media pool with the overwritable tapes.

For WORM tapes, you need to create separate media pools. In these media pools, only WORM tapes are used and they are not mixed with other tapes. The following media pools support the WORM media:

- WORM media pools
- WORM GFS media pools.

In WORM media pools, retention settings are disabled. For more information, see Media Pools and GFS Media Pools.

You can append new data to the same WORM tape cartridge until it is full as long as the media set containing this media is open. For more information about cases when Veeam Backup & Replication closes the current media set and starts a new one, see Media Sets.

Identifying WORM Tapes

Veeam Backup & Replication identifies WORM tapes and marks them as WORM in the Veeam database. WORM tapes are never mixed with standard tapes.

To identify WORM and standard tapes, run the inventory job against them. For more information, see Inventoring Tapes.

Requirements for WORM Tapes

Tape libraries must support reading/writing data on WORM tape cartridge memory chip.
Tape Barcode Labels

Library tapes can be marked with barcode labels that simplify identification of tapes and their types. Although the main source of information about the tape for Veeam Backup & Replication is a cartridge memory chip (LTO-CM), it can be read only when the media is inserted into the drive. Thus, correct labeling of tapes turns very useful for management of tape media.

Each barcode label used for marking LTO tapes supported by Veeam Backup & Replication consists of eight characters: a six-character volume serial ID and a two-character media ID. The media ID defines the tape type. The labels use the uppercase letters A through Z and the numbers 0 through 9, for example: ABC123L8, where ABC123 is the volume serial ID, L8 is the media ID indicating LTO of generation 8.

LTO data tapes used in devices supported by Veeam Backup & Replication may have the following media ID:

<table>
<thead>
<tr>
<th>Media ID</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3</td>
<td>Generation 3</td>
</tr>
<tr>
<td>L4</td>
<td>Generation 4</td>
</tr>
<tr>
<td>L5</td>
<td>Generation 5</td>
</tr>
<tr>
<td>L6</td>
<td>Generation 6</td>
</tr>
<tr>
<td>L7</td>
<td>Generation 7</td>
</tr>
<tr>
<td>L8</td>
<td>Generation 8</td>
</tr>
<tr>
<td>LT</td>
<td>Generation 3 WORM</td>
</tr>
<tr>
<td>LU</td>
<td>Generation 4 WORM</td>
</tr>
<tr>
<td>LV</td>
<td>Generation 5 WORM</td>
</tr>
<tr>
<td>LW</td>
<td>Generation 6 WORM</td>
</tr>
<tr>
<td>LX</td>
<td>Generation 7 WORM</td>
</tr>
<tr>
<td>LY</td>
<td>Generation 8 WORM</td>
</tr>
<tr>
<td>CU</td>
<td>Universal cleaning</td>
</tr>
</tbody>
</table>
Cleaning and diagnostic tapes use unique labels to distinguish them from data tapes. The first three alphanumeric characters in the volume ID indicate the tape type:

- **Cleaning tapes** use CLNxxx as volume ID plus the cleaning-specific media ID, for example: CLN001CU, where CLN001 is the cleaning media ID, CU is the indicator of the cleaning media.

- **Diagnostic tapes** use DG[space]xxx as diagnostic tape serial ID plus the media ID, for example: DG 001L8, where DG 001 is the diagnostic tape serial ID, L8 is the media ID.

**NOTE:**
If tapes have incorrect barcode labels, for example, labels on ordinary (non-WORM) tapes indicate that they are of WORM or cleaning type, Veeam Backup & Replication may incorrectly identify such tapes.
Media Pools

Media pools are logical containers created in Veeam Backup & Replication to organize and administer tapes.

Veeam Backup & Replication has the following types of media pools:

- **Service Media Pools** are created automatically and are used for automatic tape administration.
- **Media Pools** are created by user and contain tapes for backups.
- **GFS Media Pools** are created by user and contain tapes for GFS backups.

All Veeam media pools are global. They span tapes that belong to multiple libraries. In a global media pool, you can move tapes between the libraries without need to catalog them.

**NOTE:**

Mind the hardware encryption. If the tapes are encrypted by native hardware means of a tape library, you cannot read them at tape device with another encryption standard or with hardware encryption turned off.

Placing Tapes to Media Pools

Veeam Backup & Replication works only with tapes that are placed to a media pool. To introduce tapes to Veeam Backup & Replication, you need to run importing procedure against all new tapes you load to your tape devices. Importing registers tapes in the Veeam Backup database after which Veeam Backup & Replication places tapes to one of the media pools. For more information, see **Loading Tapes**.
Media Sets

Media set is a set of tapes used for continuously writing backup data. Media set is one of the parameters in media pool configuration.

A new media set always starts with a free tape. Within one media set, the new data block is appended to a previous one on a tape. Veeam Backup & Replication stores information about all tapes that belong to each media set. You can view the list of names or barcodes of tapes that are associated with a particular media set.

Media sets are used to explicitly distinguish data recorded to particular sets of tapes. You can choose between the following configuration options:

- **Creating a new media set for each backup session.** In this case, Veeam Backup & Replication will produce a separate set of tapes for each tape backup session.
- **Starting a new media set for a certain period of time,** for example, each week. As a result, you will have a separate set of tapes containing all backups that have been written to tape during a week.
- **Always continuing one media set.** Use this option if you do not need to split your tape archives into separate sets of tapes.

When planning media sets configuration, you should balance between convenient viewing of data and efficiency of using the tapes. Media sets help create distinct packs of tapes, which will be convenient, for example, if you need to bring certain tapes from an offsite storage location to restore data. However, it may use the tapes ineffectively as the new media sets always require a new tape. This option is helpful when you have a lot of backups stored offsite.

Always continuing one media set option is most efficient in terms of tape capacity usage, for the new data would be written to the same tape until it is full. However, in this case the data will be split across tapes and you may require a larger number of tapes to get a particular backup set for restore. This option is usually used in environments where the tapes are not exported from libraries.

In some cases, Veeam forcibly starts a new media set, even if media pool settings do not instruct Veeam to do so. It happens when a job starts, but the tape that was planned for writing data cannot be used. In this situation, Veeam takes a new tape, and starts a new media set on it. For example, the situation may be as following:

1. The required tape is offline. If you bring such tape online before the tape job starts, it will be used as planned.
2. If the media pool is scheduled to export tapes. Exporting closes the current media set and starts a new one on the next job run.
3. The required tape is hardware or software protected.
4. In library failover on the following events: library is offline and all drives are busy. When a tape library is failed over on these events, Veeam Backup & Replication starts a new media set even if the global media pools are configured to always continue one media set.
Note that if a new media set is started, scheduled or forced, the previous media set cannot be resumed.
Backup Sets

When a tape job runs, it analyzes disk storage and spots files that match the tape job parameters. The tape job queues the files and writes them to tape. The set of files that are archived to tape within one tape job session is a backup set.

Depending on size and number of archived files, a backup set may require different amounts of tape space. For example, if the amount of data is large, it may take several tapes.
Service Media Pools

Service media pools sort tapes and manage their free capacity for writing data. Service media pools are automatically created by Veeam Backup & Replication when needed. The following predefined media pools can be created:

- **Free** — a media pool containing empty tapes. You can use this media pool to replenish user-created pools with new tapes when needed.

- **Unrecognized** — a media pool containing tapes that were loaded to tape device. They need further identification by user that can be done by running the inventory or catalog job. This media pool also contains cleaning tapes.

- **Imported** — a media pool containing non-empty tapes. These include tapes identified by the tape catalog job.

- **Retired** — a media pool containing retired tapes that reached the maximal number of re-writes. This media pool may also contain tapes with some mechanical breakdown.

You cannot create, modify or delete service media pools.
Media Pools

Media pools are target destinations for backup to tape and file to tape jobs. The media pools manage empty (or available for overwriting) tapes to allow the tape jobs write data. You can create as many media pools as you need. One media pool can be target for unlimited number of tape jobs. The GFS jobs require GFS media pools. For more information, see [GFS Media Pools](#).

Tapes for Media Pools

For writing data, you can use rewritable tapes or WORM (Write Once Read Many) tapes. For more information, see [WORM Tapes](#). For using WORM tapes, you need to create separate media pools. The following types of media pools are available:

- Media pools
- WORM media pools.

For more information on creating WORM media pools, see [Creating Media Pools](#).

Media Pools Configuration

For each media pool, you can configure rules. Such rules are further applied to every tape that belongs to this media pool.

You can apply the following rules:

- Add tape libraries: select and manage tape libraries that will be used by the media pool.
- Configure tape replenishment: you can allocate some particular tapes or let the media pool take a free tape when required.
- Create media sets: media sets allow you to create sets of tapes with data for a particular time period.
- Set the data retention period: this setting lets you choose the period for which the data on tapes will be protected from overwriting (not applicable for WORM tapes).
- Enable parallel processing: you can allow the media pool to use multiple tape drives simultaneously for writing data to tape. With parallel processing enabled, the media pool can process simultaneously several tape jobs or split the data within one tape job across tape drives.
- Encrypt the data written to tapes.
- Export tapes to vault.
A tape allocated to a media pool will always be tied to its media pool. When you bring a tape with expired data online, Veeam Backup & Replication places it automatically to the media pool where the tape was written.

Creating Media Pools

To create a media pool, use the New Media Pool wizard or New WORM Media Pool wizard. This section will guide you through all steps of the wizard and provide explanation on available options.
Step 1. Launch New Media Pool Wizard

To run the **New Media Pool** wizard:

1. Open the **Tape Infrastructure** view and click **Add Media Pool** on the ribbon. Alternatively, you can open the **Tape Infrastructure** view, right-click the **Media Pools** node and choose **Add Media Pool**.

2. Select **Standard** if you want to create a media pool for standard tapes or **WORM** if you want to create a media pool for WORM (Write Once Read Many) tapes.

**TIP:**

You can also launch the **New Media Pool** wizard when configuring tape jobs (that is, directly from the **New Backup to Tape Job** wizard and **New File to Tape Job wizard**. For more information, see **Creating Backup to Tape Jobs** and **Creating File to Tape Jobs**.
Step 2. Specify Media Pool Name

At the Name step of the wizard, define basic description for the new media pool.

1. In the Name field, enter a name for the created media pool.

2. In the Description field, enter a description of the new media pool. The default description contains information about the user who created the media pool, date and time when the media pool was created.
Step 3. Add Tapes to Media Pool

At the Tapes step of the wizard, you can select tape libraries and allocate tapes for the pool.

1. From the list in the Tape library field, select the tape device that you want to use in this media pool. The list contains all tape libraries managed by this Veeam backup server.

2. To add more libraries, click Manage. For one media pool, you can select any tape devices that are managed by this Veeam backup server even if they are connected to different tape servers.

Click Add to add other tape libraries.

Configure the multiple libraries mode:

- Parallel processing: in this mode, tape jobs use drives in all libraries parallelly. For more information, see Tape Parallel Processing.

  To enable the parallel processing mode, set all libraries role to Active. To do this, select a library and click Edit. Use Up and Down buttons to position the libraries in order they must be used.

- Failover: in this mode, the first library in the list is active and is primarily used for writing data. Other libraries added to this media pool are passive and are used for failover in the following events:
  - The primary library is unavailable.
  - The primary library has no media available.

To enable the failover mode, set the first library role to Active and all other libraries roles to Passive. To do this, select a library from the list and click Edit. Use Up and Down buttons to position the libraries in order they must fail over. Also ensure that you select at least one failover event.
On the next backup session, Veeam Backup & Replication will try to switch back to the primary library. If it is still not available, the media pool fails over to the next library as defined.

NOTE:
If you enable the failover mode, notifications can be sent when Veeam Backup & Replication switches to a passive tape library during failover. Notifications are sent under either of the following conditions:

- The Notify on failure check box is selected in the Veeam Backup & Replication global notification settings. For more information, see the Veeam Backup & Replication User Guide, section Configuring Global Email Notification Settings.
- The Notify on error check box is selected in the tape job notification settings. For more information, see Notifications Settings.

If you enable the parallel processing mode, no email notifications are sent when Veeam Backup & Replication switches from one library to another.

3. To allocate specific tapes from the library, click the Add in the Tapes field and select tapes that should be added to the media pool. Allocated tapes will be reserved for this media pool; other media pools will not be able to use these tapes. The capacity and free space on the allocated tapes will be displayed in the bottom right corner.

Allocate standard tapes to the standard media pool and WORM tapes to the WORM media pool. Do not mix standard and WORM tapes in one media pool.

4. To make the media pool replenishable, select the Add tapes from Free media pool automatically when more tapes are required check box.

With this option enabled, additional tapes will be allocated from the Free media pool when needed. That is, when a tape job uses all available tapes from this media pool, Veeam Backup & Replication will automatically add the required number of tapes from the Free media pool to let the job complete. If the option is disabled, the job will pause and prompt the backup administrator to add new tapes to the media pool.
To a standard media pool, Veeam Backup & Replication will add only standard tapes; to a WORM media pool, Veeam Backup & Replication will add only WORM tapes.
Step 4. Specify Media Set Options

At the Media Set step of the wizard, specify rules for creating media sets. For more information, see Media Sets.

In the Media set name field, define the pattern according to which created media set(s) will be named. The default variables are $%id$ (the number of the media set) and $%date$ (the date of creation of the media set).

You can additionally use the following variables:

- $%time$ — the time of creation of the media set
- $%day$ — the day in month on which the media set is created
- $%dayofweek$ — the day of week on which the media set is created
- $%month$ — the month of creation of the media set (the month is shown as a name, for example, 'January')
- $%year$ — the year of creation of the media set
- $%job$ — the name of job for which the media set is created
- $%monthnumeric$ — the month of creation of the media set (the month is shown as a number, for example, '01' for January).

In the Automatically create new media set section, specify conditions for creating new media sets on tapes allocated to the media pool. The following options are available:

- **Do not create, always continue using current media set.** If this option is selected, each subsequent backup session will write its backup set to the existing media set; it will append backup content to the content that was written to tape with a previous backup session. If, however, a backup set is started with a new tape, Veeam Backup & Replication will create a new media set for it.

- **Create new media set for every backup session.** If this option is selected, a new media set will be created for each new backup session. Each backup session will write its backup set starting with a new tape.
- **Daily at.** If this option is selected, you can specify day and time when new media sets should be created. For example, if at the end of the week you send weekly media sets to offsite storage, you can schedule creation of new media sets at the beginning of each week.
Step 5. Specify Retention Settings

At the Retention step of the wizard, specify the retention settings and offline media tracking options for the tapes in this media pool. For more information, see Tape Data Retention.

For WORM media pools, retention option is inapplicable; retention settings are inactive.

For standard media pools, you can select one of the following options:

- **Do not protect data (cyclically overwrite tapes as required).** If this option is selected, tapes allocated to the pool will be overwritten, starting with the tape that stores the oldest archive.

- **Protect data for (time interval).** If this option is selected, data on tapes will be preserved for the specified period. When this period is over, tapes will be overwritten, starting with the tape that stores the oldest archive. This setting must accord with the retention policy specified for the backup chain that you plan to archive to tape. For more information on disk retention, see Data Retention.

- **Never overwrite data.** If this option is selected, data on tapes will not be overwritten. If there is not enough tape capacity for the archiving job to complete, Veeam Backup & Replication will pause the job and prompt the backup administrator to add new tapes to the media pool.

**NOTE:**

If at the previous step you selected the Do not create, always continue using current media set option, keep in mind that the retention period for such media sets starts after the first tape in the media set becomes full.

In the Offline media tracking section, you can set automatic moving tapes to a media vault when they are brought offline. For more information on vaults, see Media Vaults.

To enable this option:

1. Select Move all offline tapes from this media pool into the following media vault check box.
2. From the Vault list, select the media vault where you want to automatically move the tapes.
If the vault is not added yet, click **Add New** to open the **New Media Vault** wizard.
Step 6. Add Optional Media Pool Settings

At the **Options** step of the wizard, you can enable parallel processing and encryption.

1. Select the **Enable parallel processing for tape jobs using this media pool** check box if you want to process multiple tape jobs simultaneously. Set the maximum number of drives that the media pool can use in parallel.

   If you want to use multiple drives simultaneously to process multiple source backup chains within the tape jobs, select the **Enable parallel processing of backup chains within a single job** check box. For more information, see [Tape Parallel Processing](#).

2. To enable encryption, select the **Use encryption** check box. This option allows you to encrypt the content of files or backups archived to tapes in the media pool.

   From the **Password** field, select a password you want to use to encrypt data written to tape. You can also click **Add** or use the **Manage passwords** link to add a password. For more information, see the Veeam Backup & Replication User Guide, section **Tape Encryption**.

   If the source job produces encrypted backups, and you enable encryption in the properties of the media pool, the data on tape will be encrypted twice. To decrypt such tape backups, you will need to specify two passwords:
   - Password for the media pool.
   - Password for the source backup job.
Step 7. Finish Working with Wizard

Review the media pool settings and click Finish to complete the wizard.

The new media pool will be available under the Tape Infrastructure > Media Pools node in the Tape Infrastructure view.
GFS Media Pools

The GFS media pools are special media pools that store data to tape according to the GFS, or Grandfather-Father-Son rotation scheme. The GFS media pools are targets for GFS tape jobs. For more information, see GFS Backup to Tape.

Tapes for GFS Media Pools

For writing data, you can use rewritable tapes or WORM (Write Once Read Many) tapes. For more information, see WORM Tapes. For using WORM tapes, you need to create separate media pools. The following types of media pools are available:

- GFS media pools.
- WORM GFS media pools.

For more information on creating WORM media pools, see Creating GFS Media Pools.

GFS Media Sets

GFS media pool keeps four predefined media sets for storing the machine backups with a tiered retention policy scheme:

- Daily
- Weekly
- Monthly
- Quarterly
- Yearly.

You can disable any media set or sets if you do not need them.

GFS Tape Jobs

A GFS media pool can be target for unlimited number of GFS tape jobs.

Creating GFS Media Pools

To create a GFS media pool, use the New GFS Media Pool wizard. This section will guide you through all steps of the wizard and provide explanation on available options.
Step 1. Launch New GFS Media Pool Wizard

To run the **New GFS Media Pool** wizard:

1. Open the **Tape Infrastructure** view and click **Add GFS Media Pool** on the ribbon. Alternatively, you can open the **Tape Infrastructure** view, right-click the **Media Pools** node and choose **Add GFS Media Pool**.

2. Select **Standard** if you want to create a media pool for standard tapes or **WORM** if you want to create a media pool for WORM (Write Once Read Many) tapes.

**TIP:**

You can also launch the **New GFS Media Pool** wizard when configuring backup to tape jobs (that is, directly from the **New Backup to Tape Job** wizard. For more information, see Creating Backup to Tape Jobs.
Step 2. Specify Media Pool Name

At the **Name** step of the wizard, define basic description for the new GFS media pool.

1. In the **Name** field, enter a name for the created media pool.

2. In the **Description** field, enter a description of the new media pool. The default description contains information about the user who created the media pool, date and time when the media pool was created.
Step 3. Add Tapes to Media Pool

At the **Tapes** step of the wizard, you can select tape libraries and allocate tapes for the pool.

1. From the list in the **Tape library** field, select the tape device that you want to use in this media pool. The list contains all tape libraries managed by this Veeam backup server.

2. To add more libraries, click **Manage**. For one media pool, you can select any tape devices that are managed by this Veeam backup server even if they are connected to different tape servers.

   Click **Add** to add other tape libraries.

   ![Manage Libraries](image)

   **Configure the multiple libraries mode:**

   o **Active**: in this mode, tape jobs use drives in all libraries parallelly. For more information, see **Tape Parallel Processing**.

      To enable the parallel processing mode, set all libraries role to **Active**. To do this, select a library and click **Edit**. Use **Up** and **Down** buttons to position the libraries in order they must be used.

   o **Passive**: in this mode, the first library in the list is active and is primarily used for writing data. Other libraries added to this media pool are passive and are used for failover in the following events:

      ▪ The primary library is unavailable.
      ▪ The primary library has no media available.

      To enable the failover mode, set the first library role to **Active** and all other libraries roles to **Passive**. To do this, select a library from the list and click **Edit**. Use **Up** and **Down** buttons to position the libraries in order they must fail over. Also ensure that you select at least one failover event.
On the next backup session, Veeam Backup & Replication will try to switch back to the primary library. If it is still not available, the media pool fails over to the next library as defined.

NOTE:

If you enable the failover mode, email notifications can be sent when Veeam Backup & Replication switches to a passive tape library during failover. Notifications are sent under either of the following conditions:

- The **Notify on failure** check box is selected in the Veeam Backup & Replication global notification settings. For more information, see the Veeam Backup & Replication User Guide, section *Configuring Global Email Notification Settings*.
- The **Notify on error** check box is selected in the tape job notification settings. For more information, see *Notifications Settings*.

If you enable the parallel processing mode, no email notifications are sent when Veeam Backup & Replication switches from one library to another.

3. To allocate specific tapes from the library, click the **Add** in the **Tapes** field and select tapes that should be added to the media pool. Allocated tapes will be reserved for the created media pool; other media pools will not be able to use these tapes. The capacity and free space on the allocated tapes will be displayed in the bottom right corner.

   Allocate standard tapes to the standard media pool and WORM tapes to the WORM media pool. Do not mix standard and WORM tapes in one media pool.

4. To make the media pool replenishable, select the **Add tapes from Free media pool automatically when more tapes are required** check box.

   With this option enabled, additional tapes will be allocated from the Free media pool when needed. That is, when a backup to tape or file to tape job uses all available tapes from this media pool, Veeam Backup & Replication will automatically add the required number of tapes from the Free media pool to let the job complete. If the option is disabled, the job will pause and prompt the backup administrator to add new tapes to the media pool.
To a standard media pool, Veeam Backup & Replication will add only standard tapes; to a WORM media pool Veeam Backup & Replication will add only WORM tapes.
Step 4. Specify Media Set Options

In the GFS media pool, a separate media set is created for each backup cycle: daily, weekly, monthly, quarterly and yearly.

For each media set, you can set the data retention period. The retention period indicates for how long the data is protected from overwriting.

Click **Advanced** to configure the advanced media set options.
Step 5. Specify Advanced Media Set Options

You can granularly configure rules for each media set.

At the GFS Media Set step of the wizard, click Advanced. Select the Daily tab to configure the daily media set.

1. If you want the Daily media set to span several selected tapes, click Add and select tapes that should be added to the media set. You can select from tapes added to the media pool at the Tapes step of the wizard. The selected tapes will be displayed in the Daily media set field.

   This option is useful if you want the media set to use some particular user-defined tapes. Otherwise, you can use the Add tapes from media pool automatically option.

2. In the Media set name field, define the pattern according to which the created media set will be named.

3. Select the Add tapes from media pool automatically check box to allow the media set to take a tape from the media pool when required.

4. Select Append backup files to incomplete tapes if you want to write the next backup set to the tape where the previous backup set was written. Otherwise, the GFS tape job will use a new tape for each backup set.

5. You can set automatic moving tapes to a media vault when they are brought offline. To enable this option:
   a. Select Move all offline tapes from this media pool into the following media vault check box.
   b. From the list of vaults, select the media vault where you want to automatically move the tapes.
   c. If the vault is not added yet, click Add New to open the New Media Vault wizard. For more information, see Creating Vaults.

   NOTE:
   Tapes written in this media set will always be used by this media set. Other media sets will not be able to use these tapes even after the data expires.
Select the **Weekly, Monthly, Quarterly** of **Yearly** tabs to set the advanced media set options for weekly, monthly, quarterly and yearly media sets.
Step 6. Add Optional Media Pool Settings

At the Options step of the wizard, you can enable parallel processing and encryption.

1. Select the Enable parallel processing for tape jobs using this media pool check box if you want to process multiple tape jobs simultaneously. Set the maximum number of drives that the media pool can use in parallel.

   If you want to use multiple drives simultaneously to process multiple source backup chains within the tape jobs, select the Enable parallel processing of backup chains within a single job check box. For more information, see Tape Parallel Processing.

2. To enable encryption, select the Use encryption check box. This option allows you to encrypt the content of files or backups archived to tapes in the media pool.

   From the Password field, select a password you want to use to encrypt data written to tape. You can also click Add or use the Manage passwords link to add a password. For more information, see the Veeam Backup & Replication User Guide, section Tape Encryption.

   If the source job produces encrypted backups, and you enable encryption in the properties of the media pool, the data on tape will be encrypted twice. To decrypt such tape backups, you will need to specify two passwords:
   
   o Password for the GFS media pool.
   o Password for the source backup job.

   ![New GFS Media Pool](image)
Step 7. Finish Working with Wizard

Review the media pool settings and click Finish to complete the wizard.

A new media pool will be available under the Tape Infrastructure > Media Pools node in the Tape Infrastructure view.
Moving Tapes to Another Media Pool

Veeam Backup & Replication allows you to move tapes between media pools. You can move tapes between media pools and GFS media pools, and from and to the Free media pool.

You can move tapes between media pools only if the media pools span the same tape libraries.

You cannot manually move tapes to Imported, Unrecognized or Retired media pools.

IMPORTANT!

When you move a tape to any media pool, Veeam Backup & Replication marks this tape as free.

To move tapes from one media pool to another:

1. Open the Tape Infrastructure view.
2. Navigate to the list of tapes either under the Media Pools or under the Libraries > LibraryName > Media > Online.
3. Select tapes you want to move and click Move to on the ribbon. Choose the target media pool from the list. Alternatively, you can right-click selected tapes and choose Move to Media Pool. Next, choose the target media pool from the list.

NOTE:

You cannot move tapes that are protected. To move such tapes, you need to switch the protection off first.
Modifying Media Pools

If necessary, you can modify settings of a media pool.

To modify media pool settings:

1. Open the **Tape Infrastructure** view.
2. Navigate to the **Media Pool** node.
3. Right-click the necessary media pool and choose **Properties**. Alternatively, select a media pool and click **Edit Media Pool** on the ribbon.
4. Go through the **Edit Media Pool** wizard to change the necessary settings.
5. Apply changes.

Limitations for Modifying Media Pools

You can modify only regular or GFS media pools; service media pools cannot be modified.
Removing Media Pools

If you no longer need a media pool or a GFS media pool, you can remove it:

1. Open the **Tape Infrastructure** view.
2. Navigate to the **Media Pool** node.
3. Right-click the necessary media pool and choose **Remove Media Pool** from the shortcut menu. Alternatively, select a media pool and click **Remove Media Pool** on the ribbon.
4. In the displayed dialog box, click **OK** to confirm deletion.

When you remove a media pool, its tapes are moved to the **Imported** media pool. The data on the tapes is not erased. You can use the tapes in the **Imported** media pool for restore operations.

The **Imported** media pool does not have any retention settings. The tapes in the **Imported** media pool are never overwritten as they are not used by any jobs. The media set number and the media set expiration date are inherited and remain for user information. The data will remain on tapes until you choose to erase it manually.

If you do not need the data on tapes, you can move the imported tapes **to the Free** media pool or any other media pool. In this case, the tapes will be marked as free. For more information, see **Moving Tapes to Another Media Pool**.

Limitations for Removing Media Pools

- You can remove only regular media pools or GFS media pools; service media pools cannot be removed.
- You cannot remove a media pool that is used in a backup to tape or file to tape job. To remove such media pool, you need to point corresponding jobs to other media pools or GFS media pools.
Vaults

Vaults are logical containers that help you to additionally organize offline tapes. When the tapes are recorded and moved offsite, you need to have easy ways to manage data on such tapes.

Vaults visualize information about tapes. They store information about original location of tapes, such as library and media pool, data written to tapes and retention terms for it. Vaults are not limited to any original location of tapes: you can place tapes from different libraries and media pools to one vault.

You can virtually move tapes to the vaults grouping them by any criteria. For example, if you have several offsite storage locations for physical tapes, you can create a vault for each of them. When you transport the physical tapes to the offsite storage, you can accordingly move the offline tapes to a vault in your Veeam backup console mirroring the physical storage. This will allow you to have convenient representation of the list of tapes in each of your physical storage locations.

Tapes can be moved to a vault automatically if you instruct media pools to move tapes to a selected vault after the tapes go offline. You can also move the tapes from one vault to another. Tapes will not be shown in their vault when you bring them online. The tapes that have been moved to a vault stay visible in their media pools and under the Offline node. When you remove a tape from the Veeam backup server, it is automatically deleted from the vault.

To start working with vaults, you need to create one or more of them. Vaults are virtual container, and do not require any physical resources.

**NOTE:**

You can work with tape vaults if Veeam Backup & Replication Enterprise license or higher is installed on the Veeam backup server.
Creating Vaults

Created vaults are shown under the **Vaults** node. If you have no vaults created, the **Vaults** node will not be shown.

To create a new vault, use the **New Media Vault** wizard. This section will guide you through all steps of the wizard and provide explanation on available options.

To add a vault, follow the next steps:
Step 1. Launch New Media Vault Wizard

To run the New Media Vault wizard, do either of the following:

- Open the Tape Infrastructure view and select the Tape Infrastructure node. Click Add Media Vault on the ribbon.
- Open the Tape Infrastructure view, right-click the Tape Infrastructure node and choose Add Media Vault.

TIP:

You can also launch the New Media Vault wizard when configuring media pools (that is, directly from the New Media Pool or New GFS Media Pool wizard. For more information, see Creating Media Pools or Creating GFS Media Pools.
Step 2. Specify Media Vault Name

At the Name step of the wizard, you should define basic description for the new vault.

1. In the Name field, enter a name for the created vault.

2. In the Description field, enter a description of the new vault. The default description contains information about the user who created the vault, date and time when the vault was created.

3. If you want to set overwrite protection to all tapes in this vault, select the Protect all tapes moved to this media vault automatically check box. For more information, see Tape Protection.
Step 3. Finish Working with Wizard

Review the media vault settings and click Finish to complete the wizard.
Modifying Vaults

To modify vault settings:

1. Open the **Tape Infrastructure** view.
2. Navigate to the **Vaults** node.
3. Right-click the necessary vault and choose **Properties**. Alternatively, select a vault and click **Edit Vault** on the ribbon.
4. Go through the **Edit Media Vault** wizard to change the necessary settings.
5. Apply changes.
Removing Vaults

If you no longer need a vault, you can remove it. Mind the following limitation:

- You cannot remove a vault that contains tapes. To be able to remove such vault, first move tapes from this vault to other vaults or remove them from the vault. When you remove a tape from the vault, you can see it in its media pool or under Media > Offline node.

- You cannot remove a vault that has a reference to any media pool. To be able to remove such vault, first edit settings of the corresponding media pool and remove a reference to this vault.

To remove a vault:

1. Open the Tape Infrastructure view.
2. Navigate to the Vaults node.
3. Select a vault and click Remove Vault on the ribbon. Alternatively, you can right-click the necessary vault in the working area and choose Remove Vault.
4. In the displayed dialog box, click OK to confirm deletion.
Moving Tapes to Vault

Recorded tapes can be moved to a vault. In the vault, you can view tape information, including data written to tape and data retention settings.

If the tapes are placed to a vault, you can still view them under the **Offline** node or in the media pool.

You can move the tapes manually or instruct the relevant media pool to place the tapes to a vault automatically.

**In This Section**

- Moving tapes to vault manually
- Automatic vaulting for media pools
- Automatic vaulting for GFS media pools

### Moving Tapes to Vault Manually

You can move only tapes that contain data and that are offline. To move the tapes manually:

1. Open the **Tape Infrastructure** view.
2. Navigate to the list of tapes either under the **Media Pools** or under the **Libraries > LibraryName > Media > Offline**.
3. In the working area, right-click the tapes you want to move and select **Move to Vault**. Choose the vault you need.

### Automatic Vaulting for Media Pools

To set the automatic placing of tapes to a vault, you need to configure the media pool where the target tapes are recorded. To configure a media pool:

1. Open the **Tape Infrastructure** view.
2. Navigate to the **Media Pools** node.
3. Select the media pool you want to customize.
4. Click **Edit Media Pool** on the ribbon. Alternatively, you can right-click the media pool and select **Properties**.
5. Go to the **Retention** step of the **Edit Media Pool** wizard. In the **Offline media tracking** field, select **Move all offline tapes from this media pool into the following media vault**. Select the needed vault from the drop-down list.
Note that moving tapes to a vault automatically will not be available if you select **Do not protect data (cyclically overwrite tapes as required)** option as a data retention policy.

**TIP:**
If you have not previously created a vault, you can click the **Add New** button and create a new vault without closing the job wizard. For more information, see Creating Vaults.

**Automatic Vaulting for GFS Media Pools**

Vaulting of GFS tapes is set for media sets individually. To change a media set configuration:

1. Open the **Tape Infrastructure** view.
2. Navigate to the **Media Pools** node. Select the GFS media pool you want to customize.
3. Click **Edit Media Pool** on the ribbon. Alternatively, you can right-click the media pool and select **Properties**.
4. Go to the **GFS Media Set** step of the **Edit Media Pool** wizard and click **Advanced**. Select a tab with the needed media set and select **Move all offline tapes into the following media vault**. Select the needed vault from the drop-down list.

![Advanced Settings](image)

**TIP:**

If you have not previously created a vault, you can click the **Add New** button and create a new vault without closing the job wizard. For more information, see **Creating Vaults**.
Managing Tapes in Vault

When you have tapes placed to vaults, you can move them to another vault or remove from vault. When you remove tapes from a vault, they are still available in the Offline list or in their media pool.

To move tapes to another vault:

1. Open the Tape Infrastructure view and select the Vaults node. Select the vault where the needed tapes are stored.
2. In the working area, right-click the tapes you want to move and select Move to Vault. Select the target vault.

To remove tape from vault:

1. Open the Tape Infrastructure view and select the Vaults node. Select the vault you need.
2. In the working area, right-click the tapes you want to remove and select Remove from Vault.

The tapes are removed from vault automatically in the following situations:

- A tape comes online. It will re-appear in the vault when it goes offline if it was not erased or overwritten.
- A tape is removed from catalog.
- A tape is marked as free.
Tape Protection

Tape protection is a software option that prohibits overwriting, erasing or appending data to protected tape. You can protect individual tapes that, for example, contain particularly valuable data.

Tape protection overrides retention settings of the media pool. The retention of other tapes in the media pool is not modified. You can remove the protection at any time. The tape will return to the retention period set by the media pool. If the media pool retention expired during the time the tape was protected, the tape will be queued for overwriting.

You can set protection for any tape, online or offline, that contains data. If the offline tape is in a media vault, the media vault will update the Protected status for this tape automatically.

When the tapes are protected, the following operations are prohibited for them:

- Appending data to tapes
- Erasing tapes
- Marking tapes as free
- Removing tapes from catalog.

To perform these operations, you need to switch the protection off first.
Protecting Tapes

If you have tapes for which you need to change the retention to 'never overwrite', you can protect them. Protection option sets lifelong retention period for the selected tapes overriding the retention settings of the media pool.

You can set protection for both online or offline tapes that contain data.

IMPORTANT!
You can protect only tapes that contain data. You cannot protect free (empty) tapes.

Switching On Protection

To enable protection:

1. Open the Tape Infrastructure view.
2. Navigate to the list of tapes either under the Media Pools or under the Libraries > LibraryName > Media > Online.
3. Select tapes you want to protect and click Protect on the ribbon. Alternatively, you can right-click selected tapes and choose Protect from the shortcut menu.

If the tape is a part of a media set, Veeam Backup & Replication will prompt you to protect the other tapes in this media set.

If the tapes are protected, they cannot be erased or marked as free by Veeam Backup & Replication or manually. To erase such tape, you need to switch the protection off first.

Switching Off Protection

You can switch off the protection at any time. The retention will return to the value set for the media pool.
Tape Data Retention

Data retention period is a period of time when data written to tapes is protected from overwriting.

Retention period is set by user for media pool and is applied to all tapes in this media pool. To set the retention policy, you can choose between the following options:

- Never overwrite data
- Define a particular time period to protect data
- Not to protect data at all.

During the retention period, Veeam Backup & Replication will not overwrite data on tape. If a tape contains several backup sets, it will expire when the backup set with the longest retention period expires.

You can change the retention at any time. When you change the retention policy, you can select if this modification works for tapes that will be written after you apply this change or also to tapes that are already recorded. In the latter case, the retention settings of the recorded tapes will change immediately and will be applied to tapes that are both online and offline.

**NOTE:**

If you choose to set a shorter retention period and apply the retention settings to all tapes, some of your tapes may immediately become outdated. Such tapes will be queued for overwriting. Be careful when applying a new retention policy in order not to lose any data you need, or use the protection option. For more information, see Tape Protection.

Tape Retention and Disk Retention

For forward incremental and reverse incremental backup chains, it is strongly recommended that you set the retention period for the tape archive at least twice longer than the retention period for source backups on disk. The tape jobs analyze the existing tape archives and synchronize them with disk backups. If you have some restore points on disk and the tape archive misses them (for example, if the media pool retention allowed overwriting of these tapes), the tape job will re-write all missing restore points. For more information, see the Veeam Backup & Replication User Guide, section Retention Policy.

For example, there are 14 backup files on the backup repository that are kept for 14 days. The backup to tape job archives files once a week. The retention policy for the media pool is set to 7 days. In this case, Veeam Backup & Replication will first write 14 backup files from the backup repository to tape. After a 7-day interval, Veeam Backup & Replication will start recording the whole set of backup files from the backup repository to tape anew, overwriting backup files on tape with their copies from the backup repository.

When the source job produces a forever forward incremental backup chain, you can set any retention period for the tape archive. To back up such chains, the virtual full mechanism is enabled automatically. Keep in mind that the virtual full backup must be always newer than the full backup on disk. Otherwise, the tape job will copy the full backup from disk and synthesize the virtual full within one backup set. For more information, see Virtual Full Backup.
Managing Outdated Tapes

Veeam Backup & Replication will place outdated tapes to the media pools (the same media set for GFS media pools) where the tapes were originally written.

The tapes containing outdated data are handled in the following way:

- **If the expired tape is online**, it will be overwritten next time a tape job requires a free tape. The expired tape can be used only by the same media pool (or the same media set for GFS media pools) unless you erase the tape manually or move it to another media pool. The tapes are rewritten by the FIFO method.

- **If the expired tape is offline**, you can re-load it back to the library. Veeam Backup & Replication will place tapes to the media pools where the tapes were originally written. You can move tapes to another media pool or erase the tape manually.

You can erase tapes or move tapes to another media pool manually. For more information, see [Moving Tapes to Another Media Pool](#).
Virtual Full Backup

Virtual full allows you to back up forever forward incremental backup chains to tape. The forever forward incremental chain always keeps on disk one full backup followed by a fixed number of increments. The full backup is constantly rebuilt: as new increments appear, the older ones are injected into the full.

Unlike disk backups, tape archives are static: tape jobs cannot rebuild backups once they are written to tape. Also, the standard backup to tape scheme (archiving new restore points during each tape session) cannot be used: the tape archive would have one full backup and an endless chain of increments all of which would be required for restore. To adapt the forever forward incremental chains to tapes, Veeam Backup & Replication uses the virtual full.

The virtual full mechanism creates a periodic synthesized full backup on tape. The periodic fulls split the forever incremental backup chain into shorter series of files that can be effectively stored to tapes. Each series contains one synthesized full backup and a set of increments. Such series are convenient for restore: you will need to load to the tape device only those tapes that are part of one series.

The virtual full does not require additional repository disk space: it is synthesized directly on tape on the fly, when the tape job runs. To build such full backup, Veeam Backup & Replication uses backup files that are already stored on the backup repository.

The virtual full is enabled automatically if the source job has no scheduled full backups. You can schedule the virtual full on a specific day (or days) of week. This day indicates the day for which you want to synthesize full backup of the source machines.

The virtual full does not necessarily need to be scheduled on the day when the tape job runs. When the tape job starts, it synthesizes the source machines state as they were on the chosen day. For example, you can set Friday as the virtual full day, and schedule the tape job to run on Saturday. The tape job will not run on Friday. On Saturday, the tape job will copy blocks of data to reconstruct the state of the machines as they were on Friday (or, if no backup is available for Friday, the closest day preceding Friday).

You can customize the virtual full schedule according to your needs, although you cannot disable the virtual full if you back up the forever forward incremental backup chain. Also, you cannot create more than one virtual full a day.

NOTE:
The source job configuration must not have scheduled synthetic or active full backups. If it does, the virtual full will be disabled even if configured in the tape job.
How Virtual Full Backup Works

When the tape job archives the forever incremental backup chain, it copies the full backup from disk only once. After that, it copies new increments and creates virtual fulls regularly, or, if archiving of increments is disabled, creates only virtual fulls.

To create a virtual full backup, Veeam Backup & Replication uses a small temporary file of the VSB (Veeam Synthetic Backup) format. The VSB file does not contain backup data; it contains pointers to data blocks inside files of the backup chain on disk that are required to build a full backup as for the needed day. Using these pointers, the tape job detects these blocks and writes them to tape.

To create a virtual full backup, the tape job performs the following operations:

1. On the day the tape job runs, it creates a VSB file and stores it on the backup repository, next to restore points in the backup chain.
2. According to the VSB file pointers, the tape job detects what backup chain and what data blocks on disk are required to synthesize a full backup, and writes these blocks to tape as a full backup file (.vbk).
3. At the end of the tape job session, the VSB file is removed from the backup repository.

For example:
- The source backup job creates an increment every day.
- The tape job is scheduled on Saturday with a virtual full on Friday.

On Saturday, the tape job picks data blocks from the full backup on Tuesday and the subsequent increments up to Friday. Using these blocks, the tape job synthesizes a virtual full that represents the machine state as of Friday.

![Diagram showing how virtual full backups are created](image)

**NOTE:**

If the source backup chain contains a full backup that was created on the virtual full day (for example, an active full backup created manually), the tape job will copy it and will not create a virtual full.
Virtual Full Intervals

When the tape job needs to create a new virtual full, it analyzes the tape archive and detects the date of the last virtual full on tape. To create a new virtual full, the tape job needs restore points that were created in the following interval:

- The start of the interval is midnight after the last virtual full was created (the end of tape writing session).
- The end of the interval is midnight after the virtual full day.

To synthesize a new virtual full, the tape job needs at least one increment created in this interval. If there are many increments, the tape job builds a virtual full up to the most recent increment within the interval.

Missing Source Backups

The source chain may not contain an increment on the virtual full day. In this case, the tape job uses a backup that is closest to the virtual full day within the virtual full interval. For example, if the source backup closest to the virtual full day was on Tuesday, the tape job will synthesize a virtual full that represents the machine state as of Tuesday.

The source chain may have missing backups because of the following reasons:

- The source job does not run on the virtual full day.
- The tape job has multiple source jobs scheduled on different days. Some of the source jobs do not create a backup on the virtual full day.
- The source job fails to produce increments for several days, for example, because of a hardware breakdown, network inaccessibility or if the source job was disabled by the user for some time.
- Some machines in the source job have corrupted backups. The tape job will use the last valid backups for these machines and create the virtual full up to the latest valid restore point.
No Backups in the Virtual Full Interval

The source job may not produce any backups after the previous full backup day. In this case, the tape job will not create a virtual full for this period.

**IMPORTANT!**

The virtual full cannot be forced before its scheduled day. For example, if you start the tape job manually off-schedule, it will not create the virtual full if the virtual full day is in future.
Tape Parallel Processing

You can use multiple drives simultaneously for writing data to tape. This option is useful if you have a lot of tape jobs running at the same time or you have a lot of data that must be written to tape in a limited backup window. You can configure multiple drives in the following ways:

- Use multiple drives of one tape library
- Manage multiple tape libraries and use several or all drives across all managed libraries.

Parallel processing is enabled in optional media pool settings. To use drives of multiple libraries, you must enable the parallel processing mode for the libraries that are managed by the media pool.

To process the tape data parallelly, you can split the data across drives in two ways:

- Parallel processing for tape jobs.
- Parallel processing for source chains of one (or more) tape jobs.

Tape jobs may simultaneously use less drives than configured in optional media pool settings. That may happen under one of the following conditions:

- The number of tapes available is less than the number of drives assigned for this media pool.
- The number of drives available is less than the number of drives assigned for this media pool.

Processing Tape Jobs Simultaneously

When you process tape jobs parallelly, the media pool assigns a drive to each running tape job. For example, if you set three drives as the maximum, you can process up to three tape jobs at the same time. If you have more jobs running at the same time, they are queued. When one of the jobs finishes and releases its drive, the first queued job takes the drive.

To enable this mode, select the Enable parallel processing for tape jobs using this media pool check box in optional media pool settings.

This option is available for backup to tape and file to tape jobs.

For example:

- You set the maximum number of drives to three.
- Four tape jobs start at the same time.

The tape jobs start, and jobs A, B and C occupy three drives to write data to tape. Tape job D is queued and waits. When one of the jobs finishes and releases its drive, tape job D takes the drive and starts writing data.
Processing Backup Chains Simultaneously

When you select processing backup chains parallely, the media pool processes several source jobs simultaneously.

To enable this mode, select the **Enable parallel processing for tape jobs using this media pool** and **Enable parallel processing of backup chains within a single job** check boxes in **optional media pool settings**.

This option is available for backup to tape jobs only.

For example:

- You set the maximum number of drives to three.
- Tape job A has one source job; tape job B has three source jobs. Both tape jobs start at the same time.

Tape job A occupies drive 1. Tape job B occupies two other available drives and processes two source jobs. Tape job A finishes and releases drive 1, the third source job from tape job B occupies drive 1.

![Diagram of tape jobs](image.png)

If a source job produces multiple per-VM backups, the media pool processes several per-VM backup chains simultaneously. For more information about per-VM backup files, see the Veeam Backup & Replication User Guide, section **Per-VM Backup Files**.

For example:

- You set the maximum number of drives to three.
- Tape job A has one source job, the source job processes four VMs.

Tape job A starts and occupies all three available drives. It writes each separate VM of the source job by a separate drive. After tape job A finishes writing one of the current VMs and releases one of the three available drives, it occupies this drive with writing VM4. In other words, if a job with per-VM chains is configured to process more VMs than there are drives available, it occupies the entire media pool.
The order in which VMs are queued for processing is defined by the order of VMs within each source job, by the order of source jobs within each tape job and the schedule configured for running tape jobs.

Similarly, if the source job is an agent job with the configured backup policy (the Managed by agent option is selected) and produces backups for multiple machines/protection groups, the media pool processes backups for several computers simultaneously. For more information about agent backup jobs, see the Veeam Agent Management Guide, section Working with Veeam Agent Backup Jobs.
Media Sets Created with Parallel Processing

With parallel processing, a separate media set is opened per each drive used.

**NOTE:**
The media pool must have an available tape for each drive.

The media sets are opened according to media set options configured for the media pool:

- Parallel processing with Do not create, always continue using current media set option
- Parallel processing with Create new media set for every backup session option
- Parallel processing with Daily at option

You can edit the media pool settings at any time, and increase or reduce the maximum number of drives:

- If you reduce the number of drives, the media pool will use fewer drives for the next writing session. The media sets that become excessive will be closed.
- If you increase the number of drives, the media pool will open new media sets per each added drive. Further, the media pool will use these media sets according to rules described above.

**TIP:**
When multiple media sets open simultaneously, they may have identical sequence number and time of creation. To distinguish between the media sets easily, use the `%id%` variable in the media set name. This variable is added to the media set name by default.

### Parallel Processing with Do Not Create, Always Continue Using Current Media Set Option

When the media pool is set to the *Do not create, always continue using current media set* option, a media set is opened per each drive during the first tape session. The next time a tape job starts, it chooses a tape that has most free space, and appends data to it.

For example, you set the maximum number of drives to 3. The tape jobs that are first to run start 3 media sets. The following tape sessions continue these 3 media sets appending data to them.
Parallel Processing with Create New Media Set for Every Backup Session Option

When the media pool is set to the **Create new media set for every backup session** option, a media set is opened per each drive for every writing session. When the jobs run the next time, they open several media sets anew.

Each media set uses a free tape. Note that this configuration is the most tape-consumptive.

Parallel Processing with Daily at Option

When the media pool is set to **Daily at** option, several media sets (per each drive) are opened on the scheduled day. If tape jobs run twice or more before the scheduled day, they continue these media sets — in this case, the jobs use tapes that have most free space first.
Machines Backup to Tape

To back up data to tape, you need to create and run tape jobs. The backup to tape job is a dedicated job that archives to tape Veeam backups that were produced by Veeam backup jobs.

NOTE:
Support of the machine backup to tape is available in the Enterprise and Enterprise Plus editions of Veeam Backup & Replication. For details, see Veeam Editions Comparison.

You can archive the following data to tape:

- VM backups
- Veeam Agent backups
- Physical machines
- Backup repositories
- [For Veeam Cloud Connect] Tenants.

When a backup to tape job runs, it does not create new backups: it locates already existing backups and copies them from backup repository to tape. You need to set the source of the tape job: jobs and/or backup repositories.

Jobs as Source

The following jobs can be source for tape jobs:

- VMware/Hyper-V/Nutanix AHV backup jobs
- VMware/Hyper-V/Nutanix AHV backup copy jobs
- Linux/Windows Veeam Agent backup job configured in Veeam Agent operating in the standalone mode
- Linux/Windows Veeam Agent standalone backup copy job
- Linux/Windows Veeam Agent backup job configured in Veeam Backup & Replication
  a. Veeam Agent backup job managed by the backup server
  b. Veeam Agent backup job managed by Veeam Agent (backup policy)
- Linux/Windows Veeam Agent backup copy job.

NOTE:
Backup to tape jobs can process only agent backup jobs that are targeted to a Veeam backup repository.

When the tape job starts on its schedule, it picks the restore points that were produced by the source jobs in period since the last tape job run. If you change the configuration of the source jobs, the tape job is updated automatically: it adds new machines to the list of machines to archive or stops archiving machines that were removed from source jobs.

The tape job will process its source jobs in alphabetical order.
Source Jobs Backup Methods

The source jobs may use any backup method:

- **Forever forward incremental backup method**
  
  To back up the forever forward incremental chains to tape, the tape job uses the virtual full. The virtual full creates a synthetic full backup on tape regularly (for example, once a week) and splits the chain into short series of tapes which is more convenient for restore. For more information, see Virtual Full Backup.

  If the source job is a backup copy job in the periodic copy mode, keep in mind that the last restore point of the backup copy job stays active until the next restore point is created. The tape job does not copy such active points, because they may be updated. For this reason, the backup chain on tape will be always one restore point shorter than on disk.

- **Forward incremental backup method**

  When the tape job backs up the forward incremental chain to tape, it creates a copy of the disk backup chain.

- **Reverse incremental backup method**

  The last backup in the reverse incremental backup chain is always the full backup. If the source backup chain is reverse incremental, the tape job will copy the full backup each time the tape job runs. The increments are skipped.

Backup Repositories as Source

When you add a repository as source to tape job, the tape job constantly scans the selected repository (or repositories) and writes the newly created backups to tape. The tape job monitors the selected repository in a background mode. You can set explicit backup windows for the tape job. In this case, the tape job will start on the set time and archive all new restore points that were created in period since the last job run.

If you create or remove backup jobs that use this repository, or if you change the configuration of such backup jobs, you do not need to reconfigure the tape job that archives the repository.

Tenants as Source

This option is available for Veeam Cloud Connect service providers. Service providers can back up tenants backups from cloud repositories to tape. As the source to the backup to tape job, you can add tenants or cloud repositories. For more information, see the Veeam Cloud Connect guide.

For tenants backups, only GFS media pools are used. For more information, see GFS Media Pools.

Mixed Jobs

To one tape job, you can link an unlimited number of sources. You can mix source jobs of different type: backup and backup copy, and of different platform (VMware, Hyper-V, Windows Agent or Linux Agent). You can add jobs and repositories as source to the same tape job.

Also, you can add an unlimited number of tenants to one tape job. However, you cannot mix tenants with backup jobs and backup repositories.

**IMPORTANT!**

The tape job looks only for the Veeam backups that are produced by backup jobs running on your console. Other files will be skipped.
Note that to back up files, you need to configure file to tape job. For more information, see File Backup to Tape.

**Linking Source Jobs**

You can add source jobs to tape jobs at any moment: when you create a tape job, or later. Adding source jobs is not obligatory when you create a tape job: you can create an "empty" job and use it as a secondary destination target. When you link jobs, the tape job processes them in the same way as the jobs added with the Tape Job Wizard. For more information, see Linking Backup Jobs to Backup to Tape Jobs.
How Machines Backup to Tape Works

When Veeam Backup & Replication executes a backup to tape job (started manually or on schedule), it performs the following operations:

1. The backup to tape job addresses the Backup Catalog in the Veeam Backup & Replication database to detect backups that match the job criteria.

2. The files are queued for archiving.

3. Veeam Backup & Replication connects to the Data Movers and starts the data transfer process. The source Data Mover retrieves data from the backup repository and target Data Mover sends data to tape.

4. The tape job addresses the media pool that is set for this job as target. The media pool allots tapes for writing data according to the following configuration options:
   - Tapes consumption
   - Media sets
   - Tape retention.

5. While tape recording is performed, Veeam Backup service updates data in the Backup Catalog and Tape Catalog in Veeam Backup database. The Veeam Backup console displays refreshed information about backups archived to tape and shows job statistics.
Before You Begin

Before you configure a backup to tape job, complete the following prerequisites:

- You must have Veeam Backup & Replication Enterprise license or higher installed on the Veeam backup server.
- [For Veeam Cloud Connect service providers] To back up tenants to tape, you must have Veeam Cloud Connect service provider license installed on the Veeam backup server.
- You must check configuration of source backup job(s). Tape jobs have the following requirements for the restore points to keep setting:
  - A source job with **forever forward incremental** chain must keep not less than 3 restore points on disk.
  - A source job with **forward incremental** chain must keep not less than 3 restore points on disk.
  - A source **backup copy job in the immediate copy mode** must keep not less than 3 restore points on disk.
  - A source **backup copy job in the periodic copy mode** must keep not less than 4 restore points on disk.
  - A **reverse incremental** chain has no required minimum.
- You must configure one or more media pools with the necessary media set and retention settings.
- You must load tapes to the tape device and configure the target media pool so that it has access to them. If the media pool has no available tape, the tape job will wait for 72 hours and then terminate.

Mind the following limitations:

- The backup to tape job processes only VBK (full backups) and VIB files (forward incremental backups).
- If you back up to tape a reverse incremental chain, the tape job will always copy the full backup. Reverse incremental backups (VRB) are skipped from processing.
- Microsoft SQL Server log files (VLB) are skipped from processing.
- Backups created by backup copy jobs for HPE StoreOnce cannot be backed up to tape.
- [For Veeam Cloud Connect service providers] The backup to tape job that backs up tenants to tape will not process backups created with previous versions of Veeam Backup & Replication or Veeam Agents. To avoid this, you must upgrade the tenants' backup server or agent machines to the last version. After the upgrade, the tenants' jobs must run at least once.
- If a job is unable to complete within 21 days period, it will be stopped with the 'Failed' status.
Creating Backup to Tape Jobs

To archive backups to tape, you should create a backup to tape job using the New Backup to Tape Job wizard. This section will guide you through all steps of the wizard and provide explanation on available options.

With this wizard, you can create a backup to tape job or a GFS job.

To create a backup to tape job, follow the next steps:
Step 1. Launch New Backup to Tape Job Wizard

To run the **New Backup to Tape Job** wizard, do either of the following:

- On the **Home** tab, click **Tape Job** and select **Backups**.
- Open the **Home** view, right-click the **Jobs** node and select **Tape Job > Backups to Tape**.
Step 2. Specify Job Name and Description

At the **Name** step of the wizard, you should define basic settings for the backup to tape job.

1. **In the Name field**, enter a name for the job.

2. **In the Description field**, enter a description of the job. The default description contains information about the user who created the job, date and time when the job was created.

![New Backup to Tape Job](image)
Step 3. Choose Backups to Archive

At the Backups step of the wizard, select backups that you want to write to tape with the tape job.

Click Add and select the necessary backups. You can choose backups from the following sources:

- **Backup jobs.** You can select backups from available backup, backup copy or agent backup jobs. When a backup to tape job runs, Veeam Backup & Replication searches and archives restore points from the backups created by the selected backup jobs.

- **Backup repositories.** Using this option, you can select whole backup repositories. When a backup to tape job runs, Veeam Backup & Replication searches and archives restore points from all backups stored in the chosen backup repositories.

  If you choose to archive data from backup repositories, the backup to tape job will process only the backups that were created with backup jobs configured on this Veeam backup server. Imported backups and configuration backups will be skipped from processing.

- **Tenants.** This option is available for Veeam Cloud Connect service providers. With this option, you can select backups of your tenants or cloud repositories.

To learn more about sources to tape jobs, see Machines Backup to Tape.

To remove a source from the list, select it and click Remove on the right.

The sources of the backup to tape job are processed in order the displayed here. To move a source up or down in the list, use the Up and Down buttons on the right.

<table>
<thead>
<tr>
<th>Name</th>
<th>Backups:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Pool</td>
<td></td>
</tr>
<tr>
<td>Incremental Backup</td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td></td>
</tr>
<tr>
<td>Schedule</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>Atlanta Application Servers Backup</td>
<td>VMware Backup</td>
</tr>
<tr>
<td>Atlanta Sharepoint Servers Job</td>
<td>Hyper-V Backup</td>
</tr>
<tr>
<td>Atlanta Backup Repository</td>
<td>Windows</td>
</tr>
</tbody>
</table>

The total size of full backups added to the backup to tape job is displayed in the Full field. The total size of incremental backups added to the backup to tape job is displayed in the Incremental field.
TIP:
This step is optional. You can create a backup to tape job without source. You can add the source later, or you can link this job to a backup job. For more information, see Linking Backup Jobs to Backup to Tape Jobs.

Selecting Backup Chains to Archive

On the first run, the tape job can copy all restore points or only the latest backup chain. This option is useful if the source backup job or the source backup repository has several backup chains. The backup chain here means a full backup file plus a set of incremental backup files following it.

To select what backup files you want to archive:

1. Click Add and select Backup jobs or Backup repositories.
2. Select the necessary backup job or repository you want to add to the tape job.
3. Veeam Backup & Replication will display a warning informing about backup chain options. Click Latest to archive only the latest backup chain to tape. This option lets you have only the latest restore points written to tape and use less tape for data archiving. Click All to archive all available backup files.

This option selects what backup chain will be copied on the first run of the job. You can instruct the job to copy only the latest backup chain on every tape job run. This option is available in the advanced settings of the job. For more information, see Advanced Settings.
Step 4. Choose Media Pool for Full Backups

At the Media Pool step of the wizard, choose media pool for full backups.

1. From the Media pool for full backups list, choose a media pool that will be used for archiving full backup files.

   You can select a media pool or a GFS media pool. Depending on the selected type, the job schedule will change to regular schedule or GFS schedule accordingly.

   **NOTE:**
   For tenants backups, you can select only GFS media pools.

   **TIP:**
   If you have not previously created a media pool with the required settings, you can click the Add New button and create a new media pool or a GFS media pool without closing the job wizard. For more details, see Creating Media Pools or Creating GFS Media Pools.

2. You can configure schedule for virtual full backup. This option is available only if you selected a regular media pool.

   If the source job produces a forever incremental backup chain or is a backup copy job, Veeam Backup & Replication will periodically create a virtual full backup. You can configure the full backup schedule at this step of the wizard. The virtual full cannot be switched off; however, it is disabled automatically if the source job periodically creates active full or synthetic full backups.

   The virtual full does not depend on the job settings for incremental backups. If you enable the virtual full for the job, it will be created in any case, no matter whether you enable or do not enable incremental backups. To more information, see Virtual Full Backup.
To configure the virtual full schedule, click **Schedule** and select the necessary scheduling options.
Step 5. Choose Media Pool for Incremental Backups

This step is available only if you selected a regular media pool as target for full backups.

At the Incremental Backup step of the wizard, you can enable or disable incremental backups processing and choose media pool for incremental backups.

If you want to back up incremental backups to tape, select the Archive incremental backups to tape check box. If this option is disabled, the backup to tape job will archive only VBK files and will skip VIB files from processing.

From the Media pool for incremental backups list, select a media pool that will be used for incremental backups.

Veeam Backup & Replication allows you to select different media pools for full backups and incremental backups. This can be required if you use different media set or retention settings for archiving full backups and increments.

You cannot select a GFS media pool to copy incremental backups to tape. Instead you can configure a daily media set in the GFS media pool to archive incremental points along with GFS points, combining normal and GFS functionality within a single job. For more details, see Creating GFS Media Pools.

TIP:
If you have not previously created a media pool with the required settings, you can click the Add New button and create a new media pool without closing the job wizard. For more details, see Creating Media Pools.
Step 6. Specify Archiving Options

At the **Options** step of the wizard, specify archiving and media automation options. The options are different for regular backup to tape jobs and GFS tape jobs:

- Options for Backup to Tape Job
- Options for GFS Tape Job

**Options for Backup to Tape Job**

This step of the wizard is available if you selected a regular media pool at the **Full Backup** step of the wizard.

1. Select the **Eject media upon job completion** check box if the tape should be automatically ejected from the tape drive after the job successfully finishes. The ejected tapes are placed into a free tape device slot. Note that if the job started and failed, the tape will remain in the drive.

   This option does not prevent the tape job from appending data to this tape. If not configured otherwise in media pool settings, this tape will be placed into a drive on the next tape job run.

2. Select the **Export current media set upon job completion** check box if you want to pull out the tapes with the current media set from the tape device, for example, to move to a storage location. The tape device will eject the tapes that belong to the current media set when the media set is closed.

   If you want to export tapes on specific days only (for example, every Saturday), click **Days** and schedule export on the necessary days.

   Note that with this option selected, a new media set is started after each export.

Click **Advanced** to configure the advanced job options.
Options for GFS Job

This step of the wizard is available if you selected a GFS media pool at the Full Backup step of the wizard.

1. Select the **Eject media upon job completion** check box if the tape should be automatically ejected from the tape drive and placed into a free tape device slot when the job finishes.

   This option does not prevent the tape job from appending data to this tape. If not configured otherwise in media pool settings, this tape will be placed into a drive on the next tape job run.

2. Select the **Export the following media sets upon job completion** check box if you want to pull out the tapes with some media sets from the tape device, for example, to move to a storage location. The tape device will eject the tapes that belong to the selected media set.

   Click **Media sets** and select the media sets that you want to export.

Click **Advanced** to configure the advanced job options.
Step 7. Specify Advanced Job Settings

You can specify the following advanced settings for the backup to tape job:

- Notifications Settings
- Advanced Settings

Notifications Settings

At the Notifications tab, you can specify notification settings for the backup to tape job.

At the Options step of the wizard, click Advanced. Then select the Notifications tab.

Select the Send email notifications to the following recipients check box if you want to receive notifications about tape job status. In the field below, specify a recipient's email address. You can enter several addresses separated by a semicolon.

**IMPORTANT!**

To receive notifications about tape jobs status, you must enable general email notifications in Veeam Backup & Replication. For more information, see the Veeam Backup & Replication User Guide, section Specifying Email Notification Settings.

You can choose between the following options:

- **Use global notification settings**: Veeam Backup & Replication will notify you according to global email notification settings specified for the Veeam backup server.

- **Use custom notification settings specified below**: you can specify notification settings for tape jobs.

  In the Subject field, specify a notification subject. You can use the following variables in the subject:

  - %Time%: the time when the tape job finished,
  - %JobName%: the name of the tape job,
  - %TapeCount%: the number of tapes used for the tape job session,
  - %JobResult%: the job result,
  - %VmCount%: the number of machines in the job,
  - %Issues%: the number of machines in the job processed with Warning or Failed status.

Select the occasions on which you want to receive email notifications:

- **Notify on success**: Veeam Backup & Replication will notify you if the tape job finishes successfully,
- **Notify on warning**: Veeam Backup & Replication will notify you if the tape job finishes with a warning,
- **Notify on error**: Veeam Backup & Replication will notify you if the tape job fails,
- **Notify when waiting for tape**: Veeam Backup & Replication will notify you if the tape job cannot start because there are no available tapes.

TIP:
After you specify necessary settings for the tape job, you can save them as default settings. To do this, click **Save as Default** at the bottom left corner of the **Advanced Settings** window. When you create a new backup to tape job, Veeam Backup & Replication will automatically apply the default settings to the new job.

**Advanced Settings**

At the **Advanced** tab, you can select what backups from the backup chain to copy, enable hardware compression or specify custom scripts that you want to run before and/or after the backup to tape job.

The advanced options are different for regular backup to tape jobs and GFS tape jobs:

- **Advanced Settings for Tape Job**
- **Advanced Settings for GFS Tape Job**

**Advanced Settings for Backup to Tape Job**

This step of the wizard is available if you selected a regular media pool at the **Full Backup** step of the wizard.

1. Select the **Process latest full backup chain only** check box if you want to copy only the last backup chain with each tape job run. The source backup chain consists of a full backup (active or synthetic) and subsequent increments. If you disable this option, the tape job will back up all restore points that are not on tape.
2. Disable the **Use hardware compression when available** check box.

3. Select the **Run the following script before the job** and/or **Run the following script after the job** check boxes and click **Browse** to choose executable file(s).

You can select to execute pre- and post-job actions after a number of job sessions or on specific week days.

- If you select the **Run every... backup session** option, specify the number of the job sessions after which the script(s) must be executed.

- If you select the **Run on selected days only** option, click **Days** and specify week days on which the script(s) must be executed.

**TIP:**

After you specify necessary settings for the tape job, you can save them as default settings. To do this, click **Save as Default** at the bottom left corner of the **Advanced Settings** window. When you create a new backup to tape job, Veeam Backup & Replication will automatically apply the default settings to the new job.

**Advanced Settings for GFS Tape Job**

This step of the wizard is available if you selected a GFS media pool at the **Full Backup** step of the wizard.

1. Sometimes when the tape job starts there is no new daily backup on disk. Select the **Process the most recent restore point instead of waiting** check box if you want the tape job to copy the latest restore point instead of waiting. If this option is unselected, the tape job will wait for a new restore point.

2. Disable the **Use hardware compression when available** check box.
3. Select the **Run the following script before the job** and/or **Run the following script after the job** check boxes and click **Browse** to choose executable file(s).

You can select to execute pre- and post-job actions after a number of job sessions or on specific week days.

- If you select the **Run every... backup session** option, specify the number of the job sessions after which the script(s) must be executed.
- If you select the **Run on selected days only** option, click **Days** and specify week days on which the script(s) must be executed.

![Advanced Settings screen](image)

**TIP:**

After you specify necessary settings for the tape job, you can save them as default settings. To do this, click **Save as Default** at the bottom left corner of the **Advanced Settings** window. When you create a new backup to tape job, Veeam Backup & Replication will automatically apply the default settings to the new job.
Step 8. Define Job Schedule

At the **Schedule** step of the wizard, you can define a schedule for the job to run on a regular basis. The schedule settings are different for regular backup to tape jobs and GFS tape jobs:

- **Schedule for Backup to Tape Job**
- **Schedule for GFS Tape Job**

**Schedule for Backup to Tape Job**

This step of the wizard is available if you selected a regular media pool at the **Full Backup** step of the wizard.

To specify the job schedule, select the **Run the job automatically** check box. If this check box is not selected, the job is supposed to be started manually.

You can define the following scheduling settings for the job:

- **Daily at this time**: the tape job will run at specific time on defined week days.
- **Monthly at this time**: the tape job will run at specific time monthly.
- **After this job**: the tape job will start when a corresponding backup job completes. Choose the preceding backup job from the list.

**NOTE:**

Mind the following:

- This option will only start the tape or backup copy job if the source job is started automatically by schedule. If the source job is started manually you will choose to start it chained or not.
- This option is not available for agent backup jobs managed by agent or for standalone agent backup jobs.
- **As new backup files appear**: the tape job will monitor the source jobs. As soon as the source job creates a new backup, the job will write this backup to tape.

If necessary, you can limit the time when the backup to tape job can start with a schedule. You can restrict start of the backup to tape jobs when backup repositories are busy with other tasks (backup jobs writing to repositories or backup copy jobs reading from repositories). Schedule is set for backup to tape jobs start. Jobs that have started during the allowed time interval will continue working on restricted hours. To define prohibited time for the backup to tape job start, click the **Schedule** button and define the time when the job is allowed and prohibited to start.

If you have scheduled the job to run at the specific time daily or monthly, consider configuring wait timeout value. Select the **If some linked backup jobs are still running, wait for up to** check box and specify the new timeout. When a backup to tape job starts, Veeam Backup & Replication checks the status of the source jobs. If a source job is still writing data to the source repository, the backup to tape job will wait for the specified time interval.

If the timeout is disabled, the backup to tape job will terminate without waiting for the backup job to complete.

The timeout option is unavailable if you schedule the backup to tape job to run after a backup job or if you schedule the backup to tape job to start when new backups appear.

Sometimes, the source job may start when the tape job is still running. This may cause a conflict if the source job needs to perform the following operations:

- **Merge of backup files**
- Reverse incremental backup transformation
- Compact of full backup file
- Retention Policy maintenance.

By default, the source job has priority. In this case, the tape job terminates with error and no data is written to tape. Select the **Prevent this job from being interrupted by source backup jobs** option if you want to give the tape job a higher priority. If this option is selected, the tape job will not terminate and will finish writing the data. If the source job needs to perform the listed above operations, it will wait for the tape job to finish. Note that in this case the source job may finish with a significant delay.

**NOTE:**

If the source job creates per-VM backups, the tape job gets priority for each per-VM restore point separately. In this case, the source job will be able to lock other per-VM restore points and perform the needed operations. Make sure that you set sufficient timeout in the **If some linked backup jobs are still running, wait for up to** window to avoid the tape job failing.

### Schedule for GFS Job

This step of the wizard is available if you selected a GFS media pool at the **Full Backup** step of the wizard. Click **Schedule** to select days for each media set.

In the **Perform GFS scan daily at** field, specify the time when the GFS job must start.
TIP:

After you specify necessary schedule settings, you can save them as default. To do this, click **Save as Default** at the bottom left corner of the **Archival Schedule** window. When you create a new GFS job, Veeam Backup & Replication will automatically apply default settings to the new job schedule.

Sometimes, the source job may start when the tape job is still running. By default, the source job has priority. In this case, the tape job terminates with error and no data is written to tape. Select the **Prevent this job from being interrupted by source backup jobs** option if you want to give the tape job a higher priority. If this option is selected, the source job will wait until the tape job finishes. Note that the source job may start with a significant delay.

For tenant to tape jobs, this option is active by default and cannot be disabled.
Step 9. Finish Working with Wizard

After you have specified schedule settings, click **Create**. Select the **Run the job when I click Finish** check box if you want to start archiving backups to tape job right after you complete working with the wizard. Click **Finish** to close the wizard.
Linking Backup Jobs to Backup to Tape Jobs

Veeam Backup & Replication provides two options for linking backup jobs to backup to tape jobs:

- If you already have backup jobs configured, you can choose the necessary jobs in the **Backup to Tape Job Wizard**. For details, see [Creating Backup to Tape Jobs](#).

- Alternatively, you can point a backup job to an existing backup to tape job using the **Backup Job wizard**.

To point a backup job to an existing backup to tape job, perform the following steps:

1. Open the backup job settings and navigate to the **Storage** step. Select the **Configure secondary destination for this job** check box.

![Backup Job Settings](image)
2. At the **Secondary Target** step, click **Add** and choose a backup to tape job to which the backup job should be linked.

3. Save settings. Veeam Backup & Replication will automatically update backup files settings of the chosen backup to tape job.
GFS Backup to Tape

The GFS tape job creates yearly archive for source machines by the GFS (Grandfather-Father-Son) scheme. The GFS archive includes one yearly backup and several quarterly, monthly, weekly and daily backups.

You can create GFS backups for VMs and Veeam agent computers (physical machines) on tape.

The GFS tape job does not process source machines. The job uses backups created by machine-to-disk jobs.

GFS Media Sets

To distinguish between the backup cycles, the GFS media pool has 5 pre-defined media sets: yearly, quarterly, monthly, weekly and daily.

<table>
<thead>
<tr>
<th>Media Set</th>
<th>Restore Point Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly</td>
<td>Full backup or synthesized virtual full backup</td>
</tr>
<tr>
<td>Quarterly</td>
<td></td>
</tr>
<tr>
<td>Monthly</td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>As on disk (for details, see How GFS Backup to Tape Works)</td>
</tr>
</tbody>
</table>

Individual Media Sets Configuration

You can configure each media set individually. You can set retention period, appending data to tape or other settings for each media set separately.

For example, the weekly backups must be stored for 4 weeks, data is appended, tapes may be overwritten. The yearly backups must be never overwritten, each backup on an individual tape (or set of tapes), tapes must be moved to vault.

Manual Active Full

You can manually create a restore point for any media set at any time with the Active full option. Veeam Backup & Replication will copy or synthesize the most recent full backup possible for the selected period. The manual active full is not available for the Daily media set.

Schedule Overlap

If the schedule for backup periods overlap, only the backup for the eldest media set will be archived. The media sets have the following priority: Yearly, Quarterly, Monthly, Weekly, Daily. For example, if "the first Sunday of January" is the date for the monthly, the quarterly and the yearly backup, the GFS job will create only the yearly backup; the monthly and the quarterly backups will be skipped.
How GFS Backup to Tape Works

To create a GFS archive, Veeam Backup & Replication performs the following operations:

1. The GFS job starts according to the GFS job schedule and checks which media set is scheduled for today.

2. For GFS jobs with the **Daily** media set disabled:
   
   o If the source job creates a full backup, the GFS job copies it.
   
   o If the source job creates an incremental backup, the GFS job synthesizes a virtual full backup.

   If the source job created several restore points, the tape job will copy only the first one.

3. For GFS jobs with the **Daily** media set enabled:

   o If today some elder media sets are also scheduled, for example, the weekly media set, the GFS job archives the first restore point to the **Weekly** media set:

      ▪ If the source job creates a full backup, the GFS job copies it.
      
      ▪ If the source job creates an incremental backup, the GFS job synthesizes a virtual full backup.

   If there is more than 1 restore point on disk available, the GFS job copies the rest of them to the **Daily** media set.

   If only the **Daily** media set is due today, the GFS job copies all available restore points to the **Daily** media set.

4. If no backup appears on the disk till the end of the day, the GFS job waits for the source job to start. If the source job starts during the day, the GFS job waits till the source job finishes and copies the created backup to tapes. If the source job does not start, the GFS job stops at midnight. It starts again according to the configured schedule.

Consider the following:

- No restore point will be archived to the **Daily** media set when the daily backup overlaps elder media sets dates, and only one source restore point is available.

- Daily increment restore points are linked to a full restore point in any media set. For example, a full restore point from the **Weekly** media set is used. If there is no full restore point that can be used for linking the daily increments, the tape job will create a virtual full backup and put it to the **Daily** media set.

- The GFS job copies only new restore points. If the source job did not create a new point after the last GFS job run, the GFS job will not copy anything to tape. For example, if you want weekly backups in the tape GFS archive, make sure that the source job runs at least once a week.

- When you link a source job to a GFS job, the GFS job does not copy old restore points. The GFS job will copy only the restore point created on the day when the GFS job was linked to the source job or new restore points created later.

- If the restore point is available but locked (for example, if the source job is a backup copy job), the GFS job will wait for this restore point to become available for up to 7 days. If the restore point is still locked after 7 days, the GFS job will use the most recent restore point that is not locked.

   If you do not want to wait, you can instruct the tape job to copy the most recent restore point instead of waiting. To do this, select the **Process the most recent restore point instead of waiting** check box in the settings of the tape job. For more details, see Advanced Settings for GFS Tape Job.

- If you stop the tape job manually, it will start again the next day at the time scheduled.
• If there is a technical problem, for example, the tape library is offline, or the backup server is down, the GFS job will not run. When the problem is fixed, the GFS job will archive one most recent missed full backup for each media set.

• If the GFS tape job was disabled manually for some period, it will skip all backups for this period after it is resumed.

• If the GFS job failed for some reason, it will try to restart every hour for 24 hours.

• If a job is unable to complete within a period of 21 days, it will be stopped with the ‘Failed’ status.
Creating GFS Tape Jobs

To create a GFS archive on tape, you need to create a GFS media pool and target a backup to tape job to it. Technically, a GFS tape job is a variant of backup to tape job. When you select a GFS media pool as target, the job schedule automatically changes to the GFS mode. For details, see Creating Backup to Tape Jobs.

As a source, you can use any backup job with any backup method: forever forward incremental, forward incremental or reversed incremental.

**NOTE:**

Do not use backup copy jobs with the GFS retention to create a GFS tape archive. The tape jobs do not archive the GFS restore points from disk.
Tenant Backup to Tape

This option is available for Veeam Cloud Connect service providers.

Service providers can back up their tenants’ backups from cloud repositories. This allows for better protection of the tenants or for regulations compatibility. For more information, see the Veeam Cloud Connect guide.

To back up a tenant to tape, run a backup to tape job. For more information, see Machines Backup to Tape.
Viewing Backups on Tape

After the backup to tape job completes, you can view the created archive on tape:

1. Open the **Home** view.
2. Expand the **Backups > Tape** node and locate the backup archive under the name of a corresponding job.
File Backup to Tape

File to tape job allows you to back up to tape any Microsoft Windows or Linux files. Also, you can back up volumes of storage devices that support the NDMP protocol. For more information, see NDMP Servers Backup to Tape.

You can back up files to tape from the following storing devices:

- Windows servers, including physical boxes.
- Linux servers, including physical boxes.
- NAS devices (by specifying the path to the SMB (CIFS) or NFS file share).
- NDMP servers.

The file to tape job compares the source files to the files stored in tape archive and copies the changes to tape. You can create both full and incremental backups of files on tape. Veeam Backup & Replication supports file backup from any server which has been added as a managed server to the Veeam Backup console (that is, Windows or Linux server, including physical boxes). You can also archive files residing on NAS devices. For more information on backup of NAS file shares, see NAS Backup Support.

To back up Veeam backup files, you can use backup to tape jobs that are specially intended for this and offer more possibilities. However, you can archive backups as files using file to tape job.

When planning file to tape jobs, consider that the job performance depends more on the number of files to back up then on the amount of data. For example, writing a large number of small files with overall size of 10GB with one job will take more time than writing one 10GB file. If your job contains an extra-large number of files (like millions of files) with one job, the job performance will be affected significantly. To improve performance, consider creating several file to tape jobs.

NOTE:
If the file to tape job fails to complete in 3 weeks, it is terminated by timeout.
How File Backup to Tape Works

When Veeam Backup & Replication executes a file to tape job (started manually or on schedule), it performs the following operations:

1. The file to tape job detects files that match the job criteria.

2. The files are queued for archiving. The following scenarios are used:
   - If it is a first job run or a scheduled full backup, all selected files are queued for archiving.
   - If it is an incremental backup run, Veeam Backup & Replication addresses the Tape Catalog in the Veeam Backup & Replication database to detect if any data has been modified since the latest backup. Detected changes are queued for archiving.

3. Veeam Backup & Replication connects to the Data Movers and starts the data transfer process. The source Data Mover retrieves data from the source servers and target Data Mover sends data to tape.

4. The tape job addresses the media pool that is set for this job as target. The media pool allots tapes for writing data according to the following configuration options:
   - Tapes consumption
   - Media sets
   - Tape retention

5. While tape recording is performed, Veeam Backup service updates data in the Tape Catalog in Veeam Backup database. The Veeam Backup console displays refreshed information about files archived to tape and shows job statistics.
Before You Begin

Before you configure a file to tape job, complete the following prerequisites:

- You must configure one or more regular media pools with the necessary media set and retention settings.
- You must load tapes to the tape device and configure the target media pool so that it has access to them. If the media pool has no available tape, the tape job will wait for 72 hours and then terminate.
- Make sure that files and folders that you want to back up do not contain certain Unicode symbols, including but not limited to the symbols with the following codes: U+D800 – U+DFFF, U+FFFE, U+FFFF (55296 – 57343, 65534, 65535). Also the files and folders names must contain only symbols that are supported by the source file system. Files and folders with unsupported names will be skipped from processing.
- For SMB and NFS file share backup to tapes, make sure that the shared source does not contain folders with the same name entered in different letter case (for example, Documents and documents).
- To back up NDMP volumes, add a storage device that supports the NDMP protocol as an NDMP server. For more information, see Adding NDMP Servers.

Keep in mind that if a job is unable to complete within 21 days period, it will be stopped with the 'Failed' status.

System Requirements for Large Number of Files in Job

If the file to tape job will process large quantities of files, for example, more than 1 000 000 files in 1 000 folders, you must provide the following system resources:

- Backup server: 1.5 GB RAM per each 1 000 000 files
- Tape server: 800 MB RAM per each 1 000 000 files.

You must provide these resources in addition to general system requirements. For more information, see System Requirements.

IMPORTANT!

Do not back up to tape large number of files (over 1 000 000 files in 1 000 folders) in one tape job if your Veeam backup server uses Microsoft SQL Server Express edition. Processing a large number of files will result in considerable performance penalty. Also bear in mind that the usage of Microsoft SQL Server Express Edition is limited by the database size up to 10 Gb. If you plan to have larger databases, use other editions of Microsoft SQL Server.
NDMP Servers Backup to Tape

If your NAS device supports the NDMP protocol, you can back up data from it to tape. For this, you need to utilize the file to tape job.

**NOTE:**
Support of NDMP servers backup to tape is available in the Enterprise Plus edition of Veeam Backup & Replication. For details, see Veeam Editions Comparison.

To back up data from NAS devices by the NDMP protocol, you need to add the device as an NDMP server. For details, see Adding NDMP Servers.

**IMPORTANT!**
Even if the NAS device supporting NDMP protocol is already added to Veeam Backup & Replication, you need to add the NDMP server as a separate procedure. Otherwise you will not be able to perform file backup to tape.

Requirements for NDMP Servers

NDMP version 4 or higher is supported.

Number of Restore Points

For all NDMP devices, the backup chain stored on tapes will consist of 10 restore points maximum. On the 11th run, Veeam Backup & Replication will force an active full.

Limitations for NDMP Servers

- Only backup of whole volume is supported.
- The NetApp “SVM-scoped NDMP” mode is supported, however Veeam Backup & Replication does not support the NetApp Cluster Aware Backup (CAB) extension of the NDMP protocol. In SVM-scoped configuration, each cluster node must be added to the backup user interface on their own data LIF IP/DNS address. This is also known as “Node-scoped NDMP”.
- The NDMP server performs its own backup consistency check for the NDMP volumes. To provide for the correct calculation of the delta of changes and to ensure the backup chain integrity, Veeam Backup & Replication does not allow adding one NDMP volume to more than one file in tape jobs.

See Also

File Restore from Tape

Adding NDMP Servers

To add an NDMP server, follow the next steps:
Step 1. Launch New NDMP Server Wizard

To launch the **New NDMP Server** wizard:

1. Open the **Tape Infrastructure** view.
2. Do one of the following:
   - In the inventory pane, right-click the **NDMP Servers** node and select **Add Server**.
   - In the inventory pane, select the **NDMP Servers** node and click **Add Server** on the ribbon.
   - In the inventory pane, select the **Tape Infrastructure** node and click **Add NDMP Server** on the ribbon.
Step 2. Specify NDMP Server Name and Location

At the NDMP Server step of the wizard, enter the name of the NDMP server and connection details.

1. In the NDMP server name and port field, enter the name or the IP address of the NDMP server you want to connect and the port for the connection. Check your NAS device settings for details.

2. From the Credentials list, select credentials for the account that has administrator privileges on the NDMP server. If you have not set up credentials beforehand, click the Manage accounts link or click Add on the right to add the credentials. For more information, see Managing Credentials.

Veeam Backup & Replication will use the provided credentials to deploy its components on the added server.

3. In the Gateway server section, specify settings for the gateway server:
   - If a network connection between the NDMP server and gateway server is fast, choose Automatic selection. In this case, Veeam Backup & Replication will automatically select a gateway server.
   - If you perform backup over WAN or slow connections, choose The following server. From the list below, select a Microsoft Windows server on the target site that you want to use as a gateway server. The selected server must have a direct access to the NDMP server and must be located as close to the NDMP server as possible.
Step 3. Finish Working with the Wizard

Review the NDMP server settings and click Finish to complete the wizard.

New NDMP Server

Summary
You can copy the configuration information below for future reference.

<table>
<thead>
<tr>
<th>NDMP Server</th>
<th>Summary:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NDMP Server '172.24.145.116' was successfully created.</td>
</tr>
</tbody>
</table>

Finish Cancel
Creating File to Tape Jobs

To write files to tape, you should create a file to tape job using the **New File to Tape Job** wizard. This section will guide you through all steps of the wizard and provide explanation on available options.

To create a file to tape job, follow the next steps:
Step 1. Launch New File to Tape Job Wizard

To run the **New File to Tape Job** wizard, do either of the following:

- On the **Home** tab, click **Tape Job** and select **Files**.
- Open the **Home** view, right-click the **Jobs** node and select **Tape Job > Files to Tape**.

Alternatively, you can:

- Open the **Files** view, browse to the necessary files, select the files and choose **Add to Tape Job > New job** from the ribbon menu.
- Open the **Files** view, browse to the required files, right-click the necessary files and choose **Add to Tape Job > New job**.
Step 2. Specify Job Name and Description

At the **Name** step of the wizard, you should define basic settings for the created file to tape job.

1. In the **Name** field, enter a name for the created job.

2. In the **Description** field, enter a description of the created job. The default description contains information about the user who created the job, date and time when the job was created.

![New File to Tape Job](image)
Step 3. Choose Files and Folders to Archive

At the **Files and Folders** step of the wizard, select files and folders that you want to back up.

1. Click **Add**.

2. From the **Server** drop-down list, select a data source where the necessary files or folders reside:
   - If you plan to back up files and folders from a Windows or Linux server, make sure it is added as a managed server to the backup infrastructure. For details, see the Veeam Backup & Replication User Guide, sections *Adding Microsoft Windows Servers* and *Adding Linux Servers*.
   - If you plan to back up files and folders from an SMB or NFS share, make sure it is added as a file share to the inventory. For details, see the Veeam Backup & Replication User Guide, section *Adding File Share*.
   - If you plan to back up files and folders from a device supporting the NDMP protocol, make sure it is added as an NDMP server to the tape infrastructure. For details, see *Adding NDMP Servers*.

   The account you use to access the target server must have read permissions for the folder and all its child folders.

3. In the **Folders** tree, select folders you want to backup.

   To select multiple folders, hold [Ctrl] and click necessary folders. Although different folders of the same share form separate records in the table, they will be processed by one job task.

   **Note:**

   On an NDMP server, you can select only volumes. You cannot back up separate files or folders. Also, you cannot use file masks.
4. In the **Files and Folders** screen, use the **Up** and **Down** buttons on the right to move sources up or down. The sources of the job are processed in the order in which the list displays them.

If you add a folder to the job, all the folder contents will be processed. If necessary, you can choose only specific files from the added folder. To do so, select a folder in the list and click **Advanced**. In the **File Filters** window, use **Include masks** and **Exclude masks** fields to filter the folder contents. You can use exact file names or create name masks (for example, `*.EVT` or `*.PDF`).
Step 4. Choose Media Pool for Full Backup

At the Full Backup step of the wizard, choose a media pool that will be used for archiving full backups of the selected files and create a schedule for full file backups.

1. From the Media pool for full backups list, choose a media pool that will be used for full file backups.

2. To schedule periodic creation of full file backups, select the Run the full backup automatically check box and specify the schedule according to which the job will create full file backups. If this option is disabled, you will need to start the job manually to create full backups of files.

TIP:
If you have not previously created a media pool with the required settings, you can click the Add New button and create a new media pool without closing the job wizard. For more details, see Creating Media Pools.
Step 5. Specify Media Pool for Increments

At the **Incremental Backup** step of the wizard, choose a media pool that will be used for archiving incremental backups of the selected files and create a schedule for incremental file backups.

1. From the **Media pool for incremental backup** list, choose a media pool that will be used for incremental file backups.

2. To schedule periodic creation of incremental file backups, select the **Run incremental backup automatically** check box and specify the schedule according to which the job will create incremental file backups. If this option is disabled, you will need to start the job manually to create incremental backups of files.

**TIP:**

If you have not previously created a media pool with the required settings, you can click the **Add New** button and create a new media pool without closing the job wizard. For more details, see **Creating Media Pools**.
Step 6. Specify Archiving Options

At the Options step of the wizard, specify archiving and media automation options:

1. Select the **Use Microsoft volume shadow copy (VSS)** check box to enable backup of files with the help of Microsoft shadow volume copies. This option enables backup of files locked by application and provides file-level quiescence. This possibility can only be applied for files from servers running under Windows Server 2003 or later Windows-family OSs.

2. Select the **Eject media upon job completion** check box if the tape should be automatically ejected from the tape drive and placed into a slot when the job finishes.

3. Select the **Export current media set upon job completion** check box if you want to pull out the tapes with the current media set from the tape device, for example, to move to a storage location. The tape device will eject the tapes that belong to the current media set when the media set is closed.

   If you want to export tapes on specific days only (for example, every Saturday), click **Days** and schedule export on the necessary days.

   Note that with this option selected, a new media set is started after each export.
Step 7. Specify Advanced Job Settings

You can specify the following advanced settings for the file to tape job:

- Notifications Settings
- Advanced Settings

TIP:
After you specify necessary settings for the file to tape job, you can save them as default settings. To do this, click Save as Default at the bottom left corner of the Advanced Settings window. When you create a new file to tape job, Veeam Backup & Replication will automatically apply default settings to the new job.

Notifications Settings

At the Notifications tab, you can specify notification settings for the file to tape job.

At the Options step of the wizard, click Advanced. Then select the Notifications tab.

Select the Send email notifications to the following recipients check box if you want to receive notifications about tape job status. In the field below, specify a recipient's email address. You can enter several addresses separated by a semicolon.

IMPORTANT!
To receive notifications about tape jobs, you must enable general email notifications in Veeam Backup & Replication. For more information, see the Veeam Backup & Replication User Guide, section Specifying Email Notification Settings.

You can choose between the following options:

- **Use global notification settings**: Veeam Backup & Replication will notify you according to global email notification settings specified for the Veeam backup server.

- **Use custom notification settings specified below**: you can specify notification settings for tape jobs.

  In the Subject field, specify a notification subject. You can use the following variables in the subject:
  
  - [%Time%]: the time when the tape job finished,
  - [%JobName%]: the name of the tape job,
  - [%TapeCount%]: the number of tapes used for the tape job session,
  - [%JobResult%]: the job result,
  - [%VmCount%]: the number of machines in the job,
  - [%Issues%]: the number of machines in the job processed with Warning or Failed status.

Select the occasions on which you want to receive email notifications:

- **Notify on success**: Veeam Backup & Replication will notify you if the tape job finishes successfully,
- **Notify on warning**: Veeam Backup & Replication will notify you if the tape job finishes with a warning,
- **Notify on error**: Veeam Backup & Replication will notify you if the tape job fails,
- **Notify when waiting for tape**: Veeam Backup & Replication will notify you if the tape job cannot start because there are no available tapes.

---

**Advanced Settings**

At the **Advanced** tab, you can enable hardware compression or specify custom scripts that you want to run before and/or after the file to tape job.

At the **Options** step of the wizard, click **Advanced**. Select the **Advanced** tab.

1. Select the **Use hardware compression if available** check box if the tape drive should compress data before writing it to tape.

   **IMPORTANT!**

   Enable the hardware compression only if your tape library provides support for hardware compression.

2. Select the **Run the following script before the job** and/or **Run the following script after the job** check boxes and click **Browse** to choose executable file(s). You can select to execute pre- and post-job actions after a number of job sessions or on specific week days.

   - If you select the **Run every... backup session** option, specify the number of the job sessions after which the script(s) must be executed.
If you select the **Run on selected days only** option, click **Days** and specify week days on which the script(s) must be executed.
Step 8. Finish Working with Wizard

After you have specified schedule settings, click **Create**. Select the **Run the job when I click Finish** check box if you want to start archiving file to tape job right after you complete working with the wizard. Click **Finish** to close the wizard.
Viewing Files on Tape

After the file to tape job completes, you can view the created archive on tape:

1. Open the **Files** view and press F5 to refresh it.
2. Expand the **Tape** node and locate the files archive.

For Microsoft Windows and Linux file backups, Veeam Backup & Replication preserves the source hierarchy of folders for archived files.

For NMDP backups, you can view only volumes.

You can use the created archives for file recovery. For more information, see [File Restore from Tape](#).

**NOTE:**

The **Files on Tape** view displays only first 1000 items. For archive folders with more than 1000 items, you can use the search field to display the items you are looking for.
VM Restore from Tape to Infrastructure

Restoring a VM from tape with Veeam Backup & Replication is a lot like restoring a VM from disk. For example, you can choose a desired restore point, select the target location or change the configuration of the restored VM.

To restore a VM from tape, you can choose between the following options:

- Restore VMs directly to infrastructure
- Restore VMs through a staging repository

To choose the needed option, select **Restore directly to the infrastructure** or **Restore through the staging repository** at the **Backup Repository** step of the **Full VM Restore** wizard. For more information, see **Choose Backup Repository**.

You can restore only virtual machines backups from tape to infrastructure. For physical machines backups, use **Backup Restore from Tape to Repository**.

**Restore Directly to Infrastructure**

When you restore VMs from tape directly to the infrastructure, the restore process publishes the VMs to the virtual infrastructure copying the VM data directly from tape. This option is recommended if you want to restore one VM or a small number of VMs from a large backup that contains a lot of VMs. In this case, you do not need to provide a staging repository for a large amount of data most of which is not needed to you at the moment.

This option is not recommended in the following cases:

- If you want to restore a large number of VMs
- If you used parallel processing to record the VM backup.

In these cases, the restore may be very slow because the required blocks of data may be located on tapes randomly. The restore process may require a lot of rewinding of tapes as tapes do not provide random access to data.

**NOTE:**

If the list of proxies to use for direct restore contains a Linux proxy, only the Appliance mode (HotAdd) is available for the source VM disks that will be processed via this Linux proxy. The Appliance mode (HotAdd) has a number of requirements and limitations described in this KB article.

If disks cannot be processed in the Appliance mode (HotAdd), the VM restore fails.

**Restore Through Staging Repository**

When you restore VMs from tape through a staging repository, the restore process temporarily copies the whole restore point to a backup repository or a folder on disk. After that Veeam starts a regular VM restore.

This option is recommended if you want to restore a lot of VMs from a backup as the disk provides a much faster access to random data blocks than tape.
# How Restoring VM from Tape to Infrastructure Works

## Restore Directly to Infrastructure

For each VM, Veeam starts a separate restore job. However, you can select multiple VMs to restore: in this case, Veeam will queue the restore jobs and run them one after the other.

For restoring a VM directly to the infrastructure, Veeam Backup & Replication performs the following steps:

1. The VM from tape restore job checks the Backup Catalog in the Veeam Backup & Replication database to discover the tapes containing the needed backup files. If the tapes are offline, Veeam Backup & Replication prompts the user to insert the required tapes.
   - Veeam needs to load and read the selected tapes for 3 times.

2. Veeam loads the tapes for the 1st time.

3. Veeam reads metadata and caches it on the tape server. This requires approximately 100Mb of disk space per 1TB of tape data for the default data block size.

4. Using the cached data, Veeam builds a map of data blocks. The map contains references to the data blocks of the VM you restore: the VM configuration file and the VM disks data.

5. Veeam loads the tapes for the 2nd time.

6. Veeam restores the VM configuration:
   - To restore to original location, Veeam synchronizes the VM configuration file up to the backup state.
   - To restore to another location, Veeam copies the VM configuration file and registers the VM on the target host.

7. Veeam loads the tapes for the 3rd time.

8. Veeam restores the VM disks. Multiple disks are restored parallelly. Veeam reads the tape consequently and, using the map of data blocks, copies the VM disks data.
Restore Through Staging Repository

For restoring through a staging repository, Veeam Backup & Replication performs the following steps:

1. Veeam starts 2 jobs at background:
   - Backup restore job: temporarily restores the backup to the repository.
   - VM restore job: restores the VM to the infrastructure.
   
The jobs start simultaneously. The VM restore job starts and remains pending until the backup restore completes.

2. The backup restore job checks the Backup Catalog in the Veeam Backup & Replication database to discover the tapes containing the needed backup. If the tapes are offline, Veeam Backup & Replication prompts the user to insert the required tapes.

3. The backup restore job reads the tapes consecutively and copies the backup to the selected staging repository or folder.

4. When the backup is copied, Veeam registers it temporarily as an imported backup.

5. The backup restore job finishes.

6. The VM restore job receives information about the backup restored successfully and launches a standard VM restore process. For more information, see the Veeam Backup & Replication User Guide, section Full VM Recovery.

7. When the VM is successfully restored, the VM restore process finishes.

8. Veeam deletes the backup from the staging repository and from disk.
Before You Begin

For restoring VMs from tape, you must provide the following system resources:

- Tape server: 200 MB RAM for each restored VM disk.

Keep in mind that if a job is unable to complete within 21 days period, it will be stopped with the 'Failed' status.
Restoring VM from Tape to Infrastructure

To restore VMs from tape to virtual infrastructure, use the **Full VM Restore** wizard. This section will guide you through all steps of the wizard and provide explanation on available options.

If the tapes are online in your tape device, Veeam Backup & Replication will get the needed data automatically. If the tapes are offline, Veeam Backup & Replication will list the names of the required tapes.

To restore VMs from tape, follow the next steps:
Step 1. Launch Full VM Restore Wizard

To run the Full VM Restore wizard, do one of the following:

- Open the Home view, expand the Backups > Tape node. Choose and expand the tape backup you need. Select the necessary VMs in the tape backup and click Restore Entire VM on the ribbon.
- Open the Home view, expand the Backups > Tape node. Choose and expand the tape backup you need. Right-click the necessary VMs in the tape backup and choose Restore entire VM.
Step 2. Choose Virtual Machines to Restore

At the Virtual Machines step of the wizard, review VMs that should be restored. To add one or more VMs to the list, click Add VM and select where to browse for the machines:

- **From infrastructure** — this option is available for VMs only. Browse the virtual environment and select VMs to restore. If you choose a VM container, Veeam Backup & Replication will expand it to a plain VM list. To quickly find a VM, use the search field at the top of the list: enter the VM name or a part of it and click the search button on the right or press [ENTER].

  Make sure that VMs you select from the virtual environment have been successfully archived to tape at least once.

- **From backup** — browse existing backups and select VMs under backup to tape jobs. To quickly find VMs, use the search field at the bottom of the Select Objects window: enter a VM name or a part of it and click the Start search button on the right or press [ENTER]. Full Restore from backups

  **NOTE:**
  You can add VMs only of the same virtualization platform.

To remove a VM, select it in the list and click Remove on the right.

![Virtual Machines Selection Wizard](image-url)

<table>
<thead>
<tr>
<th>Virtual Machines</th>
<th>Virtual Machines to restore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Size</td>
</tr>
<tr>
<td>Exchange_0</td>
<td>103.0 GB</td>
</tr>
</tbody>
</table>

Add VM  
Point...  
Remove
Step 3. Select Restore Point

By default, Veeam Backup & Replication will restore VMs to their latest state archived to tape. However, if you want to restore a VM to an earlier state, select a VM in the list and click Point on the right. In the Restore Points section, select a restore point that should be used for full VM recovery.

If you have chosen to restore multiple VMs, you can select a different restore point for every VM specifically.
Step 4. Choose Restore Source

At the **Restore Source** step of the wizard, choose the restore mode:

- Select **Restore directly from tape** if you want to restore a VM without a staging repository. In this case, the restore job will read data directly from tape.
  
  Note that restoring VMs directly to the infrastructure is recommended for restore of 1 VM at a time. The process may be slow if you restore a lot of VMs simultaneously.

- Select **Restore through a staging repository** if you want to temporarily copy the tape backup to a repository or a folder first. The restore job will copy the backup to the selected destination and launch a standard restore VM from disk process.

  From the **Backup repository** list, select the repository that should be used as a temporary storage (staging area) for machine backup before the VM is restored to the virtual infrastructure.

  You can also select a target folder on any server connected to Veeam Backup & Replication. To do so, choose the **Select folder** option from the **Backup repository** list and choose the location to which backups should be restored before full VM recovery.

  If you choose to restore files to a shared folder, make sure that the account under which Veeam Backup Service runs has write permissions to the target folder. If the account does not have sufficient permissions, Veeam Backup & Replication will prompt you to enter credentials for the account that can be used for writing to the target folder.

**NOTE:**

If you plan to restore a VM directly from tape using NBD transport mode, make sure that the VM has 28 disks maximum. To restore a VM with more than 28 disks, use HotAdd mode or restore through a staging repository.
Step 5. Specify Restore Mode and Other Recovery Options

Go through the remaining steps of the Full VM Restore wizard. The procedure is identical to full VM recovery. For more information, see the Veeam Backup & Replication User Guide, section Performing Full VM Restore.
Backups Restore from Tape to Repository

This option allows you to copy machines backups from tape to repository. This is helpful if you need some backups on disk for later use, or also for machines guest OS files restore. You can restore full backups or incremental backups to a repository or any location of your choice. The restored backup is registered in the Veeam Backup & Replication console as an imported disk backup so that you can use it for any restore from disk scenario later on. For one restore session at a time, you can choose one restore point available on tape.
How Restoring Backups from Tape to Repository Works

For restoring machines backups to a repository or a folder on disk, Veeam Backup & Replication performs the following steps:

1. Veeam checks the Backup Catalog in the Veeam Backup & Replication database to discover the tapes containing the needed backup. If the tapes are offline, Veeam Backup & Replication prompts the user to insert the required tapes.

2. The backup restore job reads the tapes consequently and copies the backup to the selected repository or folder.

3. When the backup is copied, Veeam registers it as an imported backup.
Restoring Backups from Tape to Repository

To restore backups from tape, use the **Restore Backup from Tape to Repository** wizard. This section will guide you through all steps of the wizard and provide explanation on available options.

If the tapes are online in your tape device, Veeam Backup & Replication will get the needed data automatically. If the tapes are offline, Veeam Backup & Replication will list the names of the required tapes.

Keep in mind that if a job is unable to complete within 21 days period, it will be stopped with the 'Failed' status.

To restore files from tape, follow the next steps:
Step 1. Launch Restore Backup from Tape to Repository Wizard

To run the Restore Backup from Tape to Repository wizard, on the Home tab, click Restore and choose Tape > Restore Backups.

Alternatively, you can:

- Open the Home view, expand the Backups > Tape node. Select the necessary machines in backup and click Restore to Repository on the ribbon.
- Open the Home view, expand the Backups > Tape node. Right-click the necessary machines in backup and choose Restore backup from tape to repository.
Step 2. Choose Machines to Restore

At the Source step of the wizard, select one or more physical or virtual machines for which backup files should be restored. If you have chosen machines to restore from archives on tape, the list of objects to restore will be populated with selected machines.

To add one or more machines to the list, click Add VM and select where to browse for the machines:

- **From vSphere Infrastructure** — this option is available for VMs only. Browse the virtual environment and select VMs to restore. If you choose a VM container, Veeam Backup & Replication will expand it to a plain VM list. To quickly find a VM, use the search field at the top of the list: enter the VM name or a part of it and click the search button on the right or press [ENTER]. Make sure that VMs you select from the virtual environment have been successfully archived to tape at least once.

- **From backups** — browse existing backups on tape and select machines under backup to tape jobs. To quickly find machines, use the search field at the bottom of the Select Objects window: enter a virtual or physical machine name or a part of it and click the Start search button on the right or press [ENTER].

To remove a machine, select it in the list and click Remove on the right.

<table>
<thead>
<tr>
<th>Name</th>
<th>Restore point</th>
</tr>
</thead>
<tbody>
<tr>
<td>exchange_01</td>
<td>2 days ago (10:26 PM Wednesday)</td>
</tr>
</tbody>
</table>

Total size: 10.20 GB
View files
Step 3. Select Restore Point

By default, Veeam Backup & Replication will restore backup with the latest state of the archived machine. However, if you want to restore a backup for the machine to an earlier state, select a machine in the list and click Point on the right. In the Restore Points section, select a restore point that should be used to restore machine backup.

NOTE:

If you choose a full backup point in the list, Veeam Backup & Replication will restore only this full backup. If you choose an increment, Veeam Backup & Replication will restore a chain consisting of a full backup and forward increments, necessary to restore machines to the required point-in-time.

If you have chosen to restore multiple machines, you can select a different restore point for every machine specifically.

![Restore Points](image)

<table>
<thead>
<tr>
<th>Job</th>
<th>Type</th>
<th>Media pool</th>
<th>Media set</th>
<th>Backup set date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange Database</td>
<td>Increment</td>
<td>Atlanta Web Servers Backup</td>
<td>Media set #4</td>
<td>2 days ago (102..)</td>
</tr>
<tr>
<td>2 days ago (102..)</td>
<td>Increment</td>
<td>Atlanta Web Servers Backup</td>
<td>Media set #3</td>
<td>3 days ago (101..)</td>
</tr>
<tr>
<td>3 days ago (101..)</td>
<td>Increment</td>
<td>Atlanta Web Servers Backup</td>
<td>Media set #2</td>
<td>4 days ago (102..)</td>
</tr>
<tr>
<td>4 days ago (102..)</td>
<td>Increment</td>
<td>Atlanta Web Servers Backup</td>
<td>Media set #1</td>
<td>5 days ago (103..)</td>
</tr>
<tr>
<td>5 days ago (105..)</td>
<td>Full</td>
<td>Atlanta Web Servers Backup</td>
<td>Media set #1</td>
<td>5 days ago (103..)</td>
</tr>
</tbody>
</table>
Step 4. Choose Backup Destination

At the **Destination** step of the wizard, select where the backup files for the selected machines should be restored:

- To restore machine backup files to a repository, select the **Backup repository** option and choose the necessary repository from the list.

- To restore machine backup files to the Veeam backup server, shared folder or to any Microsoft or Linux server connected to Veeam backup server, select the **Server** option. Choose the necessary server from the list and specify path to the target folder in the **Path to folder** field.

If you choose to restore files to a shared folder, make sure that the account under which Veeam Backup Service runs has write permissions to the target folder. If the account does not have sufficient permissions, Veeam Backup & Replication will prompt you to enter credentials for the account that can be used for writing to the target folder.
Step 5. Finish Working with Wizard

Review the settings and click **Finish** to restore selected machines backups.

<table>
<thead>
<tr>
<th>Source</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>VM name: exchange_21</td>
<td></td>
</tr>
<tr>
<td>VM size: 103.06 Gb</td>
<td></td>
</tr>
<tr>
<td>Restore points 2 days ago (10:26 PM Wednesday 11/11/2017)</td>
<td></td>
</tr>
</tbody>
</table>

Viewing Restored BACKUPS

After backups are restored from tape, they are displayed as imported backups in the **Home view > Backups > Imported**. You can use the restored to disk backup for regular data recovery, including full recovery, recovery of machine files, guest OS files recovery and other.
Tenant Restore from Tape

This option is available only for Veeam Cloud Connect service providers.

Service providers can restore their tenants' backups from tape. For more information, see the Veeam Cloud Connect guide.
File Restore from Tape

You can restore data previously archived with file to tape jobs. You can restore the following data:

- Microsoft Windows files and folders.
- Linux files and folders.
- Files and folders on SMB (CIFS) and NFS file shares.
- NDMP volumes.

The file restore process allows you to restore files to any restore point available on tape.

Limitations for NFS File Share Restore

If you restore files to the NFS file share running the NFS protocol version different from the NFS version of the source file share, Veeam Backup & Replication does not restore security attributes.

Limitations for NDMP Volumes Restore

- Only restore of whole volume is supported.
- Only restore to original location or to a similar NDMP server is supported.
How Restoring Files from Tape Works

When Veeam Backup & Replication restores files archived to tape, it performs the following operations:

1. Veeam Backup & Replication checks the Tape Catalog in the Veeam Backup & Replication database to discover the tapes containing the needed restore point of the files. If the tapes are offline, Veeam Backup & Replication prompts the user to insert the required tapes.

2. Veeam Backup & Replication connects to the Data Mover service deployed on a tape server.

3. The Data Mover copies the relevant files from the tapes to a chosen target location, same or new one.

4. Veeam Backup & Replication updates the Tape Catalog in the Veeam Backup database.
Before You Begin

If the tape backup contains a large quantity of files, for example, more than 1 000 000 files in 1 000 folders, you must provide the following system resources for restore:

- Backup server: 2.6 GB RAM per each 1 000 000 files.

Keep in mind that if a job is unable to complete within 21 days period, it will be stopped with the 'Failed' status.
Restoring Files from Tape

To restore files or NDMP volumes backed up to tape, use the Files from Tape Restore wizard. This section will guide you through all steps of the wizard and provide explanation on available options.

If the tapes are online in your tape device, Veeam Backup & Replication will get the needed data automatically. If the tapes are offline, Veeam Backup & Replication will list the names of the required tapes.

**NOTE:**

The Files from Tape Restore wizard allows you to restore files and folders archived to tape. You cannot restore VM guest OS files using this wizard. To restore VM guest OS files, restore a machine backup from tape to a backup repository and perform VM guest OS files restore. For more information, see Backup Restore from Tape to Repository.

To restore files from tape, follow the next steps:
Step 1. Launch Files from Tape Wizard

To run the Restore from Tape wizard, do either of the following:

- Open the Home tab and click Restore on the ribbon. Choose Tape > Restore Files.
- Open the Files view, expand the Tape node and browse to the necessary files on tape. Select the files and click Restore Files from Tape on the ribbon. Alternatively, you can right-click the files and choose Restore files from tape.
Step 2. Choose Files to Restore

At the **Objects to Restore** step, choose data that you want to restore.

Click **Add** and browse to the file or folder, or NDMP volume you want to restore. The selected item will be added to the list. To quickly find file, folder or volume, use the search field at the top of the list: enter an object name or a part of it and click the search button on the right or press [ENTER].

If you have chosen files to restore in the **Files** view, the list of objects to restore will be populated with selected files.

To remove a file or folder from the list, select it and click **Remove**.

**NOTE:**
For one restore session, you can select only Microsoft Windows and Linux files, or NDMP volumes.

By default, Veeam Backup & Replication will restore the latest version of files available on tape. If you want to restore files from another restore point, select the necessary file and click **Backup Set**. In the list of available backup sets, select the necessary archiving session and click **OK**.
NOTE:
For backups created with Veeam Backup & Replication 9.5 Update 3a and earlier: when you restore an entire folder from tape, Veeam Backup & Replication restores all files that have ever existed in the folder and been archived to tape. To restore files in the folder, Veeam Backup & Replication scans the selected backup set and backup sets that were created previously. If a file is not found in the selected backup set, Veeam Backup & Replication will restore the most recent version of the file from a backup set preceding the selected backup set.
Step 3. Specify Restore Destination

At the **Destination** step of the wizard, specify destination where the archived files will be restored. You can use one of the following options:

- **Original location.** Use this option to restore data to the location where the original file resides (or resided): Microsoft Windows server, Linux server, or NMDP server. This type of restore is only possible if the original machine is connected to Veeam Backup & Replication and powered on.

- **This server.** Use this option if you want to restore data to another server. The following options are available:
  - Microsoft Windows or Linux files: you can restore files to the Veeam backup server, shared folder or to any other machine added to Veeam Backup & Replication. From the server list, choose a machine to which files should be restored and specify path to the target folder.
  - NDMP volumes: you can restore data to another NDMP server added to Veeam Backup & Replication. From the server list, select an NDMP server added to Veeam Backup & Replication. In the **Path to folder** field, specify the volume to which you want to restore the archived volume.
  - NAS file shares: you can restore data to an SMB (CIFS) or NFS file share. From the server list, select a NAS file share added to Veeam Backup & Replication. In the **Path to folder** field, specify the folder to which you want to restore the archived files and folders.

When restoring files to a location other than original, Veeam Backup & Replication preserves the folder hierarchy. To restore files to the specified target folder without keeping the folder structure, clear the **Preserve folder hierarchy** check box. This option is unavailable for restore of NDMP volumes.
Step 4. Specify Restore Options

At the **Options** step of the wizard, specify overwrite options in case the file already exists in the target folder:

- **Leave the existing file.** Select this option if you do not want to overwrite the existing file with the restored one.

- **Overwrite the existing file if older than the backed up file.** Select this option if you want to overwrite the existing file only if it is older than the restored file.

- **Always overwrite the existing file.** Select this option if you want to overwrite the existing file with the restored file in all cases.

Select the **Restore file and folder security** check box if you want the restored files to keep their original ownership and security permissions. In the opposite case, Veeam Backup & Replication will change security settings: the user account under which the Veeam Backup Service runs will be set as the owner of the restored objects, while access permissions will be inherited from the target folder to which the objects are restored.

**NOTE:**

This step is inapplicable for NMDP restore. If you restore NMDP volumes, these options will be skipped. The NMDP volumes will be restored according to the hardware settings.

<table>
<thead>
<tr>
<th>Objects to Restore</th>
<th>Options if file already exists</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Options</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leave the existing file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overwrite the existing file if older than the backed up file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Always overwrite the existing file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restore file and folder security</td>
<td></td>
</tr>
</tbody>
</table>
Step 5. Finish Working with Wizard

Review the settings and click **Finish** to restore selected files and folders.
Tape States Indicators

The user interface indicates on states of the tape infrastructure components.

## Tape Libraries

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td>🏬</td>
<td>Connected tape library</td>
</tr>
<tr>
<td>🏬</td>
<td>Tape library connected over SCSI</td>
</tr>
</tbody>
</table>

## Drives

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td>🏬</td>
<td>Enabled drive</td>
</tr>
<tr>
<td>🎬</td>
<td>Disabled drive</td>
</tr>
</tbody>
</table>

## Media Pools

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td>🏬</td>
<td>Free media pool</td>
</tr>
<tr>
<td>🎬</td>
<td>Imported media pool</td>
</tr>
<tr>
<td>🎬</td>
<td>Unrecognized media pool</td>
</tr>
<tr>
<td>🎬</td>
<td>Retired media pool</td>
</tr>
<tr>
<td>🎬</td>
<td>Media pool</td>
</tr>
<tr>
<td>🎬</td>
<td>GFS media pool</td>
</tr>
<tr>
<td>🎬</td>
<td>WORM media pool</td>
</tr>
</tbody>
</table>
### Online Tapes

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Retired tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Encrypted tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Software protected tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Hardware protected tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Software protected and encrypted tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Hardware protected and encrypted tape</td>
</tr>
</tbody>
</table>

### Online WORM Tapes

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>WORM tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Retired WORM tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Encrypted WORM tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Software protected WORM tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Hardware protected WORM tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Software protected and encrypted WORM tape</td>
</tr>
</tbody>
</table>
### Offline Tapes

Offline indication does not differ for standard and WORM tapes.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Retired tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Encrypted tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Hardware protected tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Software protected tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Software protected and encrypted tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Hardware protected and encrypted tape</td>
</tr>
</tbody>
</table>

### Cleaning Tape

<table>
<thead>
<tr>
<th>Icon</th>
<th>Component state</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Online cleaning tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Offline cleaning tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Retired online cleaning tape</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Retired offline cleaning tape</td>
</tr>
</tbody>
</table>
# Tape Drive Alerts

Tape drive alerts are informational, warning or critical notifications designed to provide real-time monitoring of the hardware operation status. They ensure quick detection and troubleshooting of various issues with tape drives.

<table>
<thead>
<tr>
<th>Alert Code (Dec)</th>
<th>Alert Code (Hex)</th>
<th>Severity</th>
<th>Description</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0x01</td>
<td>Warning</td>
<td>The tape drive is having problems reading data. No data has been lost, but there has been a reduction in the performance of the tape.</td>
<td>Read warning</td>
</tr>
<tr>
<td>2</td>
<td>0x02</td>
<td>Warning</td>
<td>The tape drive is having problems writing data. No data has been lost, but there has been a reduction in the capacity of the tape.</td>
<td>Write warning</td>
</tr>
<tr>
<td>3</td>
<td>0x03</td>
<td>Warning</td>
<td>The operation has stopped because an error has occurred while reading or writing data that the drive cannot correct.</td>
<td>Hard error</td>
</tr>
</tbody>
</table>
| 4                | 0x04             | Critical | Your data is at risk:  
1. Copy any data you require from this tape.  
2. Do not use this tape again.  
3. Restart the operation with a different tape. | Media error         |
| 5                | 0x05             | Critical | The tape is damaged or the drive is faulty. Call the tape drive supplier helpline. | Read failure        |
| 6                | 0x06             | Critical | The tape is from a faulty batch or the tape drive is faulty:  
1. Use a good tape to test the drive.  
2. If problem persists, call the tape drive supplier helpline. | Write failure       |
| 7                | 0x07             | Warning  | The tape cartridge has reached the end of its calculated useful life:  
1. Copy data you need to another tape.  
2. Discard the old tape. | Media life          |
<p>| 8                | 0x08             | Warning  | The tape cartridge is not data-grade. Any data you back up to the tape are at risk. Replace the cartridge with a data-grade tape. | Not data grade tape |</p>
<table>
<thead>
<tr>
<th>Alert Code (Dec)</th>
<th>Alert Code (Hex)</th>
<th>Severity</th>
<th>Description</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>0x09</td>
<td>Critical</td>
<td>You are trying to write to a write-protected cartridge. Remove the write-protection or use another tape.</td>
<td>Attempted backup to write-protected tape</td>
</tr>
<tr>
<td>10</td>
<td>0x0a</td>
<td>Information</td>
<td>You cannot eject the cartridge because the tape drive is in use. Wait until the operation is complete before ejecting the cartridge.</td>
<td>Tape drive is in use</td>
</tr>
<tr>
<td>11</td>
<td>0x0b</td>
<td>Information</td>
<td>The tape in the drive is a cleaning cartridge.</td>
<td>Attempted backup/restore to cleaning tape</td>
</tr>
<tr>
<td>12</td>
<td>0x0c</td>
<td>Information</td>
<td>You have tried to load a cartridge of a type which is not supported by this drive.</td>
<td>Unsupported cartridge type</td>
</tr>
<tr>
<td>13</td>
<td>0x0d</td>
<td>Critical</td>
<td>The operation has failed because the tape in the drive has experienced a mechanical failure:</td>
<td>Detected snapped tape</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Discard the old tape.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Restart the operation with a different tape.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>0x0e</td>
<td>Critical</td>
<td>The operation has failed because the tape in the drive has experienced a mechanical failure:</td>
<td>Detected snapped tape</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. Do not attempt to extract the tape cartridge.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Call the tape drive supplier helpline.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0x0f</td>
<td>Warning</td>
<td>The memory in the tape cartridge has failed, which reduces performance. Do not use the cartridge for further write operations.</td>
<td>Cartridge memory chip failure</td>
</tr>
<tr>
<td>16</td>
<td>0x10</td>
<td>Critical</td>
<td>The operation has failed because the tape cartridge was manually de-mounted while the tape drive was actively writing or reading.</td>
<td>Forced eject</td>
</tr>
<tr>
<td>17</td>
<td>0x11</td>
<td>Warning</td>
<td>You have loaded a cartridge of a type that is read-only in this drive. The cartridge will appear as write-protected.</td>
<td>Read-only format</td>
</tr>
<tr>
<td>Alert Code (Dec)</td>
<td>Alert Code (Hex)</td>
<td>Severity</td>
<td>Description</td>
<td>Cause</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>----------</td>
<td>-------------</td>
<td>-------</td>
</tr>
<tr>
<td>18</td>
<td>0x12</td>
<td>Warning</td>
<td>The tape directory on the tape cartridge has been corrupted. File search performance will be degraded. The tape directory can be rebuilt by reading all the data on the cartridge.</td>
<td>Tape directory corrupted in the cartridge memory</td>
</tr>
<tr>
<td>19</td>
<td>0x13</td>
<td>Information</td>
<td>The tape cartridge is nearing the end of its calculated life. It is recommended that you: 1. Use another tape cartridge for your next backup. 2. Store this tape in a safe place in case you need to restore data from it.</td>
<td>Nearing media life</td>
</tr>
<tr>
<td>20</td>
<td>0x14</td>
<td>Critical</td>
<td>The tape drive needs cleaning: 1. If the operation has stopped, eject the tape and clean the drive. 2. If the operation has not stopped, wait for it to finish and then clean the drive. Check the tape drive user’s manual for device specific cleaning instructions.</td>
<td>Clean now</td>
</tr>
<tr>
<td>21</td>
<td>0x15</td>
<td>Warning</td>
<td>The tape drive is due for routine cleaning: 1. Wait for the current operation to finish. 2. Then use a cleaning cartridge. Check the tape drive user’s manual for device specific cleaning instructions.</td>
<td>Clean periodic</td>
</tr>
<tr>
<td>22</td>
<td>0x16</td>
<td>Critical</td>
<td>The last cleaning cartridge used in the tape drive has worn out: 1. Discard the worn out cleaning cartridge. 2. Wait for the current operation to finish. 3. Then use a new cleaning cartridge.</td>
<td>Expired cleaning media</td>
</tr>
<tr>
<td>23</td>
<td>0x17</td>
<td>Critical</td>
<td>The last cleaning cartridge used in the tape drive was an invalid type: 1. Do not use this cleaning cartridge in this drive. 2. Wait for the current operation to finish. 3. Then use a new cleaning cartridge.</td>
<td>Invalid cleaning cartridge</td>
</tr>
<tr>
<td>Alert Code (Dec)</td>
<td>Alert Code (Hex)</td>
<td>Severity</td>
<td>Description</td>
<td>Cause</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>24</td>
<td>0x18</td>
<td>Warning</td>
<td>The tape drive has requested a retention operation.</td>
<td>Request retention</td>
</tr>
<tr>
<td>25</td>
<td>0x19</td>
<td>Warning</td>
<td>A redundant interface port on the tape drive has failed.</td>
<td>Dual-port interface error</td>
</tr>
<tr>
<td>26</td>
<td>0x1a</td>
<td>Warning</td>
<td>A tape drive cooling fan has failed.</td>
<td>Cooling fan failure</td>
</tr>
<tr>
<td>27</td>
<td>0x1b</td>
<td>Warning</td>
<td>A redundant power supply has failed inside the tape drive enclosure. Check the enclosure user’s manual for instructions on replacing the failed power supply.</td>
<td>Power supply</td>
</tr>
<tr>
<td>28</td>
<td>0x1c</td>
<td>Warning</td>
<td>The tape drive power consumption is outside the specified range.</td>
<td>Power consumption is outside the specified range</td>
</tr>
<tr>
<td>29</td>
<td>0x1d</td>
<td>Warning</td>
<td>Preventive maintenance of the tape drive is required. Check the tape drive user’s manual for device specific preventive maintenance tasks or call the tape drive supplier helpline.</td>
<td>Preventative maintenance is required</td>
</tr>
<tr>
<td>30</td>
<td>0x1e</td>
<td>Critical</td>
<td>The tape drive has a hardware fault: 1. Eject the tape or magazine. 2. Reset the drive. 3. Restart the operation.</td>
<td>Drive hardware fault</td>
</tr>
<tr>
<td>31</td>
<td>0x1f</td>
<td>Critical</td>
<td>The tape drive has a hardware fault: 1. Turn the tape drive off and then on again. 2. Restart the operation. 3. If the problem persists, call the tape drive supplier helpline.</td>
<td>Drive hardware fault</td>
</tr>
<tr>
<td>32</td>
<td>0x20</td>
<td>Warning</td>
<td>The tape drive has a problem with the application client interface: 1. Check the cables and cable connections. 2. Restart the operation.</td>
<td>Host interface fault</td>
</tr>
<tr>
<td>Alert Code (Dec)</td>
<td>Alert Code (Hex)</td>
<td>Severity</td>
<td>Description</td>
<td>Cause</td>
</tr>
<tr>
<td>-----------------</td>
<td>-----------------</td>
<td>----------</td>
<td>-------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| 33              | 0x21            | Critical | The operation has failed:  
1. Eject the tape or magazine.  
2. Insert the tape or magazine again.  
3. Restart the operation. | Eject media request |
| 34              | 0x22            | Warning  | The firmware download has failed because you have tried to use the incorrect firmware for this tape drive. Obtain the correct firmware and try again. | Firmware download fault |
| 35              | 0x23            | Warning  | Environmental conditions inside the tape drive are outside the specified humidity range. | Humidity specification exceeded |
| 36              | 0x24            | Warning  | Environmental conditions inside the tape drive are outside the specified temperature range. | Temperature specification exceeded |
| 37              | 0x25            | Warning  | The voltage supply to the tape drive is outside the specified range. | Voltage specification exceeded |
| 38              | 0x26            | Critical | A hardware failure of the tape drive is predicted. Call the tape drive supplier helpline. | Tape device predicted to fail |
| 39              | 0x27            | Warning  | The tape drive may have a hardware fault. Run extended diagnostics to verify and diagnose the problem. Check the tape drive user’s manual for device specific instructions on running extended diagnostic tests. | Drive hardware fault |
| 40              | 0x28            | Critical | The changer mechanism is having difficulty communicating with the tape drive:  
1. Turn the autoloader off then on.  
2. Restart the operation.  
3. If problem persists, call the tape drive supplier helpline. | Autoloader communication fault |
<table>
<thead>
<tr>
<th>Alert Code (Dec)</th>
<th>Alert Code (Hex)</th>
<th>Severity</th>
<th>Description</th>
<th>Cause</th>
</tr>
</thead>
</table>
| 41              | 0x29            | Critical    | A tape has been left in the autoloader by a previous hardware fault:  
1. Insert an empty magazine to clear the fault.  
2. If the fault does not clear, turn the autoloader off and then on again.  
3. If the problem persists, call the tape drive supplier helpline. | Detected stray tape in autoloader               |
| 42              | 0x2a            | Warning     | There is a problem with the autoloader mechanism.                                                                                                                                                           | Autoloader mechanism fault                      |
| 43              | 0x2b            | Critical    | The operation has failed because the autoloader door is open:  
1. Clear any obstructions from the autoloader door.  
2. Eject the magazine and then insert it again.  
3. If the fault does not clear, turn the autoloader off and then on again.  
4. If the problem persists, call the tape drive supplier helpline. | Autoloader door open                           |
| 44              | 0x2c            | Critical    | The autoloader has a hardware fault:  
1. Turn the autoloader off and then on again.  
2. Restart the operation.  
3. If the problem persists, call the tape drive supplier helpline.  
Check the autoloader user’s manual for device specific instructions on turning the device power on and off. | Autoloader hardware fault                       |
| 45              | 0x2d            | Critical    | The autoloader cannot operate without the magazine:  
1. Insert the magazine into the autoloader.  
2. Restart the operation.                                                                                                                   | Autoloader cannot operate without magazine      |
<p>| 46              | 0x2e            | Warning     | A hardware failure of the changer mechanism is predicted. Call the tape drive supplier helpline.                                                                                                        | Autoloader predicted to fail                    |</p>
<table>
<thead>
<tr>
<th>Alert Code (Dec)</th>
<th>Alert Code (Hex)</th>
<th>Severity</th>
<th>Description</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>47 - 49</td>
<td>0x2f - 0x31</td>
<td></td>
<td>These codes are reserved for future use.</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0x32</td>
<td>Warning</td>
<td>Media statistics have been lost at some time in the past.</td>
<td>Media statistics is lost</td>
</tr>
<tr>
<td>51</td>
<td>0x33</td>
<td>Warning</td>
<td>The tape directory on the tape cartridge just unloaded has been corrupted. File search performance will be degraded. The tape directory can be rebuilt by reading all the data.</td>
<td>Tape directory is corrupted</td>
</tr>
<tr>
<td>52</td>
<td>0x34</td>
<td>Critical</td>
<td>The tape just unloaded could not write its system area successfully: 1. Copy data to another tape cartridge. 2. Discard the old cartridge.</td>
<td>Tape system area write failure</td>
</tr>
<tr>
<td>53</td>
<td>0x35</td>
<td>Critical</td>
<td>The tape system area could not be read successfully at load time: 1. Copy data to another tape cartridge. 2. Discard the old cartridge.</td>
<td>Tape system area read failure</td>
</tr>
<tr>
<td>54</td>
<td>0x36</td>
<td>Critical</td>
<td>The start or data could not be found on the tape: 1. Check you are using the correct format tape. 2. Discard the tape or return the tape to your supplier.</td>
<td>Start of data not found</td>
</tr>
<tr>
<td>55</td>
<td>0x37</td>
<td>Critical</td>
<td>The operation has failed because the media cannot be loaded and threaded: 1. Remove the cartridge, inspect it as specified in the product manual, and retry the operation. 2. If the problem persists, call the tape drive supplier help line.</td>
<td>Load failure</td>
</tr>
<tr>
<td>56</td>
<td>0x38</td>
<td>Critical</td>
<td>The operation has failed because the medium cannot be unloaded: 1. Do not attempt to extract the tape cartridge. 2. Call the tape driver supplier help line.</td>
<td>Medium unload failure</td>
</tr>
<tr>
<td>Alert Code (Dec)</td>
<td>Alert Code (Hex)</td>
<td>Severity</td>
<td>Description</td>
<td>Cause</td>
</tr>
<tr>
<td>-----------------</td>
<td>------------------</td>
<td>----------</td>
<td>-------------</td>
<td>-------</td>
</tr>
</tbody>
</table>
| 57              | 0x39             | Critical | The tape drive has a problem with the automation interface:  
1. Check the power to the automation system.  
2. Check the cables and cable connections.  
3. Call the supplier help line if problem persists. | Interface failure |
| 58              | 0x3a             | Warning  | The tape drive has reset itself due to a detected firmware fault. If problem persists, call the supplier help line. | Firmware failure |