Guidelines for the Blood Transfusion Services

Chapter 7: Specifications for blood components

http://www.transfusionguidelines.org/red-book/chapter-7-specifications-for-blood-components

Chapter 7: Specifications for blood components

This chapter details process, product, quality monitoring, labelling, discard, storage and transport specifications.

7.1: Leucocyte depletion

> Update notice: Section 7.1 - Technical information has been updated following the the issue of Change Notification 21 - 2015.

With very few stated exceptions (e.g. granulocytes), from November 1999 all allogeneic blood components produced in the UK have been subjected to a leucocyte depletion process. The term ‘LD’ may be used where necessary instead of ‘leucocyte depleted’ or ‘leucocyte depletion’ although component names will state ‘Leucocyte Depleted’ where appropriate. The UK specification for leucodepletion is that more than 90% of leucocyte-depleted components from relevant processes should have less than 1×10^6 leucocytes and more than 99% of components should contain less than 5×10^6 leucocytes, both with 95% confidence. Process performance should be assessed against the 1×10^6 limit when using statistical process control (statistical process monitoring) measurements.

Leucocyte depletion can be achieved by a number of methods, which must be validated before use. If filtration is used the recommended capacity of the filter must not be exceeded.

Currently, it is not feasible to assess all components for the effectiveness of the leucodepletion process. Therefore, the UK Blood Transfusion Services (UKBTS) should apply recognised statistical process monitoring methodologies such as those proposed by the International Society of Blood Transfusion Biomedical Excellence for Safer Transfusion (ISBT) BEST Expert Working Party, published in Transfusion,[1] to ensure the following:

- conformance of the process to the LD process specification
- identification of LD component specified limit failures
- stability of the process over time.

The residual leucocyte testing schedule should be defined in process monitoring and conformance checking procedures.

It is advisable to identify results to a production run or ‘batch’ and to ensure conformance of components to relevant specifications before release of components to stock or to ensure that a monitored filter batch is producing components that conform to specification.

A leucocyte depletion process is controlled if a control chart or equivalent is in use and does not currently display control limit or trend warnings.

A leucocyte depletion process is uncontrolled if a control chart or equivalent is not in operation for the process or if a current control chart or equivalent displays control limit or trend warnings.

Where statistical process monitoring methodology is not judged appropriate due to an inability to control the process or the production of small numbers of components, all components routinely issued to stock must have been shown to contain less than 5×10^6 leucocytes.

Issue (to stock) of components, which do not meet the leucocyte depletion specified limit of 5×10^6/unit, must follow a concessionary release procedure (see Section 6.10).

Patient-designated components should not be discarded before referral to a clinician.

Secondary components or split components produced from primary components do not require a leucocyte count provided the primary process is controlled or the individual primary component is tested and found to be acceptable.

Plasma components derived from whole blood filtration do not require residual leucocytes to be monitored provided the associated red cell process is controlled.

Leucocyte or platelet counts on components produced from frozen and thawed material should be made, where necessary, prior to the initial freezing process unless otherwise validated.

If the leucodepletion process transfers the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure the correct identification number is put on the final component pack.

Leucocyte depletion of components should take place before the end of Day 2 (Day 0 is the day of collection).

Once a red cell component has been cooled to its storage temperature (i.e. 4 ±2°C) prior to leucodepletion, and when leucodepletion by filtration is to take place at ambient temperature, the ambient temperature of the room in which filtration takes place should not exceed 26°C (see also section 6.4).

If components are removed from their designated storage temperature to undergo a leucodepletion process, they must be returned to their storage temperature as soon as possible and in any event within 3 hours (see also section 6.4).

7.2: Other component specifications

Other component and process monitoring specifications are detailed later in this chapter. As far as possible, all parameters tested should be derived from a single component. Because of biological variability, it is acceptable if a minimum of 75% of the results from component and process monitoring tests (other than leucocyte depletion specifications, platelets for intrauterine transfusion, washed red cells, and prion-reduced red cell components) achieve the specifications.

Yield specifications (e.g. platelet yield/unit, total haemoglobin/unit) for components produced by splitting primary components should be the indicated specification for the primary component divided by the number of split components produced.

Haemolysis measurements on red cell components are performed at the end of the component shelf life. Due to intermittent availability of outdated red cell components, each primary process should be validated to give haemolysis of <0.8% of the red cell mass at the end of component shelf life in >75% of components with a minimum of 20 components tested. Revalidation of the red cell preparation processes for red cell haemolysis must be performed at least annually and after any alteration to the production method.

For mandatory microbiology screening and blood grouping tests, all components must conform to the requirements specified in Chapter 9. Concessionary procedures for release of components that do not conform to these requirements are given in section 6.10.

7.3: Production advice

Update notice: This section has been updated following the issue of Change Notification 10 - 2017.

The timing and method of separation depends on the components to be prepared from a given donation.

If the production, washing or splitting process transfers the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure the correct identification number is put on the final component pack.

Where a production process amends the expiry date of the component, there are different consequences, dependent on the process.

Further processing or irradiation may reduce the expiry date of the component. Here the expiry date of the new component must not exceed that of the primary component or the expiry date limitations conferred by the process.

Components produced by pooling primary components must have an expiry date of the shortest dated component used.

When remanufacturing neonatal or paediatric red cell components into adult components, to avoid unnecessary wastage, the expiry date may be extended.

Processing of a red cell component to allow frozen storage will result in a lengthened expiry date.

The method of preparation should ensure that plasma components have the maximum level of labile coagulation factors with minimum cellular contamination.

Donations from donors with clinically significant human platelet antigen (HPA) and/or human leucocyte antigen (HLA) antibodies should not be used for the production of plasma-rich blood products (e.g. fresh frozen plasma, platelet concentrate, whole blood, cryoprecipitate). Red cells suspended in additive solution can be produced from such donations.

Platelet and plasma components should not be produced from lipaemic or icteric donations or be contaminated with red cells. Procedures should exist for assessing these findings.

An upper platelet concentration should be assigned for each platelet component type based on pack validation data or the pack manufacturer’s recommendations.

pH measurements on platelet components should be made between 20 and 24°C or the measurements corrected to 22°C.

Unless a validated pathogen inactivation process is used, blood components for use in intrauterine transfusion, neonates and infants (see also section 7.21) must be derived from selected donors who fulfil the following criteria:

- Have given at least one donation in the last 2 years, which was either negative for all mandatory markers, or if repeat reactive, has been confirmed to be non-specifically reactive and the donor reinstated in accordance with section 9.4 (on reinstatement of blood donors).
- Negative results were obtained for mandatory microbiology markers with the current donation.

Each component should be visually inspected at each stage of processing and immediately prior to issue. The component must be withdrawn if there is evidence of leakage, damage to or fault in the container, excessive air, suspicion of microbial contamination or any other contraindications such as platelet clumping, unusual turbidity, haemolysis or other abnormal colour change.

7.4: Whole Blood, Leucocyte Depleted

A unit of blood collected into an anticoagulant, containing less than 1×10^6 leucocytes.

7.4.1: Technical information

- A unit of whole blood collected in the UK currently consists of 450 mL ±10% of blood from a suitable donor (see Chapter 3), plus 63 mL of anticoagulant, which is then leucocyte depleted, and stored in an approved container. The Eurobloodpack contains 66.5 mL of anticoagulant and is suitable for the collection of 475 mL ±10%, although in the UK a volume of 495 mL will not be exceeded.
- Whole Blood, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.4.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Whole Blood, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the anticoagulant solution
- the date of collection

- the expiry date*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.4.3: Storage

For general guidelines, see section 6.7.

- The component may be stored for a maximum of 35 days at a core temperature of 4 ±2°C if an adenine-supplemented anticoagulant is used, otherwise the maximum period of storage is 28 days at a core temperature of 4 ±2°C.
- Variation from the core temperature of 4 ±2°C must be kept to a minimum during storage and restricted to any short period necessary for examining, labelling or issuing the component.
- Exceptionally, i.e. due to equipment failure at a Blood Centre, red cell components which have been exposed to a core temperature not exceeding 10°C and not less than 1°C may be released for transfusion provided that:
  - the component has been exposed to such a temperature change on one occasion only
  - the duration of the temperature excursion has not exceeded 5 hours
  - a documented system is available in each Blood Centre to cover such eventualities
  - adequate records of the incident are compiled and retained.

7.4.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.1 shall meet the specified values.

Table 7.1 Whole Blood, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume*	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	470 ±50 mL
Haemolysis	As per section 7.2	<0.8% of red cell mass
		>=40 g/unit

Haemoglobin content	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	
Leucocyte count**	As per sections 6.3 and 7.1	<1 × 10^6/unit
* After volume losses resulting from leucodepletion		
** Methods validated for counting low numbers of leucocytes must be used		

7.4.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- transport time normally should not exceed 12 hours.

In some instances it is necessary to issue red cell components that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

7.5: Red Cells, Leucocyte Depleted

> Update notice: Sections 7.5, 7.6, 7.22, 7.24, 7.25 and 7.26 have been updated following the issue of Change Notification No 33 – 2016.

A red cell component containing less than 1 × 10^6 leucocytes.

7.5.1: Technical information

- A red cell component prepared by removing a proportion of the plasma from leucocyte-depleted whole blood or by leucodepleting plasma reduced red cells.

- Red Cells, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.5.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the anticoagulant solution
- the date of collection
- the expiry date*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.5.3: Storage

For general guidelines, see section 6.7.

- The component may be stored for a maximum of 35 days at a core temperature of 4 ±2°C if an adenine supplemented anticoagulant is used, otherwise the maximum period of storage is 28 days at a core temperature of 4 ±2°C.
- Variation from the core temperature of 4 ±2°C of the finished component must be kept to a minimum during storage at all stages of the blood supply chain and restricted to any short period necessary for examining, labelling or issuing the component.

- Exceptionally, i.e. due to equipment failure at a Blood Centre or hospital, for temperature excursions where the core temperature has not exceeded 10°C or fallen below 1°C, components may be released for transfusion provided that:
  - the component has been exposed to such a temperature change on one occasion only
  - the duration of the temperature change has not exceeded 5 hours
  - a documented system is available in each Blood Centre or hospital to cover such eventualities
  - adequate records of the incident are compiled and retained.

7.5.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.2 shall meet the specified values.

Table 7.2 Red Cells, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	280 ±60 mL
Haemoglobin content		>=40 g/unit
Haemolysis	As per section 7.2	<0.8% of red cell mass
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit
* Methods validated for counting low levels of leucocytes must be used		

7.5.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised

- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- for transportation between blood supplier and hospital an upper limit of 10°C surface temperature is acceptable but should be limited to one occasion, not exceeding 12 hours

In some instances it is necessary to issue red cell components from the blood supplier to hospitals that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Removal from and return to 2-6°C controlled storage within hospitals

For occasions when red cells are removed from 2-6°C controlled storage (eg when issued to a clinical area immediately prior to transfusion) and returned then:

- If possible, time out of a controlled temperature environment should be restricted to under 30 minutes
- if 30 minutes is exceeded the unit should not be returned to the issue location in the refrigerator, but returned to the transfusion laboratory or quarantined remotely using electronic blood tracking
- up to 60 minutes out of controlled temperature is acceptable, provided the unit is then quarantined by placing in a secure refrigerator for at least 6 hours prior to reissue, to allow the unit to return to 2-6°C
- Hospitals will need to identify such units so that they are not subject to being out of controlled temperature storage for between 30 and 60 minutes on more than three occasions.

Transfusion should be completed within 4 hours of issue out of a controlled temperature environment.

7.6: Red Cells in Additive Solution, Leucocyte Depleted

> Update notice: Concessionary release limits have been updated in table 7.3 following the the issue of Change Notification 22 - 2015

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> Sections 7.5, 7.6, 7.22, 7.24, 7.25 and 7.26 have been updated following the issue of Change Notification No 33 – 2016.

A red cell component containing less than 1×10^6 leucocytes and suspended in an approved additive solution.

7.6.1: Technical information

- A red cell component prepared by removing a proportion of the plasma from leucocyte-depleted whole blood and suspending in an approved additive solution. Leucodepletion may be carried out on either the whole blood starting material or on the final component.
- Red Cells in Additive Solution, Leucocyte Depleted should be transfused through a 170–200 µm filter.
- May be produced by remanufacture of Red Cells for Exchange Transfusion, Leucocyte Depleted (section 7.24) up to 6 days after donation.

7.6.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells in Additive Solution, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the additive solution
- the date of collection
- the expiry date*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.6.3: Storage

For general guidelines, see section 6.7.

- The component may be stored for a maximum of 35 days at a core temperature of 4 ±2°C.

- Variation from the core temperature of 4 ±2°C of the finished component must be kept to a minimum during storage at all stages of the blood supply chain and restricted to any short period necessary for examining, labelling or issuing the component.

- Exceptionally, i.e. due to equipment failure at a Blood Centre or hospital, for temperature excursions where the core temperature has not exceeded 10°C or fallen below 1°C, components may be released for transfusion provided that:
  - the component has been exposed to such a temperature change on one occasion only
  - the duration of the temperature excursion has not exceeded 5 hours
  - a documented system is available in each Blood Centre or hospital to cover such eventualities
  - adequate records of the incident are compiled and retained.

7.6.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.3 shall meet the specified values.

Table 7.3 Red Cells in Additive Solution, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	280 ±60 mL**
Haemoglobin content		>=40 g/unit***
Haemolysis	As per section 7.2	<0.8% of red cell mass
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit
* Methods validated for counting low numbers of leucocytes must be used		
**Units measured and found to be >375 mL should not be issued for transfusion		
***Units tested and found to have <30 g/unit should not be issued for transfusion		

7.6.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- for transportation between blood supplier and hospital an upper limit of 10°C surface temperature is acceptable but should be limited to one occasion, not exceeding 12 hours

In some instances it is necessary to issue red cell components from the blood supplier to hospitals that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Removal from and return to 2-6°C controlled storage within hospitals

For occasions when red cells are removed from 2-6°C controlled storage (eg when issued to a clinical area immediately prior to transfusion) and returned then:

- If possible, time out of a controlled temperature environment should be restricted to under 30 minutes
- if 30 minutes is exceeded the unit should not be returned to the issue location in the refrigerator, but returned to the transfusion laboratory or quarantined remotely using electronic blood tracking
- up to 60 minutes out of controlled temperature is acceptable, provided the unit is then quarantined by placing in a secure refrigerator for at least 6 hours prior to reissue, to allow the unit to return to 2-6°C
- Hospitals will need to identify such units so that they are not subject to being out of controlled temperature storage for between 30 and 60 minutes on more than three occasions.

Transfusion should be completed within 4 hours of issue out of a controlled temperature environment.

7.7: Red Cells, Washed, Leucocyte Depleted

> Update notice: Table 7.4 has been updated following the issue of Change Notification 30 - 2015.

A red cell component, containing less than 1×10^6 leucocytes, which has been washed with 0.9% w/v sodium chloride for injection (BP) or other validated solution. The Red Cells, Washed, Leucocyte Depleted may then be suspended in an approved solution.

7.7.1: Technical information

- The amount of residual protein will depend on the washing protocol. Washing can be performed by interrupted or continuous flow centrifugation.
- The use of validated washing procedures that incorporate chilled saline or other validated solution for suspension is recommended. This will minimise the risk of bacterial growth and help to produce a

component that meets the transit temperature requirements. Use of an automated, closed washing system would be preferable.

- If the washing process results in the transfer of the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure the correct donation identification number is put on the component pack of Red Cells, Washed, Leucocyte Depleted.
- Red Cells, Washed, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.7.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells, Washed, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the suspending solution
- the date and time of preparation
- the expiry date and time*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.7.3: Storage

For general guidelines, see section 6.7.

The component should be used as soon as possible if produced in an open system. Where the component has been produced in a closed system and storage is required the component should be stored at a core temperature of 4 ±2°C and used within 24 hours of production if suspended in saline or a defined validated period if suspended in an approved additive solution.

7.7.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.4 shall meet the specified values. Provided the component is prepared from a process that is validated for leucocyte removal, testing of washed red cells for residual leucocytes is not required.

7.7.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- transport time normally should not exceed 12 hours.

In some instances it is necessary to issue red cell components that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Table 7.4 Red Cells, Washed, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	100% unless the process capability by SPC demonstrates otherwise	Within locally specified volume range
Haemoglobin content		>=40 g/unit
Haematocrit		0.5 - 0.70
Residual protein**		<0.5 g/unit

Leucocyte count* (pre-wash)	As per sections 6.3 and 7.1	<1 × 10^6/unit
* Methods validated for counting low numbers of leucocytes must be used		
** Units tested and found to have >0.5 g/unit should not be issued for transfusion		

7.8: Red Cells, Thawed and Washed, Leucocyte Depleted

> Update notice: Section 7.8.3 has been updated following the issue of Change Notification No 32 – 2016

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A red cell component, that contains less than 1 × 10^6 leucocytes, frozen in the presence of a cryoprotectant (preferably within 5 days of collection), and washed before use. Red Cells, Thawed and Washed, Leucocyte Depleted may then be suspended in an approved additive solution.

7.8.1: Technical information

- The concentration and nature of the cryoprotectant must provide appropriate protection of the red cells at the intended storage temperature. The entire process of freezing, thawing and washing must be validated and documented.
- The use of validated washing procedures that incorporate chilled saline or other validated solution for suspension is recommended. This will minimise the risk of bacterial contamination and helps to produce a component that meets the transit temperature requirements. Use of an automated, closed washing system would be preferable.
- The target minimum haemoglobin content is 36 g.
- If the washing process results in the transfer of the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure the correct donation identification number is put on the pack in which the component is frozen and the pack in which the final component is presented.
- Red Cells, Thawed and Washed, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.8.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells, Thawed and Washed, Leucocyte Depleted* and volume
- the blood component producer’s name*

- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the suspending solution
- the date and time of preparation
- the expiry date and time*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.8.3: Storage

For general guidelines, see section 6.7.

- Maintenance of a constant storage temperature is important, particularly if a low-glycerol cryoprotectant system is used. Storage should be controlled to ensure the temperature is:
  - –60°C to –80°C if stored in an electrical freezer, when a high-glycerol method is used
  - –140°C to –150°C if stored in vapour phase liquid nitrogen, when a low-glycerol method is used.
- Storage may be extended to 30 years if the correct storage temperature is guaranteed.

- The thawed component should be used as soon as possible if produced in an open system. Where the component has been produced in a closed system and storage is required the component should be stored at a core temperature of 4 ±2°C and used within 24 hours of production if suspended in saline or a defined validated period if suspended in an approved additive solution.

7.8.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.5 shall meet the specified values. Provided the component is prepared from a process that is validated for leucocyte removal, testing of washed red cells for residual leucocytes is not required.

Table 7.5 Red Cells, Thawed and Washed, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	All	Within locally defined nominal volume range
Supernatant haemoglobin	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	<=2 g/unit
Red cell haemoglobin		>=36 g/unit
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit**
*Methods validated for counting low numbers of leucocytes must be used		
**Pre-freeze		

7.8.5: Transportation

For general guidelines, see section 6.11.

- The transport requirements for red cells in the frozen state will be influenced by the nature and concentration of cryoprotectant used: e.g. a component containing <20% glycerol requires a refrigerant colder than dry ice, such as the vapour phase of liquid nitrogen.

- For thawed red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:
  - the validation exercise should be repeated periodically
  - if melting ice is used, it should not come into direct contact with the components
  - dead air space in packaging containers should be minimised
  - as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
  - transport time normally should not exceed 12 hours.

In some instances it is necessary to issue red cell components that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

7.9: Platelets, Pooled, Buffy Coat Derived, Leucocyte Depleted

> Update notice: Sections 7.9.3, 7.9.4 and table 7.6 have been updated following the the issue of Change Notification 18 - 2015. Further changes have also been made to the concessionary release limits in table 7.6 following the the issue of Change Notification 22 - 2015.
> The tables in the sections 7.9.4, 7.10.4, 7.11.4, 7.12.4, 7.29.4 and 7.30.4 have been updated following the issue of Change Notification No 34 – 2016.

A pool of platelets, derived from buffy coats, which contains less than 1×10^6 leucocytes.

7.9.1: Technical information

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for platelet production.
- The buffy coats must be prepared at ambient temperature from whole blood where the surface temperature of packs has not dropped below 18°C.
- Initial separation of buffy coat must occur within 24 hours of venepuncture (unless supported by additional validation), with a minimum buffy coat rest period of 2 hours before secondary pooling and processing of buffy coats to produce the final component, which is generally completed before the end of Day 1.
- The volume of suspension medium must be sufficient to maintain the pH within the range 6.4–7.4 at the end of the shelf life of the component.
- The production process transfers the final component into a pack that was not part of the original pack assembly. Therefore a secure system must be in place to ensure a full audit trail and that the correct identification number is put on the final component pack.
- Where the production method requires the use of a single unit of plasma for resuspension, the plasma from group O donors should be tested for high-titre anti-A and anti-B and ‘high-titre negative’ units labelled. The testing method and acceptable limits should be defined (see also Chapter 9). Plasma should be selected from male donors as a TRALI risk reduction strategy.
- Platelets, Pooled, Buffy Coat Derived, Leucocyte Depleted, should be transfused through a 170–200 m filter.

7.9.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets, Pooled, Buffy Coat Derived, Leucocyte Depleted* and volume
- the blood component producer’s name*
- a unique pool or batch number or the donation number of all contributing platelet units*
- the ABO group*
- the RhD group stated as positive or negative*
- the expiry date*
- the temperature of storage and a comment that continuous gentle agitation throughout storage is recommended

- the blood pack lot number*
- the name, composition and volume of the anticoagulant or additive solution.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.9.3: Storage

For general guidelines, see section 6.7.

- The storage period depends on a number of factors including the nature of the container, the concentration of platelets and on whether an open or closed system is used.
- Packs currently in use for this purpose allow for storage at a core temperature of 22 ±2°C with continuous gentle agitation for up to 5 days in a closed system. Appropriate pack and platelet concentration combinations may allow storage up to 7 days, but due to concerns over bacterial contamination requires either an assay to exclude bacterial contamination prior to transfusion or application of a licensed pathogen inactivation procedure.
- If any production stage involves an open system, after preparation the component should be used as soon as possible. If storage is unavoidable, the component should be stored at a core temperature of 22 ±2°C with continuous agitation and used within 6 hours.
- Platelets should be gently agitated during storage. If agitation is interrupted, for example due to equipment failure or prolonged transportation, the components are suitable for use, retaining the same shelf life, provided the interruptions are for no longer than a total of 24 hours and no single interruption lasts for more than eight hours.

7.9.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.6 shall meet the specified values.

Table 7.6 Platelets, Pooled, Buffy Coat Derived, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range**
Platelet count		>=240 × 10^9/pool***
		>= 6.4

pH at end of shelf life****		
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/pool
* Methods validated for counting low numbers of leucocytes must be used		
** Units measured and found to be outside of the range 150 to 380 mL should not be issued for transfusion		
*** Units tested and found to have <160 × 10^9/pool should not be issued for transfusion		
**** A minimum of 95% of components tested shall meet the specified values		

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.9.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22 ±2°C with continuous gentle agitation.
- Plastic overwraps should be removed prior to storage.

7.10: Platelets, Apheresis, Leucocyte Depleted

> Update notice: Sections 7.10.1, 7.10.3, 7.10.4 and table 7.7 have been updated following the the issue of Change Notification 18 - 2015.
>
> Further changes have also been made to the concessionary release limits in table 7.7 following the the issue of Change Notification 22 - 2015
> The tables in the sections 7.9.4, 7.10.4, 7.11.4, 7.12.4, 7.29.4 and 7.30.4 have been updated following the issue of Change Notification No 34 – 2016.

A single-donor platelet component containing less than 1 × 10^6 leucocytes.

7.10.1: Technical information

- Platelets, Apheresis, Leucocyte Depleted may be collected by a variety of apheresis systems using different protocols. Since platelet yields may vary, each procedural protocol must be fully validated, documented and specifications set accordingly.
- If a double or triple dose is collected the platelet concentrate must be temporarily split, as a continuous part of the collection process, into the storage packs integral to the collection set so that the capacity of an individual pack is not exceeded.

- If filtration is used the recommended capacity of the filter should not be exceeded.
- The volume of suspension medium must be sufficient to maintain the pH within the range 6.4–7.4 at the end of the shelf life of the component.
- If the leucodepletion process transfers the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure the correct identification number is put on the final component pack.
- The plasma from group O donors should be tested for high-titre anti-A and anti-B, and ‘high-titre negative’ units labelled. The testing method and acceptable limits should be defined (see also Chapter 9). Screening of female donors for HLA/HNA antibodies should be considered as a TRALI risk reduction strategy.
- Platelets, Apheresis, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.10.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets, Apheresis, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number and, if divided, sub-batch number*
- the ABO group*
- the RhD group stated as positive or negative*
- the expiry date*
- the temperature of storage and a comment that continuous gentle agitation throughout storage is recommended
- the blood pack lot number*
- the name, composition and volume of the anticoagulant or additive solution.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.10.3: Storage

For general guidelines, see section 6.7.

- The storage period depends on a number of factors including the nature of the container, the concentration of platelets and whether an open or closed system is used.
- Packs currently in use for this purpose allow for storage at a core temperature of 22 ±2°C with continuous gentle agitation for up to 5 days in a closed system. Appropriate pack and platelet concentration combinations may allow storage up to 7 days, but due to concerns over bacterial contamination requires either an assay to exclude bacterial contamination prior to transfusion or application of a licensed pathogen inactivation procedure.
- Where any manufacturing step involves an open system the platelets should be used as soon as possible after collection. If storage is unavoidable, the component should be stored at a core temperature of 22 ±2°C with continuous agitation and used within 6 hours.
- Platelets should be gently agitated during storage. If agitation is interrupted, for example due to equipment failure or prolonged transportation, the components are suitable for use, retaining the same shelf life, provided the interruption is for no longer than a total of 24 hours and no single interruption lasts for more than eight hours.

7.10.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.7 shall meet the specified values.

Table 7.7 Platelets, Apheresis, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range**
Platelet count		>=240 × 10^9/unit***
pH at end of shelf life****		>= 6.4
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit
* Methods validated for counting low numbers of leucocytes must be used		
** Units measured and found to be outside of the range 150 to 380 mL should not be issued for transfusion		
*** Units tested and found to have <160 × 10^9/pool should not be issued for transfusion		
**** A minimum of 95% of components tested shall meet the specified values		

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.10.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22 ±2°C with continuous gentle agitation.

- Plastic overwraps should be removed prior to storage.

7.11: Platelets, Pooled, Buffy Coat Derived, in Additive Solution and Plasma, Leucocyte Depleted

> Update notice: Section 7.11.1, 7.11.2 and 7.11.3 - Technical information has been updated following the the issue of Change Notification 19 - 2015.

> The tables in the sections 7.9.4, 7.10.4, 7.11.4, 7.12.4, 7.29.4 and 7.30.4 have been updated following the issue of Change Notification No 34 – 2016.

A platelet concentrate, derived from buffy coats, which contains less than 1×10^6 leucocytes and where the suspending medium comprises approximately 30% plasma and 70% additive solution.

7.11.1: Technical Information

- The component is manufactured as a primary component and not as a remanufactured secondary component.

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for platelet production.

- The buffy coats must be prepared at ambient temperature from whole blood where the surface temperature of packs has not dropped below 18°C.

- Initial separation of buffy coat must occur within 24 hours of venepuncture (unless supported by additional validation), with a minimum buffy coat rest period of 2 hours before secondary pooling and processing of buffy coats to produce the final component, which is generally completed before the end of Day 1.

- The proportion of plasma carried over into the final component should be determined by validation and will depend upon the type of additive solution and platelet storage pack. Re-validation of the proportion of plasma carried over must be performed at least annually on a minimum of 25 units and after any changes to production method.

- The volume of suspension medium must be sufficient to maintain the pH within the range 6.4–7.4 at the end of the shelf life of the component.

- Where the production process transfers the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure the audit trail and the correct identification number is put on the final component pack.

- Platelets, Pooled, Buffy Coat Derived, in Additive Solution and Plasma, Leucocyte Depleted, should be transfused through a 170–200 m filter.

7.11.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets in Additive Solution and Plasma, Leucocyte Depleted * and volume

- the blood component producer’s name*

- a unique pool or batch number or the donation number of all contributing platelet units*

- the RhD group stated as positive or negative*

- the expiry date*

- the temperature of storage and a comment that continuous gentle agitation throughout storage is recommended

- the blood pack lot number*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.11.3: Storage

For general guidelines, see section 6.7.

- The storage period depends on a number of factors including the nature of the container, the concentration of platelets and on whether an open or closed system is used.

- Packs currently in use for this purpose allow for storage at a core temperature of 22 ±2°C with continuous gentle agitation for up to 5 days in a closed system. Appropriate pack and platelet concentration combinations may allow storage up to 7 days, but due to concerns over bacterial contamination would require either an assay to exclude bacterial contamination prior to transfusion or application of a licensed pathogen reduction procedure.

- If any production stage involves an open system, after preparation the component should be used as soon as possible. If storage is unavoidable, the component should be stored at a core temperature of 22 ±2°C with continuous agitation and used within 6 hours. If platelet agitation is interrupted due to equipment breakdown or prolonged transportation, platelets are suitable for use provided that no single interruption lasts for more than eight hours, and the total length of all interruptions is no longer than 24 hours.

7.11.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9 and leucocyte counting (see section 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown at Table 7.8 shall meet the specified values.

Table 7.8 Platelets in Additive Solution and Plasma – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range
Platelet count		>=240 × 10^9/pool
pH at end of shelf life	If less than 10 per month, every available component	>=6.4
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/pool*
* Methods validated for counting low levels of leucocytes must be used		

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.11.5: Transportation

For general guidelines, see section 6.11.

Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22 ±2°C with continuous gentle agitation. Plastic overwraps should be removed prior to storage.

7.12: Platelets in Additive Solution, Leucocyte Depleted

> Update notice: Section 7.12.1 - Technical information has been updated following the the issue of Change Notification 16 - 2013.

> The tables in the sections 7.9.4, 7.10.4, 7.11.4, 7.12.4, 7.29.4 and 7.30.4 have been updated following the issue of Change Notification No 34 – 2016.

A platelet concentrate derived from buffy coats or apheresis, which contains less than 1×10^6 leucocytes and where the suspending medium is additive solution. This component is indicated for patients with reactions to plasma-containing components.

7.12.1: Technical information

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for platelet production.
- Where prepared from buffy coats, the buffy coats must be prepared at ambient temperature from whole blood where the surface temperature of packs has not dropped below 18°C.
- Where prepared from buffy coats, initial separation of buffy coat must occur within 24 hours of venepuncture (unless supported by additional validation), with a minimum buffy coat rest period of 2 hours before secondary pooling and processing of buffy coats to produce the final component, which is generally completed before the end of Day 1.
- The volume of suspension medium must be sufficient to maintain the pH within the range 6.4–7.4 at the end of the shelf life of the component.
- Where the production process transfers the final component into a pack that was not part of the original pack assembly, a secure system must be in place to ensure a full audit trail and that the correct identification number is put on the final component pack.
- Platelets in Additive Solution, Leucocyte Depleted, should be transfused through a 170–200 m filter.

7.12.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets in Additive Solution, Leucocyte Depleted* and volume
- the blood component producer’s name*
- a unique pool or batch number or the donation number of all contributing platelet units*
- the ABO group*
- the RhD group stated as positive or negative*
- the expiry date and time*
- the temperature of storage and a comment that continuous gentle agitation throughout storage is recommended

- the blood pack lot number*
- the name, composition and volume of the additive solution.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.12.3: Storage

For general guidelines, see section 6.7.

- The storage period depends on a number of factors including the nature of the container, the concentration of platelets, the additive solution used and whether an open or closed system is used.
- Platelets in Additive Solution, Leucocyte Depleted, should be used within 24 hours of production.
- If any production stage involves an open system, after preparation the component should be used as soon as possible. If storage is unavoidable, the component should be stored at a core temperature of 22 ±2°C with continuous agitation and used within 6 hours.

7.12.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.9 shall meet the specified values.

Table 7.9 Platelets in Additive Solution, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range
Platelet count		>=200 × 10^9/unit
pH at end of shelf life		>=6.4
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit
* Methods validated for counting low levels of leucocytes must be used		

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.12.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of
  22 ±2°C with continuous gentle agitation.

- Plastic overwraps should be removed prior to storage.

7.13: Granulocytes, Apheresis

This component is now redundant and has been moved to Annex 4: Redundant Components

7.14: Granulocytes, Pooled, Buffy Coat Derived, in Platelet Additive Solution and Plasma

A pool of granulocytes, derived from buffy coats, with retention of neutrophils as the major cellular product, suspended in a portion of the plasma and platelet additive solution.

7.14.1: Technical information

- The component is not leucodepleted.

- The component contains red cells and requires compatibility testing.

- CMV seronegative granulocytes should be considered for CMV seronegative recipients.

- The component contains 2.0 adult transfusion doses (ATDs) of platelets[2] and additional platelet transfusion is therefore unlikely to be required.

- The component must not be agitated during storage.

- The component must be irradiated before use.

- Granulocytes should be transfused through a 170–200 µm filter.

- The component must be stored in a pack that allows gas exchange (i.e. a platelet pack).

- The production process transfers the final component into a pack that was not part of the original pack assembly. Therefore a secure system must be in place to ensure a full audit trail and that the correct identification number is put on the final component pack.

- Recommended dose for adults is 1–2 packs daily and for a child 10–20 mL/kg.

- A clinical study has been undertaken in 30 human patients using this component. Leucocyte antibody formation occurred at a rate similar to historical multiply transfused controls3 of 29 patients assessed).4

7.14.2: Labelling

For general guidelines, see section 6.6.

The following should be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Granulocytes, Pooled, Buffy Coat Derived, in Platelet Additive Solution and Plasma* and volume
- the blood component producer’s name*
- a unique pool or batch number or the donation number of all contributing units*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date and time*
- the temperature of storage
- the statement ‘Do not agitate’
- the blood pack lot number*
- the name, composition and volume of the anticoagulant solution
- the name, composition and volume of the platelet additive solution.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.14.3: Storage

For general guidelines, see section 6.7.

- Granulocytes should be used as soon as possible after their preparation. If storage is unavoidable, provided the component is produced using a closed system, the component should be stored, without agitation, at a core temperature of 22 ±2°C and transfusion should commence by midnight on Day 1 (the day following donation).

7.14.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, all components tested for the parameters shown in Table 7.11 shall meet the specified values.

Table 7.11 Granulocytes, Pooled, Buffy Coat Derived, in Additive Solution and Plasma – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	175–250 mL*
Total granulocyte count		>5 × 10^9 /unit*
* Based on production from ten whole blood donations		

7.14.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting granulocytes should be equilibrated at room temperature before use. During transportation the temperature of the component must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22 ±2°C without agitation.
- Plastic overwraps should be removed prior to storage.

7.15: Fresh Frozen Plasma, Leucocyte Depleted

> Update notice: Section 7.15.4 – Testing has been updated following the issue of Change Notification No 25 – 2020

“To align these guidelines with the Blood Safety and Quality Regulations (BSQR) specifications while providing reassurance on likely minimum FVIII content, the following changes have been made to section 7.15.4.”

Plasma that has been obtained from whole blood or by apheresis (as defined in section 7.3). The plasma contains less than 1 × 10^6 leucocytes per component and has been rapidly frozen to a temperature that will maintain the activity of labile coagulation factors.

7.15.1: Technical information

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.

- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.
- The plasma should be separated before the red cell component is cooled to its storage temperature. Greater FVIII:C yields will be obtained when the plasma is separated as soon as possible after venepuncture and rapidly frozen to –25°C or below.
- The method of preparation should ensure the component has the maximum level of labile coagulation factors with minimum cellular contamination. The production process should be validated to ensure that components meet the specified limits for FVIII:C concentration.
- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII:C levels between ABO blood groups.
- Fresh Frozen Plasma, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.15.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Fresh Frozen Plasma, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number and, if divided, sub-batch number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component must be used within 4 hours of thawing if maintained at 22 ±2°C, or up to a maximum of 120 hours of thawing if stored at 4 ±2°C, depending on indication
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.15.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, and at the time of administration, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact. If to be stored thawed for an extended period (>24 hours from thawing), thawing methods that do not directly expose units to water must be used to minimise bacterial contamination.
- Once thawed, the component must not be refrozen and should be transfused as soon as possible. If delay is unavoidable, the component may be stored and should be used within 4 hours if maintained at 22 ±2°C or up to a maximum of 120 hours if stored at 4 ±2°C, but it should be borne in mind that extended post-thaw storage will result in a decline in the content of labile coagulation factors.
- Pre-thawed FFP that is out of a controlled temperature environment (4 ±2°C), can be accepted back into temperature controlled storage if this occurs on one occasion only of less than 30 minutes. Transfusion of FFP should be completed within 4 hours of issue out of a controlled temperature environment.
- For indications other than unexpected major haemorrhage, the component should be used within 24 hours of thawing.

7.15.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.12 shall meet the specified values with the exception of FVIII:C.

Table 7.12 Fresh Frozen Plasma, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Stated volume ±10% **

Total protein		>=50 g/L
Platelet count		<30 × 10^9/L***
Red cell count		<6 × 10^9/L***
FVIII:C****/*****		Mean >=0.70 IU/mL
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit***
* Methods validated for counting low numbers of leucocytes must be used		
** Units measured and found to be outside of the range 200 to 340 mL should not be issued for transfusion		
*** Pre-freeze in starting component		
**** Units tested and found to have < 0.3 IU/mL should not be issued for transfusion		
***** a minimum of 90% of those components tested should have >=0.50 IU/mL		

7.15.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.16: Fresh Frozen Plasma, Methylene Blue Treated and Removed, Leucocyte Depleted

> Update notice: Section 7.16.3 - Storage has been updated following the issue of Change Notification 17 - 2013

This component is intended for use in children and is made from plasma from a country with a low risk of variant Creutzfeldt-Jakob Disease (vCJD).

Fresh Frozen Plasma, Methylene Blue Treated (MBT) and Removed, Leucocyte Depleted, is plasma that has been obtained from whole blood or by apheresis from a previously tested donor (as defined in section 7.3), contains less than 1 × 10^6 leucocytes and has been treated with methylene blue and exposure to visible light to inactivate pathogens.

Following methylene blue treatment and removal, the plasma is rapidly frozen to a temperature that will maintain the activity of labile coagulation factors.

7.16.1: Technical information

- Where the starting component is sourced outside the UK, a detailed and agreed specification must be available.
- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.
- The plasma should be separated before the red cell component is cooled to its storage temperature. Greater FVIII:C yields will be obtained when the plasma is separated as soon as possible after venepuncture, methylene blue treated and rapidly frozen to –25°C or below.
- The method of preparation should ensure the component has the maximum level of labile coagulation factors with minimum cellular contamination. The production process should be validated to ensure that components meet the specified limits for FVIII:C concentration.
- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.
- The MBT process reduces the FVIII:C content by approximately 30% when compared to standard fresh frozen plasma.
- Intact white blood cells in the plasma should be reduced to less than 1×10^6 per unit prior to exposure to methylene blue and visible light.
- The process for methylene blue removal should be validated to give components with a methylene blue concentration <=0.30 µmol/L (less than approximately 30 µg per unit).
- Fresh Frozen Plasma, Methylene Blue Treated and Removed, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.16.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Fresh Frozen Plasma, Methylene Blue Treated and Removed, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*

- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component should be used within 4 hours of thawing if maintained at 22 ±2°C and 24 hours if maintained at 4 ±2°C
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection

7.16.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.
- Once thawed, the component must not be refrozen and should be transfused as soon as possible. If delay is unavoidable, the component may be stored and should be used within 4 hours if maintained at 22 ±2°C or 24 hours if stored at 4 ±2°C, but it should be borne in mind that extended post-thaw storage will result in a decline in the content of labile coagulation factors.

7.16.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.13 shall meet the specified values.

Table 7.13 Fresh Frozen Plasma, Methylene Blue Treated and Removed, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range and within any limits specified for the MBT process used
Platelet count		<30 × 10^9/L**
FVIII:C		>=0.50 IU/mL
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit**
* Methods validated for counting low numbers of leucocytes must be used		
** Pre-freeze in starting component		

7.16.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.17: Cryoprecipitate, Leucocyte Depleted

> Update notice: Section 7.17.3 - Storage has been updated following the issue of Change Notification 17 - 2013. Section 7.17 has been updated following the issue of Change Notification 10 - 2017.

The component represents a source of concentrated FVIII:C, and von Willebrand factor, fibrinogen, FXIII and fibronectin from a unit of fresh frozen plasma. The plasma from which the cryoprecipitate was produced contains less than 1 × 10^6 leucocytes per component.

7.17.1: Technical information

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Cryoprecipitate, Leucocyte Depleted is the cryoglobulin fraction of plasma obtained by thawing a single donation of Fresh Frozen Plasma, Leucocyte Depleted (see section 7.15) at 4 ±2°C.

- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.
- For storage, Cryoprecipitate, Leucocyte Depleted should be rapidly frozen to a core temperature of –25°C or below within 2 hours of preparation.
- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII:C levels between ABO blood groups.
- Cryoprecipitate, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.17.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the component label:

(* = in eye-readable and UKBTS approved barcode format)

- Cryoprecipitate, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component must be used within 4 hours of thawing
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.17.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.
- Once thawed, the component must not be refrozen and should be used immediately. If delay is unavoidable, the component should be stored at ambient temperature and used within 4 hours.

7.17.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.14 shall meet the specified values.

Table 7.14 Cryoprecipitate, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal range
Fibrinogen		>=140 mg/unit
FVIII:C		>=70 IU/unit
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit**
* Methods validated for counting low numbers of leucocytes must be used		
** Pre-freeze in starting component		

7.17.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.18: Cryoprecipitate Pooled, Leucocyte Depleted

> Update notice: Section 7.18.3 - Storage has been updated following the issue of Change Notification 17 - 2013, Section 7.18 has been updated following the issue of Change Nofication 10 - 2017.

The pooled component represents a source of concentrated FVIII:C, von Willebrand factor, fibrinogen, FXIII and fibronectin from primary cryoprecipitate components derived from units of fresh frozen plasma. The plasma from which the cryoprecipitate was produced contains less than 1×10^6 leucocytes per primary component.

7.18.1: Technical information

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Cryoprecipitate Pooled, Leucocyte Depleted is the cryoglobulin fraction of plasma obtained by thawing and pooling five single cryoprecipitate components or pooling five single cryoprecipitate components immediately after production from thawed fresh frozen plasma.
- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.
- For storage, Cryoprecipitate Pooled, Leucocyte Depleted should be rapidly frozen to a core temperature of –25°C or below within 2 hours of preparation.
- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.
- Initial process validation must ensure that for a minimum of 20 tested Cryoprecipitate Pooled, Leucocyte Depleted components a minimum of 75% of those components tested for the parameters shown in Table 7.15 shall meet the specified values.
- Annual process validation is acceptable for quality monitoring purposes, provided that the primary components, Fresh Frozen Plasma, Leucocyte Depleted and/or Cryoprecipitate, Leucocyte Depleted are separately monitored as part of monthly testing. If this is not the case, test monthly 1% or as determined by statistical process control (if <=10 components produced per month then test every available component), of Cryoprecipitate Pooled, Leucocyte Depleted components. A minimum of 75% of those components tested for the parameters shown in Table 7.15 shall meet the specified values.

- A secure system must be in place to ensure a full audit trail and that the correct identification number is put on the final component pack.
- Cryoprecipitate Pooled, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.18.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the component label:

(* = in eye-readable and UKBTS approved barcode format)

- Cryoprecipitate Pooled, Leucocyte Depleted* and volume
- the blood component producer’s name*
- a unique pool or batch number or the donation number of all contributing units*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component must be used within 4 hours of thawing
- the name, composition and volume of anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.18.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling

such packs.

- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.

- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.

- Once thawed, the component must not be refrozen and should be transfused as soon as possible. If delay is unavoidable, the component should be stored at ambient temperature and used within 4 hours.

7.18.4: Testing

In addition to the mandatory and other tests required for blood donations described in Annex 4, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown at Table 7.15 shall meet the specified values.

Table 7.15 Cryoprecipitate Pooled, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	100–250 mL
Fibrinogen	Refer to Technical information (section 17.18.1) above	>=700 mg/unit
FVIII:C		>=350 IU/unit
Leucocyte count	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit* in the starting component
* Pre-freeze methods validated for counting low numbers of leucocytes must be used		

7.18.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.19: Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted

This component is made for neonatal use – refer to section 7.28.

7.20: Plasma, Cryoprecipitate Depleted, Leucocyte Depleted

> Update notice: Section 7.20.3 - Storage has been updated following the issue of Change Notification 17 - 2013

The supernatant plasma removed during the preparation of Cryoprecipitate, Leucocyte Depleted. The plasma from which the Plasma, Cryoprecipitate Depleted, Leucocyte Depleted was made contains less than 1×10^6 leucocytes per component and is derived from a previously tested donor (as defined in section 7.3).

7.20.1: Technical information

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.
- Plasma, Cryoprecipitate Depleted, Leucocyte Depleted should be frozen to a core temperature of –25°C or below within 2 hours of separation from its Cryoprecipitate, Leucocyte Depleted.
- Plasma, Cryoprecipitate Depleted, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.20.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the component label:

(* = in eye-readable and UKBTS approved barcode format)

- Plasma, Cryoprecipitate Depleted, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*

- a warning that the component must be used within 4 hours of thawing if maintained at 22 ±2°C, or 24 hours of thawing if stored at 4 ±2°C
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.20.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.
- Once thawed, the component must not be refrozen and should be transfused as soon as possible. If delay is unavoidable, the component may be stored and should be used within 4 hours if maintained at 22 ±2°C or 24 hours if stored at 4 ±2°C, but it should be borne in mind that extended post-thaw storage will result in a decline in the content of labile coagulation factors.

7.20.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.16 shall meet the specified values.

Table 7.16 Plasma, Cryoprecipitate Depleted, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Stated volume ±10%

Platelet count		<30 × 10^9/L**
Red cell count		<6 × 10^9/L**
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit**
* Methods validated for counting low numbers of leucocytes must be used		
** Pre-freeze in starting component (fresh frozen plasma)		

7.20.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.21: Components suitable for use in intrauterine transfusion, neonates and infants under 1 year

7.21.1: General requirements

- Unless they are subjected to a validated pathogen inactivation process, components for use in intrauterine transfusion, neonates and infants under 1 year must be prepared from previously tested donors who fulfil the following criteria:
    - have given at least one donation in the last 2 years, which was either negative for all mandatory markers, or if repeat reactive, has been confirmed to be non-specifically reactive and the donor reinstated in accordance with section 9.4, Reinstatement of blood donors
    - negative results were obtained for mandatory microbiology markers with the current donation.

- Red cell and platelet components should be negative for CMV antibodies although leucodepleted components may be used if CMV antibody negative components are not available.

- Components should be tested and shown to be free of clinically significant, irregular blood group antibodies including high-titre anti-A and anti-B.

- It is good practice to provide neonates, who are likely to be repeatedly transfused, with components in which the original donation has been split, thereby providing the potential to reduce donor exposures in this vulnerable group of recipients.

- When a component is to be split for neonatal use, the original pack must first be mixed thoroughly by a validated procedure to ensure that the contents are homogeneous.

- When a component is split for neonatal use, it is sufficient to undertake leucocyte counting on the parent pack or process.
- When a component is split for neonatal use, each ‘split’ must be identified by a unique number to ensure all splits can be accounted for.

7.22: Red Cells for Intrauterine Transfusion (IUT), Leucocyte Depleted

> Update notice: Concessionary release limits have been updated in table 7.17 following the the issue of Change Notification 22 - 2015.
>
> Sections 7.5, 7.6, 7.22, 7.24, 7.25 and 7.26 have been updated following the issue of Change Notification No 33 – 2016

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A component for intrauterine transfusion, prepared by removing a proportion of the plasma from fresh whole blood. The component should be leucocyte depleted to less than 1×10^6 leucocytes per unit.

7.22.1: Technical information

- The component must be prepared and used for IUT by the end of Day 5, should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B (see Chapter 12), and should be negative for antibodies to CMV.
- The component must be irradiated and should be transfused within 24 hours of irradiation. See the British Committee for Standards in Haematology (BCSH) ‘Transfusion guidelines for neonates and older children’.5
- Unless the Blood Centre recommends screening is unnecessary, the donor should be Haemoglobin S screen negative.
- Red Cells for Intrauterine Transfusion, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.22.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells for Intrauterine Transfusion, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*

- the RhD group stated as positive or negative*
- the name, composition and volume of the anticoagulant solution
- the date of collection
- the expiry date*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.22.3: Storage

For general guidelines, see section 6.7.

- The component may be stored for a maximum of 5 days at a core temperature of 4 ±2°C.
- The component must be used within 24 hours of irradiation and within the overall maximum 5-day shelf life.
- Variation from the core temperature of 4 ±2°C of the finished component must be kept to a minimum during storage at all stages of the blood supply chain and restricted to any short period necessary for examining, labelling or issuing the component.
- Exceptionally, i.e. due to equipment failure at a Blood Centre or hospital, for temperature excursions where the core temperature has not exceeded 10°C or fallen below 1°C, components may be released for transfusion provided that:
  - the component has been exposed to such a temperature change on one occasion only
  - the duration of the temperature excursion has not exceeded 5 hours
  - a documented system is available in each Blood Centre or hospital to cover such eventualities
  - adequate records of the incident are compiled and retained.

7.22.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.17 shall meet the specified values.

Table 7.17 Red Cells for Intrauterine Transfusion (IUT), Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification

Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range**
Haematocrit		0.70–0.85***
Haemoglobin content		Locally defined****
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit
* Methods validated for counting low levels of leucocytes must be used ** Units measured and found to be outside of the range 150 to 350 mL should not be issued for transfusion *** Units tested and found to be outside of the range 0.70 to 0.85 should not be issued for transfusion **** Units tested and found to have <30 g/unit should not be issued for transfusion		

7.22.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- for transportation between blood supplier and hospital an upper limit of 10°C surface temperature is acceptable but should be limited to one occasion, not exceeding 12 hours

In some instances it is necessary to issue red cell components from the blood supplier to hospitals that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Removal from and return to 2-6°C controlled storage within hospitals

For occasions when red cells are removed from 2-6°C controlled storage (eg when issued to a clinical area immediately prior to transfusion) and returned then:

- If possible, time out of a controlled temperature environment should be restricted to under 30 minutes

- if 30 minutes is exceeded the unit should not be returned to the issue location in the refrigerator, but returned to the transfusion laboratory or quarantined remotely using electronic blood tracking
- up to 60 minutes out of controlled temperature is acceptable, provided the unit is then quarantined by placing in a secure refrigerator for at least 6 hours prior to reissue, to allow the unit to return to 2-6°C
- Hospitals will need to identify such units so that they are not subject to being out of controlled temperature storage for between 30 and 60 minutes on more than three occasions.

Transfusion should be completed within 4 hours of issue out of a controlled temperature environment.

7.23: Whole Blood for Exchange Transfusion, Leucocyte Depleted

A component for exchange or large-volume transfusion of neonates, containing less than 1×10^6 leucocytes per unit.

7.23.1: Technical information

- The component must be prepared and used for exchange transfusion by the end of Day 5, should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B (see Chapter 12) and should be negative for antibodies to CMV.
- The component should be irradiated and transfused within 24 hours of irradiation. See the BCSH ‘Transfusion guidelines for neonates and older children’.[5]
- Unless the Blood Centre recommends screening is unnecessary, the donor should be Haemoglobin S screen negative.
- Whole Blood for Exchange Transfusion, Leucocyte Depleted should be transfused through a 170–200 µm filter.
- If not required for exchange transfusion, the component may be remanufactured into Red Cells in Additive Solution, Leucocyte Depleted (see section 7.6), up to 6 days after donation, with a shelf life of up to 35 days in total.

7.23.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Whole Blood for Exchange Transfusion, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*

- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the anticoagulant solution
- the date of collection
- the expiry date*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.23.3: Storage

For general guidelines, see section 6.7.

- The component may be stored for a maximum of 5 days at a core temperature of 4 ±2°C.
- The component should be used within 24 hours of irradiation and within the overall maximum 5-day shelf life.
- Variation from the core temperature of 4 ±2°C must be kept to a minimum during storage and restricted to any short period necessary for examining, labelling or issuing the component.
- Exceptionally, i.e. due to equipment failure at a Blood Centre, red cell components which have been prepared in a closed system and exposed to a core temperature not exceeding 10°C and not less than 1°C may be released for transfusion provided that:
    - the component has been exposed to such a temperature change on one occasion only
    - the duration of the temperature excursion has not exceeded 5 hours
    - a documented system is available in each Blood Centre to cover such eventualities
    - adequate records of the incident are compiled and retained.
- If Whole Blood for Exchange Transfusion, Leucocyte Depleted is unused within its specified shelf life, the Blood Centre may return the component to stock provided that:
    - the component was stored within specification
    - the component is appropriately relabelled as Whole Blood Leucocyte Depleted and, if necessary, ‘irradiated’
    - the storage restrictions of irradiated red cells are observed, i.e. use within 14 days of irradiation.

7.23.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.18 shall meet the specified values.

Table 7.18 Whole Blood for Exchange Transfusion, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range
Haematocrit		0.4–0.5
Haemoglobin content		>=40 g/unit
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit
* Methods validated for counting low levels of leucocytes must be used		

7.23.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- transport time normally should not exceed 12 hours.

In some instances it is necessary to issue red cell components that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

7.24: Red Cells for Exchange Transfusion, Leucocyte Depleted

Update notice: Concessionary release limits have been updated in table 7.19 following the the issue of Change Notification 22 - 2015.

Sections 7.5, 7.6, 7.22, 7.24, 7.25 and 7.26 have been updated following the issue of Change Notification No 33 – 2016.

A component for exchange or large-volume transfusion of neonates prepared by leucodepleting fresh whole blood to less than 1×10^6 leucocytes per component and removing a proportion of the plasma.

7.24.1: Technical information

- The component must be prepared and used by the end of Day 5, should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B (see Chapter 12), and should be negative for antibodies to CMV.
- The component should be irradiated and transfused within 24 hours of irradiation. See the BCSH 'Transfusion guidelines for neonates and older children'.[3]
- Unless the Blood Centre recommends screening is unnecessary, the donor should be Haemoglobin S screen negative.
- Red Cells for Exchange Transfusion, Leucocyte Depleted should be transfused through a 170–200 µm filter.
- If not required for exchange transfusion, the component may be remanufactured into Red Cells in Additive Solution, Leucocyte Depleted (see section 7.6), up to 6 days after donation, with a shelf life of up to 35 days in total.

7.24.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells for Exchange Transfusion, Leucocyte Depleted* and volume
- the blood component producer's name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the anticoagulant solution
- the date of collection
- the expiry date*

- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.24.3: Storage

For general guidelines, see section 6.7.

- The component may be stored for a maximum of 5 days at a core temperature of 4 ±2°C.
- Transfusion of this component should commence within 24 hours of irradiation and within the overall maximum 5-day shelf life.
- Variation from the core temperature of 4 ±2°C of the finished component must be kept to a minimum during storage at all stages of the blood supply chain and restricted to any short period necessary for examining, labelling or issuing the component.
- Exceptionally, i.e. due to equipment failure at a Blood Centre or hospital, for temperature excursions where the core temperature has not exceeded 10°C or fallen below 1°C, components may be released for transfusion provided that:
  - the component has been exposed to such a temperature change on one occasion only
  - the duration of the temperature excursion has not exceeded 5 hours
  - a documented system is available in each Blood Centre or hospital to cover such eventualities
  - adequate records of the incident are compiled and retained.
- If Red Cells for Exchange Transfusion, Leucocyte Depleted are unused within their specified shelf life, the Blood Centre may return them to stock provided that:
  - the component was stored within specification
  - the component is appropriately relabelled as Red Cells, Leucocyte Depleted and, if necessary, ‘irradiated’
  - the storage restrictions of irradiated red cells are observed, i.e. use within 14 days of irradiation.

7.24.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.19 shall meet the specified values.

Table 7.19 Red Cells for Exchange Transfusion, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification

Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range**
Haematocrit		0.50–0.60***
Haemoglobin content		>=40 g/unit****
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit
* Methods validated for counting low levels of leucocytes must be used		
** Units measured and found to be outside of the range 220 to 420 mL should not be issued for transfusion		
***Units tested and found to be outside of the range 0.50 to 0.60 should not be issued for transfusion		
****Units tested and found to have <30 g/unit should not be issued for transfusion		

7.24.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- for transportation between blood supplier and hospital an upper limit of 10°C surface temperature is acceptable but should be limited to one occasion, not exceeding 12 hours

In some instances it is necessary to issue red cell components from the blood supplier to hospitals that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Removal from and return to 2-6°C controlled storage within hospitals

For occasions when red cells are removed from 2-6°C controlled storage (eg when issued to a clinical area immediately prior to transfusion) and returned then:

- If possible, time out of a controlled temperature environment should be restricted to under 30 minutes
- if 30 minutes is exceeded the unit should not be returned to the issue location in the refrigerator, but returned to the transfusion laboratory or quarantined remotely using electronic blood tracking
- up to 60 minutes out of controlled temperature is acceptable, provided the unit is then quarantined by placing in a secure refrigerator for at least 6 hours prior to reissue, to allow the unit to return to 2-6°C
- Hospitals will need to identify such units so that they are not subject to being out of controlled temperature storage for between 30 and 60 minutes on more than three occasions.

Transfusion should be completed within 4 hours of issue out of a controlled temperature environment.

7.25: Red Cells for Neonates and Infants, Leucocyte Depleted

> Update notice: Sections 7.5, 7.6, 7.22, 7.24, 7.25 and 7.26 have been updated following the issue of Change Notification No 33 – 2016.

A red cell component suitable for neonates and infants under 1 year that contains less than 1×10^6 leucocytes (per starting component). The Red Cells for Neonates and Infants, Leucocyte Depleted may be divided into approximately equal volumes using a closed system.

7.25.1: Technical information

- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B and should be negative for antibodies to CMV.
- Red Cells for Neonates and Infants, Leucocyte Depleted should be transfused through a 170–200 µm filter.
- Unless the Blood Centre recommends screening is unnecessary, the donor should be Haemoglobin S screen negative.

7.25.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells for Neonates and Infants, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number and, if divided, sub-batch number*

- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the anticoagulant solution
- the date of collection
- the expiry date*
- the temperature of storage
-
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.25.3: Storage

For general guidelines, see section 6.7.

- For top-up transfusions of neonates and infants under 1 year, this component may be stored for a maximum of 35 days at a core temperature of 4 ±2°C if an adenine-supplemented anticoagulant is used, otherwise (e.g. with CPD anticoagulant) the maximum period of storage is 28 days at a core temperature of 4 ±2°C.
- Variation from the core temperature of 4 ±2°C of the finished component must be kept to a minimum during storage at all stages of the blood supply chain and restricted to any short period necessary for examining, labelling or issuing the component.
- For large-volume transfusion of neonates, this component should be used within 24 hours of irradiation and before the end of Day 5.
- Exceptionally, i.e. due to equipment failure at a Blood Centre or hospital, for temperature excursions where the core temperature has not exceeded 10°C or fallen below 1°C, components may be released for transfusion provided that:
    - the component has been exposed to such a temperature change on one occasion only
    - the duration of the temperature excursion has not exceeded 5 hours
    - a documented system is available in each Blood Centre or hospital to cover such eventualities
    - adequate records of the incident are compiled and retained.

7.25.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant

irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.20 shall meet the specified values.

Table 7.20 Red Cells for Neonates and Infants, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal volume range
Haemoglobin content		Locally defined
Haemolysis (only required if produced as a primary component)	As per section 7.2	<0.8% of red cell mass
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^{6}$/starting component
* Methods validated for counting low levels of leucocytes must be used		

7.25.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- for transportation between blood supplier and hospital an upper limit of 10°C surface temperature is acceptable but should be limited to one occasion, not exceeding 12 hours

In some instances it is necessary to issue red cell components from the blood supplier to hospitals that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Removal from and return to 2-6°C controlled storage within hospitals

For occasions when red cells are removed from 2-6°C controlled storage (eg when issued to a clinical area immediately prior to transfusion) and returned then:

- If possible, time out of a controlled temperature environment should be restricted to under 30 minutes
- if 30 minutes is exceeded the unit should not be returned to the issue location in the refrigerator, but returned to the transfusion laboratory or quarantined remotely using electronic blood tracking
- up to 60 minutes out of controlled temperature is acceptable, provided the unit is then quarantined by placing in a secure refrigerator for at least 6 hours prior to reissue, to allow the unit to return to 2-6°C
- Hospitals will need to identify such units so that they are not subject to being out of controlled temperature storage for between 30 and 60 minutes on more than three occasions.

Transfusion should be completed within 4 hours of issue out of a controlled temperature environment.

7.26: Red Cells in Additive Solution for Neonates and Infants, Leucocyte Depleted

> Update notice: Concessionary release limits have been updated in table 7.21 following the the issue of Change Notification 22 - 2015.
>
> Sections 7.5, 7.6, 7.22, 7.24, 7.25 and 7.26 have been updated following the issue of Change Notification No 33 – 2016.

A red cell component suitable for top-up or large-volume transfusion of neonates and infants under 1 year containing less than 1×10^6 leucocytes (per starting component). The red cells are suspended in an additive solution and may be divided into approximately equal volumes using a closed system.

7.26.1: Technical information

- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B and should be negative for antibodies to CMV.
- Red Cells in Additive Solution for Neonates and Infants, Leucocyte Depleted should be transfused through a 170–200 µm filter.
- Unless the Blood Centre recommends screening is unnecessary, the donor should be Haemoglobin S screen negative.

7.26.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Red Cells in Additive Solution for Neonates and Infants, Leucocyte Depleted* and volume

- the blood component producer’s name*
- the donation number and, if divided, sub-batch number*
- the ABO group*
- the RhD group stated as positive or negative*
- the name, composition and volume of the additive solution
- the date of collection
- the expiry date*
- the temperature of storage
- the blood pack lot number.*

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.26.3: Storage

For general guidelines, see section 6.7.

- Red Cells in Additive Solution for Neonates and Infants, Leucocyte Depleted for top-up transfusion of neonates and infants under 1 year may be stored for a maximum of 35 days at a core temperature of 4 ±2°C.
- Variation from the core temperature of 4 ±2°C of the finished component must be kept to a minimum during storage at all stages of the blood supply chain and restricted to any short period necessary for examining, labelling or issuing the component.
- For large-volume transfusion of neonates and infants under 1 year, this component should be transfused within 24 hours of irradiation and before the end of Day 5.
- Exceptionally, i.e. due to equipment failure at a Blood Centre or hospital, for temperature excursions where the core temperature has not exceeded 10°C or fallen below 1°C, components may be released for transfusion provided that:
    - the component has been exposed to such a temperature change on one occasion only
    - the duration of the temperature excursion has not exceeded 5 hours
    - a documented system is available in each Blood Centre or hospital to cover such eventualities
    - adequate records of the incident are compiled and retained.

7.26.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.21 shall meet the specified values.

Table 7.21 Red Cells in Additive Solution for Neonates and Infants, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	280 ±60 mL
Haemoglobin content		>=40 g/unit**
Haemolysis (only required if produced as a primary component)	As per section 7.2	<0.8% of red cell mass
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/starting component
* Methods validated for counting low numbers of leucocytes must be used		
**Units tested and found to have <30 g prior to splitting should not be issued for transfusion		

7.26.5: Transportation

For general guidelines, see section 6.11.

For red cell components, transit containers, packing materials and procedures should have been validated to ensure the component surface temperature can be maintained between 2°C and 10°C during transportation. Additionally:

- the validation exercise should be repeated periodically
- if melting ice is used, it should not come into direct contact with the components
- dead air space in packaging containers should be minimised
- as far as is practicable, transit containers should be equilibrated to their storage temperature prior to filling with components
- for transportation between blood supplier and hospital an upper limit of 10°C surface temperature is acceptable but should be limited to one occasion, not exceeding 12 hours

In some instances it is necessary to issue red cell components from the blood supplier to hospitals that have not been cooled to their storage temperature prior to placing in the transit container. The transport temperature specified above is not applicable for such consignments.

Removal from and return to 2-6°C controlled storage within hospitals

For occasions when red cells are removed from 2-6°C controlled storage (eg when issued to a clinical area immediately prior to transfusion) and returned then:

- If possible, time out of a controlled temperature environment should be restricted to under 30 minutes
- if 30 minutes is exceeded the unit should not be returned to the issue location in the refrigerator, but returned to the transfusion laboratory or quarantined remotely using electronic blood tracking
- up to 60 minutes out of controlled temperature is acceptable, provided the unit is then quarantined by placing in a secure refrigerator for at least 6 hours prior to reissue, to allow the unit to return to 2-6°C
- Hospitals will need to identify such units so that they are not subject to being out of controlled temperature storage for between 30 and 60 minutes on more than three occasions.

Transfusion should be completed within 4 hours of issue out of a controlled temperature environment.

7.27: Fresh Frozen Plasma, Neonatal Use, Methylene Blue Treated and Removed, Leucocyte Depleted

> Update notice: Section 7.27.3 - Storage has been updated following the issue of Change Notification 17 - 2013

Fresh Frozen Plasma, Neonatal Use, Methylene Blue Treated (MBT) and Removed, Leucocyte Depleted is plasma that has been obtained from whole blood or by apheresis from a country with a low risk of vCJD, contains less than 1×10^6 leucocytes and has been treated with methylene blue and exposure to visible light to inactivate pathogens, and processed to remove residual methylene blue.

Using a closed system the component may be subdivided into approximately equal volumes and rapidly frozen to a temperature that will maintain the activity of labile coagulation factors.

7.27.1: Technical information

- Where the starting component is sourced outside the UK, a detailed and agreed specification must be available.
- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B. Testing for CMV antibodies is not required.
- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.

- The plasma should be separated before the red cell component is cooled to its storage temperature. Greater FVIII:C yields will be obtained when the plasma is separated as soon as possible after venepuncture and rapidly frozen to –25°C or below.
- The method of preparation should ensure the component has the maximum level of labile coagulation factors with minimum cellular contamination. The production process should be validated to ensure that components meet the specified limits for FVIII:C concentration.
- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.
- The MBT process reduces the FVIII:C content by approximately 30% when compared to standard fresh frozen plasma.
- Intact white blood cells in the plasma should be reduced to less than 1×10^6 per unit prior to exposure to methylene blue and visible light.
- The process for methylene blue removal should be validated to give components with a methylene blue concentration <=0.30 µmol/L. The methylene blue content of the final component is the initial content of the unsplit starting component (less than approximately 30 µg per unit) divided by the number of split components produced.
- Fresh Frozen Plasma, Neonatal Use, Methylene Blue Treated and Removed, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.27.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Fresh Frozen Plasma, Neonatal Use, Methylene Blue Treated and Removed, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*

- a warning that the component should be used within 4 hours of thawing
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection

7.27.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.
- Once thawed, the component must not be refrozen and should be transfused as soon as possible. If delay is unavoidable, the component may be stored and should be used within 4 hours if maintained at 22 ±2°C or 24 hours if stored at 4 ±2°C, but it should be borne in mind that extended post-thaw storage will result in a decline in the content of labile coagulation factors.

7.27.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.22 shall meet the specified values.

Table 7.22 Fresh Frozen Plasma, Neonatal Use, Methylene Blue Treated and Removed, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume		Within locally defined nominal volume range and within any limits specified for the MBT process used

Platelet count	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	<30 × 10^9/L**
FVIII:C		>=0.50 IU/mL
Leucocyte count*	As per sections 6.3 and 7.1	<1 × 10^6/unit**
* Methods validated for counting low numbers of leucocytes must be used		
** Pre-freeze in starting component		

7.27.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.28: Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted

> Update notice: Section 7.28.3 - Storage has been updated following the issue of Change Notification 17 - 2013

The component represents a source of concentrated FVIII:C, and von Willebrand factor, fibrinogen, FXIII and fibronectin from a unit of Fresh Frozen Plasma, Methylene Blue Treated and Removed. The plasma from which the Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted was produced contains less than 1 × 10^6 leucocytes per component and is from a country with a low risk of vCJD.

7.28.1: Technical information

- Where the starting component is sourced outside the UK, a detailed and agreed specification must be available.
- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Plasma should be selected from male donors or screening of female donors for HLA/HNA antibodies should be considered, as a TRALI risk reduction strategy.
- Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted is the cryoglobulin fraction of plasma obtained by thawing a single donation of Fresh Frozen Plasma, Neonatal Use, Methylene Blue Treated and Removed, Leucocyte Depleted (see section 7.27) at 4 ±2°C.

- The process for methylene blue removal should be validated to give components with a methylene blue concentration <=0.30 µmol/L (less than approximately 30 µg per unit) in the starting component.
- For storage, Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted should be rapidly frozen to a core temperature of –25°C or below within 2 hours of preparation.
- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.
- Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.28.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the component label:

(* = in eye-readable and UKBTS approved barcode format)

- Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component must be used within 4 hours of thawing
- the name, composition and volume of the anticoagulant or additive solution.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection

7.28.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.
- Once thawed, the component must not be refrozen and should be used immediately. If delay is unavoidable, the component should be stored at ambient temperature and used within 4 hours.

7.28.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.23 shall meet the specified values.

Table 7.23 Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal range
Fibrinogen		>140 mg/unit
FVIII:C		>=50 IU/unit
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit**
* Methods validated for counting low numbers of leucocytes must be used		
** Pre-freeze in starting component		

7.28.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.29: Platelets for Intrauterine Transfusion, Leucocyte Depleted

> Update notice: Concessionary release limits have been updated in table 7.24 following the the issue of Change Notification 22 - 2015.
> The tables in the sections 7.9.4, 7.10.4, 7.11.4, 7.12.4, 7.29.4 and 7.30.4 have been updated following the issue of Change Notification No 34 – 2016.

A hyperconcentrated platelet component for intrauterine transfusion, prepared by apheresis, that contains less than 1×10^6 leucocytes per donation.

7.29.1: Technical information

- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B and should be negative for antibodies to CMV.
- The component must be used by the end of Day 1.
- The component must be irradiated. See the BCSH ‘Transfusion guidelines for neonates and older children’.[5]
- The component should contain a concentration of platelets between 2 and 4×10^{12}/L in a collected volume generally in the range of 50–100 mL.
- All components should be quality monitored and achieve the specified requirements. The testing need not necessarily be performed before component release.
- Screening of female donors for HLA/HNA antibodies should be considered as a TRALI risk reduction strategy. If platelets are to be issued as HPA-matched (e.g. HPA-1a or HPA-5b negative) then donors should be screened and found negative for all clinically significant HLA and HPA antibodies (as defined in Chapters 16 and 18). This screening can be done on an initial sample and does not need repeating at each donation unless the donor has been transfused or pregnant since the last antibody screen.
- A record which demonstrates that the donor has not been transfused since the initial negative screen for antibodies and in case of female donors that the donor has not been pregnant since the initial negative screen for antibodies needs to be maintained.
- Platelets for Intrauterine Transfusion, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.29.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets for Intrauterine Transfusion, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the relevant HPA and HLA type, if necessary
- the date of collection
- the expiry date and time*
- the temperature of storage and a comment that continuous gentle agitation during storage is recommended
- the blood pack lot number*
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.29.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of 22 ±2°C for use up to the end of Day 1.
- The component should be gently and continuously agitated during storage.

7.29.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B and antibodies to CMV. Furthermore, all components tested for the other parameters shown in Table 7.24 shall meet the specified values.

Table 7.24 Platelets for Intrauterine Transfusion, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	Every component	Within locally defined range***
Platelet concentration		$2–4 \times 10^{12}$/L
pH at end of shelf life*		>=6.4
Leucocyte count**	As per sections 6.3 and 7.1	$<1 \times 10^{6}$/unit****
* The shelf life of this hyperconcentrated platelet component has been set to reflect validation data. Therefore, once this has been validated locally, there is no need to measure pH at expiry on a routine basis		
** Methods validated for counting low numbers of leucocytes must be used		
*** Units measured and found to be outside of the range 50 to 120 mL should not be issued for transfusion		
****Units tested and found to have > 2.5 $x10^{6}$/unit should not be issued for transfusion		

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.29.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22°C with continuous gentle agitation.
- Plastic overwraps should be removed prior to storage.

7.30: Platelets for Neonatal Use, Leucocyte Depleted

> Update notice: The tables in the sections 7.9.4, 7.10.4, 7.11.4, 7.12.4, 7.29.4 and 7.30.4 have been updated following the issue of Change Notification No 34 – 2016.

An apheresis platelet component for neonatal use that contains less than 1×10^{6} leucocytes per starting component.

7.30.1: Technical information

- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B and should be negative for antibodies to CMV.

- The component may be prepared by splitting Platelets, Apheresis, Leucocyte Depleted (see section 7.10) using a closed system.
- The component should contain >40 × 10^9 platelets in sufficient plasma to maintain the pH between 6.4 and 7.4 at the end of the shelf life of the component.
- The component may be leucodepleted as part of an apheresis process or by subsequent filtration of the platelet component.
- Screening of female donors for HLA/HNA antibodies should be considered as a TRALI risk reduction strategy. If platelets are to be issued as HPA-matched (e.g. HPA-1a or HPA-5b negative) then donors should be screened and found negative for all clinically significant HLA and HPA antibodies (as defined in Chapters 16 and 18). This screening can be done on an initial sample and does not need repeating at each donation unless the donor has been transfused or pregnant since the last antibody screen.
- A record which demonstrates that the donor has not been transfused since the initial negative screen for antibodies and in the case of female donors that the donor has not been pregnant since the initial negative screen for antibodies needs to be maintained.
- Platelets for Neonatal Use, Leucocyte Depleted should be transfused through a 170–200 µm filter.

7.30.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets for Neonatal Use, Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number and, if divided, sub-batch number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date*
- the temperature of storage and a comment that continuous gentle agitation throughout storage is recommended
- the blood pack lot number*
- the name, composition and volume of the anticoagulant or additive solution.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.30.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of 22 ±2°C for up to 5 days. Appropriate pack and platelet concentration combinations may allow storage up to 7 days, but due to concerns over bacterial contamination would require either an assay to exclude bacterial contamination prior to transfusion or application of a licensed pathogen inactivation procedure.

- Platelets should be agitated during storage. If agitation is interrupted, for example due to equipment failure or prolonged transportation, the components are suitable for use, retaining the same shelf life, provided the interruption is for no longer than a total of 24 hours.

7.30.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.25 shall meet the specified values.

Table 7.25 Platelets for Neonatal Use, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined range
Platelet count		>=40 × 10^9/unit
pH at end of shelf life*		>=6.4
Leucocyte count**	As per sections 6.3 and 7.1	<1 × 10^6/starting component
* If producing low numbers, use of most units is likely to make testing of outdated units impossible. In this situation periodic checks to ensure end-of-shelf-life quality should be undertaken with the combination of blood pack platelet concentration and storage conditions in routine use.		
** Methods validated for counting low levels of leucocytes must be used.		

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.30.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22°C with continuous gentle agitation.
- Plastic overwraps should be removed prior to storage.

7.31: Irradiated components

- For the whole of this section X-irradiation may be regarded as equivalent to gamma irradiation. Times when irradiation should be undertaken and the permitted post-irradiation storage times are the same, as are the required labelling and dosing (recommended minimum dose achieved in the irradiation field is 25 Gy, with no part receiving >50 Gy) (±10% at 95% confidence interval).
- Note that the X-ray equipment should be dose-mapped prior to release from the factory and at installation, and the manufacturers recommend routine dosimetry at 6-monthly intervals (gamma-irradiation equipment requires annual dosimetry). A radiation-sensitive label specifically for use with X-irradiation is available.
- It is not necessary to irradiate the following components:
    - cryopreserved red cells after washing
    - plasma components.
- For more information, refer to the BCSH Guidelines on the Use of Irradiated Blood Components.[3]
- Irradiated components not used for the intended recipient can safely be used for recipients who do not require irradiated components provided the other requirements of Chapters 6 and 7 have been satisfied. However, any reduction in shelf life resulting from the irradiation process must be observed.
- Irradiated components should conform to their appropriate specification previously given in this chapter. In addition, the guidelines shown below should be observed.

7.31.1: Description

Irradiated components are components that have been irradiated by a validated procedure.

7.31.2: Technical information

- Other than for use in intrauterine transfusion, exchange transfusion, or large-volume transfusion of neonates, red cells can be irradiated at any time up to 14 days after collection.

- Platelets can be irradiated at any stage in their storage.
- Granulocytes should be irradiated as soon as possible after production.
- For red cells, platelets and granulocytes the recommended minimum dose achieved in the irradiation field is 25 Gy, with no part receiving >50 Gy (±10% at 95% confidence interval).
- Laboratories performing irradiation of blood components must work to a clearly defined specification and are strongly recommended to work closely with a medical physicist. The defined irradiation procedure must be validated and there must be regular monitoring of the blood component dosimetry and the laboratory equipment.
- Provided the blood dosimetry uncertainty of measurement used by blood establishments is equal to or less than the uncertainty as it was measured in the original study data (Pelzsynski et al, 1994) (±10%), there is no clinical indication to include the uncertainty of measurement within routine mapping to confirm ongoing specification compliance.
- It is recommended that irradiation of blood components is carried out using dedicated blood irradiation machines. If radiotherapy machines are used, equivalent protocols should be developed.
- Appropriate radiation-sensitive labels should be used as an aid to differentiating irradiated from non-irradiated components. However, it may not be necessary to attach a radiation-sensitive label to every component pack, provided that the irradiation procedure follows a validated, documented and well-controlled system of work that is integrated with the component labelling and release mechanism and permits retrospective audit of each stage of the irradiation process.
- There should be a permanent record of all units irradiated. This should include details of irradiation batch and donation numbers, component type, the site of irradiation, when irradiation was performed and by whom.

7.31.3: Labelling

- Irradiated components must be identified by the applied labelling and include the date of irradiation and any reduction in shelf life.
- Labels which are sensitive to irradiation and change from ‘NOT IRRADIATED’ to ‘IRRADIATED’ are available and are considered a useful indicator of exposure to irradiation. The dose at which the label changes to ‘IRRADIATED’ must be marked on the label. It must be remembered that such labels simply reflect that the unit has been exposed to radiation and their use does not replace the need for regular and precise dosimetry nor carefully controlled working procedures.

7.31.4: Storage

For general guidelines, see section 6.7.

Red cell components, other than washed red cells and those for intrauterine transfusion, exchange transfusion, or large-volume transfusion of neonates and infants can be irradiated at any time up to 14 days after collection and stored for up to 14 days thereafter, provided the other requirements of this section are adhered to.

Following irradiation washed red cells that are suspended in a validated additive solution should be

transfused as soon as possible and no later than a maximum of 5 days if irradiated at the point of manufacture or 48 hours if irradiated later in shelf-life. Red cells washed and stored in saline must be transfused within 24 hours of irradiation or production.

7.32: References

1. Dumont L, Dzik W, Rebulla P, Brandwein H and members of the BEST Expert Working Party of the ISBT (1996). Practical guidelines for process validation and process control of white cell-reduced blood components: report of the Biomedical Excellence for Safer Transfusion (BEST) Working Party of the International Society of Blood Transfusion (ISBT). *Transfusion*, 36, 11–20.
2. Bashir S, Stanworth S, Massey E, Goddard F, Cardigan R. (2008). Neutrophil function is preserved in a pooled granulocyte component prepared from whole blood donations. *British Journal of Haematology*, 140, 701–711.
3. British Committee for Standards in Haematology Blood Transfusion Task Force (2010). *Guidelines on the Use of Irradiated Blood Components*. Available at www.bcshguidelines.com/documents/Irradiation_BJH_2011.pdf.
4. Massey E, Harding K, Kahan BC, Llewelyn C, Wynn R, Moppett J, Robinson SP, Green A, Lucas G, Sadani D, Liakopoulou E, Bolton-Maggs P, Marks DI, Stanworth S (2012). The granulocytes in neutropenia 1 (GIN 1) study: a safety study of granulocytes collected from whole blood and stored in additive solution and plasma. *Transfusion Medicine*, 22, 277–284.
5. British Committee for Standards in Haematology Blood Transfusion Task Force (2004). Transfusion guidelines for neonates and older children. *British Journal of Haematology*, 124, 433–453.

7.33: Cryoprecipitate, Pooled, Methylene Blue Treated and Removed, Leucocyte Depleted

> Update notice: Section 7.33 has been added following the issue of Change Notification 11 - 2013

> Update notice: Section 7.33.3 - Storage has been updated following the issue of Change Notification 17 - 2013

This component is intended for use for patients born on or after 1st January 1996.

The component represents a source of concentrated FVIII, and von Willebrand factor, fibrinogen, Factor XIII and fibronectin produced from units of Fresh Frozen Plasma, Methylene Blue Treated and Removed. The plasma from which the Cryoprecipitate, Methylene Blue Treated and Removed, Leucocyte Depleted was produced contains less than 1 x 10^6 leucocytes per component and is from a country with a low risk of vCJD.

7.33.1: Technical information

- Where the starting component is sourced outwith the UK, a detailed and agreed specification must be available.

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Plasma should be selected from male donors or screening of female donors for HLA / HNA antibodies should be considered, as a TRALI risk reduction strategy.
- Cryoprecipitate, Pooled, Methylene Blue Treated and Removed, Leucocyte Depleted is the cryoglobulin fraction of plasma obtained by thawing and pooling six single Cryoprecipitate, Methylene Blue Treated and Removed plasma components.
- A secure system must be in place to ensure a full audit trail and the correct identification number is put on the final component pack.
- The process for methylene blue removal should be validated to give components with a methylene blue concentration <=0.30 µM (< approximately 30 µg per unit) in the starting components.
- Annual process validation is acceptable for leucodepletion quality monitoring purposes, provided that the primary components, Methylene Blue Treated and Removed Fresh Frozen Plasma, Leucocyte Depleted are separately monitored as part of monthly testing. If this is not the case, test monthly 1% or as determined by statistical process control (if <=10 components produced per month then test every available component), of Cryoprecipitate Pooled, Methylene Blue Treated and Removed Leucocyte Depleted components. A minimum of 75% of those components tested for the parameters shown at Table 7.26 below shall meet the specified values.
- For storage, Cryoprecipitate, Pooled, Methylene Blue Treated and Removed, Leucocyte Depleted should be rapidly frozen to a core temperature of –25 °C or below within two hours of preparation.
- Component samples collected for the Quality Monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.
- Cryoprecipitate, Pooled, Methylene Blue Treated and Removed, Leucocyte Depleted, should be transfused through a 170–200 µm filter.

7.33.2: Labelling (for general guidelines see Section 6.6)

The following shall be included on the component label:

(* = in eye-readable and UKBTS approved barcode format.)

- Cryoprecipitate Pooled, Methylene Blue Treated and Removed, Leucocyte Depleted * and volume
- the blood component producer's name*
- a unique pool or batch number or the donation number of all contributing units*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection

- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component must be used within four hours of thawing
- the name, composition and volume of the anticoagulant or additive solution.

In addition, the following statements should be made:

INSTRUCTION
Always check patient/component compatibility/identity
Inspect pack and contents for signs of deterioration or damage
Risk of adverse reaction/infection

7.33.3: Storage (for general guidelines see Section 6.7)

- The component should be stored at a core temperature of –25 °C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.
- The component should be thawed in a water bath or other equipment designed for the purpose, within a vacuum sealed over wrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37 °C; temperatures between 33 - 37 °C are acceptable.
- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimize the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.
- Once thawed, the component must not be refrozen and should be used immediately. If delay is unavoidable, the component should be stored at ambient temperature and used within four hours.

7.33.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see Sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.26 shall meet the specified values.

Table 7.26 Cryoprecipitate, pooled, methylene blue treated and removed, leucocyte depleted – additional tests

Parameter	Frequency of test	Specification

Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	100 – 300 mL
Fibrinogen	Refer to Technical Information above	>700 mg/unit
FVIII:C		>=250 IU/unit
Leucocyte Count*	**As per Sections 6.3 and 7.1**	<1 x 10^6 /unit**

*Methods validated for counting low numbers of leucocytes must be used.
**Prefreeze in starting component.

7.33.5: Transportation (for general guidelines see Section 6.11)

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straight away it should be transferred immediately to storage at the recommended temperature.

7.34: Platelets in Plasma and Additive Solution for Neonatal Use, Leucocyte Depleted

An apheresis platelet component for neonatal use which contains less than 1 × 10^6 leucocytes per starting component and where the suspending medium comprises approximately 80% plasma and 20% additive solution.

7.34.1: Technical information

- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B and should be negative for antibodies to CMV.
- The component is manufactured as a secondary component by splitting Platelets, Apheresis, Leucocyte Depleted (see section 7.10) after the sterile addition of a controlled volume of an approved platelet additive solution. Splitting must be performed using a closed system.
- The volume of additive solution added should be determined by validation and will depend upon the type of additive solution and platelet storage pack. Re-validation of the proportion of plasma / PAS must be performed at least annually on a minimum of 25 units and after any changes to production method.
- The volume of additive solution should be sufficient to maintain the pH >=6.4 at the end of the shelf life of the component.
- The component should contain >=40 × 10^9 platelets.

- The component may be leucodepleted as part of an apheresis process or by subsequent filtration of the platelet component.
- Screening of female donors for HLA/HNA antibodies should be considered as a TRALI risk reduction strategy. If platelets are to be issued as HPA-matched (e.g. HPA-1a or HPA-5b negative) then donors should be screened and found negative for all clinically significant HLA and HPA antibodies (as defined in Chapters 16 and 18). This screening can be done on an initial sample and does not need repeating at each donation unless the donor has been transfused or pregnant since the last antibody screen.
- A record which demonstrates that the donor has not been transfused since the initial negative screen for antibodies and in the case of female donors that the donor has not been pregnant since the initial negative screen for antibodies needs to be maintained.
- Platelets in Plasma and Additive Solution for Neonatal Use, Leucocyte Depleted should be administered through a CE marked transfusion set.

7.34.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Platelets in Plasma and Additive Solution for Neonatal Use Leucocyte Depleted* and volume
- the blood component producer’s name*
- the donation number and, if divided, sub-batch number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date*
- the temperature of storage and a comment that continuous gentle agitation throughout storage is recommended
- the blood pack lot number*
- the name of the anticoagulant and additive solution

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity
Inspect pack and contents for signs of deterioration or damage
Risk of adverse reaction/infection, including vCJD

7.34.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of 22 ±2°C for up to 5 days. Appropriate pack and platelet concentration combinations may allow storage up to 7 days, but due to concerns over bacterial contamination would require either an assay to exclude bacterial contamination prior to transfusion or application of a licensed pathogen inactivation procedure.

- Platelets should be agitated during storage. If agitation is interrupted, for example due to equipment failure or prolonged transportation, the components are suitable for use, retaining the same shelf life, provided the interruption is for no longer than a total of 24 hours and no single interruption lasts for more than eight hours.

7.34.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B, and antibodies to CMV.

Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.27 shall meet the specified values.

Table 7.27 Platelets in Plasma and Additive Solution for Neonatal Use, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined range
Platelet count *		>=40 × 10^9/unit
pH at end of shelf life**/***		>=6.4
Leucocyte count****	As per sections 6.3 and 7.1	<1 × 10^6/starting component
* Units tested and found to have <40 × 10^9/unit, or more than the maximum recommended by the manufacturer of the storage pack, where stated, should not be issued for transfusion.		
** If producing low numbers, issue of most units is likely to make testing of outdated units impossible. In this situation periodic checks to ensure end-of-shelf-life quality should be undertaken with the combination of blood pack platelet concentration and storage conditions in routine use.		
*** A minimum of 90% of components tested shall meet the specified value.		

**** Methods validated for counting low levels of leucocytes must be used.

Note: Visual inspection of platelet components for the swirling phenomenon, clumping, excessive red cell contamination and abnormal volume is a useful pre-issue check.

7.34.5: Transportation

For general guidelines, see section 6.11.

- Containers for transporting platelets should be equilibrated at room temperature before use. During transportation the temperature of platelets must be kept as close as possible to the recommended storage temperature and, on receipt, unless intended for immediate therapeutic use, the component should be transferred to storage at a core temperature of 22°C with continuous gentle agitation.

- Plastic overwraps should be removed prior to storage.

7.35: Fresh Frozen Plasma for Neonates and Infants, Leucocyte Depleted

Fresh Frozen Plasma for Neonates and Infants, Leucocyte Depleted is plasma that has been obtained from whole blood or by apheresis. The plasma contains less than 1×10^6 leucocytes per component.
Using a closed system the component may be subdivided into approximately equal volumes and rapidly frozen to a temperature that will maintain the activity of labile coagulation factors.

7.35.1: Technical information

- Section 7.21 provides general guidance on the requirements for components for use in neonates and infants under 1 year.

- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.

- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B. Testing for CMV antibodies is not required.

- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.

- The plasma should be separated before the red cell component is cooled to its storage temperature. Greater FVIII:C yields will be obtained when the plasma is separated as soon as possible after venepuncture and rapidly frozen to -25°C or below.

- The method of preparation should ensure the component has the maximum level of labile coagulation factors with minimum cellular contamination. The production process should be validated to ensure that components meet the specified limits for FVIII:C concentration.

- Component samples collected for the quality monitoring assessment of FVIII:C should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.

- Fresh Frozen Plasma for Neonates and Infants, Leucocyte Depleted should be transfused through a CE marked transfusion set.

7.35.2: Labelling

For general guidelines, see section 6.6

The following shall be included on the label:

(* = in eye-readable and UKBTS approved barcode format)

- Fresh Frozen Plasma for Neonates and Infants, Leucocyte Depleted* and volume

- the blood component producer's name*

- the donation number*

- the ABO group*

- the RhD group stated as positive or negative*

- the date of collection

- the expiry date of the frozen component*

- the temperature of storage

- the blood pack lot number*

- a warning that the component should be used within 4 hours of thawing if maintained at 22 ±2oC or up to a maximum of 24 hours of thawing if stored at 4 ±2°C

- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.35.3: Storage

- For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.

- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.

- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.

- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, and at the time of administration, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.

- Once thawed, the component must not be refrozen and should be transfused as soon as possible. If delay is unavoidable, the component may be stored and should be used within 4 hours if maintained at 22 ±2°C, or up to a maximum of 24 hours if stored at 4 ±2°C.

- Transfusion of FFP should be completed within 4 hours of issue out of a controlled temperature environment.

7.35.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), the component shall be free from clinically significant irregular blood group antibodies and high-titre anti-A and/or anti-B. Furthermore, a minimum of 75% of those components tested for the other parameters shown in Table 7.35 shall meet the specified values with the exception of FVIII:C.

Table 7.35 Fresh Frozen Plasma for Neonates and Infants, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Stated volume ±10%
Total protein		>=50 g/L
Platelet count		<30 × 10^9/L**
Red Cell Count		<6 × 10^9/L**
FVIII:C***/****		Mean >=0.70 IU /mL
Leucocyte count*	As per sections 6.3 and 7.1	<1 x 10^6/unit**

* Methods validated for counting low numbers of leucocytes must be used
** Pre-freeze in starting component
*** Units tested and found to have < 0.3 IU/mL should not be issued for transfusion
**** a minimum of 90% of those components tested should have >=0.50 IU/mL

7.35.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.36: Cryoprecipitate for Neonates and Infants, Leucocyte Depleted

The component represents a source of concentrated FVIII, and von Willebrand factor, fibrinogen, FXIII and fibronectin from a unit of fresh frozen plasma. The plasma from which the cryoprecipitate was produced contains less than 1×10^6 leucocytes per component.

7.36.1: Technical information

- Section 7.21 provides general guidance on the requirements for components for use in neonates and infants under 1 year.
- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for direct clinical use.
- Cryoprecipitate for Neonates and Infants, Leucocyte Depleted is the cryoglobulin fraction of plasma obtained by thawing a single donation of Fresh Frozen Plasma, Leucocyte Depleted (see section 7.15), fulfilling the requirements for neonates and infants, at 4 ±2°C.
- The component should be free from clinically significant irregular blood group antibodies including high-titre anti-A and anti-B. Testing for CMV antibodies is not required.
- Plasma should be selected from male donors or consideration should be given to screening female donors for HLA/HNA antibodies, as a TRALI risk reduction measure.
- For storage, Cryoprecipitate for Neonates and Infants, Leucocyte Depleted should be rapidly frozen to a core temperature of –25°C or below within 2 hours of preparation.
- Component samples collected for the quality monitoring assessment of FVIII should be from an equal mix of group O and non-O donations due to the difference in FVIII levels between ABO blood groups.

- Cryoprecipitate for Neonates and Infants, Leucocyte Depleted should be administered through a CE marked transfusion set.

7.36.2: Labelling

For general guidelines, see section 6.6.

The following shall be included on the component label:

(* = in eye-readable and UKBTS approved barcode format)

- Cryoprecipitate for Neonates and Infants, Leucocyte Depleted* and volume
- the blood component producer's name*
- the donation number*
- the ABO group*
- the RhD group stated as positive or negative*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- a warning that the component must be used within four hours of thawing
- the name, composition and volume of the anticoagulant.

In addition, the following statements should be made:

INSTRUCTION

Always check patient/component compatibility/identity

Inspect pack and contents for signs of deterioration or damage

Risk of adverse reaction/infection, including vCJD

7.36.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –25°C or below for a maximum of 36 months.
- Although a storage temperature below –25°C improves the preservation of labile coagulation factors, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.

- The component should be thawed in a waterbath or other equipment designed for the purpose, within a vacuum-sealed overwrap bag according to a validated procedure. The optimal temperature at which the component should be thawed is 37°C; temperatures between 33°C and 37°C are acceptable.

- Protocols must be in place to ensure that the equipment is cleaned daily and maintained to minimise the risk of bacterial contamination. After thawing, the content should be inspected to ensure that no insoluble cryoprecipitate is visible and that the container is intact.

- Once thawed, the component must not be refrozen and should be used immediately. If delay is unavoidable, the component should be stored at ambient temperature and used within 4 hours.

7.36.4: Testing

In addition to the mandatory and other tests required for blood donations described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), a minimum of 75% of those components tested for the parameters shown in Table 7.36 shall meet the specified values.

Table 7.36 Cryoprecipitate, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Within locally defined nominal range
Fibrinogen		>=140 mg/unit
FVIII		>=70 IU/unit
Leucocyte count*	As per sections 6.3 and 7.1	$<1 \times 10^6$/unit**
* Methods validated for counting low numbers of leucocytes must be used		
** Pre-freeze in starting component		

7.36.5: Transportation

For general guidelines, see section 6.11.

Every effort should be made to maintain the core storage temperature during transportation. Unless the component is to be thawed and used straightaway it should be transferred immediately to storage at the recommended temperature.

7.37 Human Plasma for Fractionation, Leucocyte Depleted

Plasma that has been obtained from whole blood or by apheresis (as defined in section 7.3), containing less than 1×10^6 leucocytes per unit.

UK derived plasma may be used for the manufacture of immunoglobulins for domestic use provided all relevant vCJD risk mitigation measures currently in place for blood components for transfusion are applied and manufacturers submit an application to the MHRA to register the use of UK-sourced plasma including a product specific risk assessment. Manufacture of other blood products such as clotting factors or albumin is not currently permitted.

7.37.1: Technical information

- All aspects of collection and manufacture, testing and storage should satisfy the requirements defined in the current *British Pharmacopoeia* monograph on Human Plasma for Fractionation.
- See chapters 3, 4, 5, 9 and 12 for specific details on donor selection, care and testing for Human Plasma for Fractionation, Leucocyte Depleted.
- Donations of whole blood where the bleed time exceeded 15 minutes are not suitable for the production of plasma components for clinical use.
- Plasma with a volume below 200 mL is not suitable for use.
- Plasma may be selected from both male and female donors. Female donors do not need additional screening for anti-HLA and anti-HNA antibodies.
- When obtained by plasmapheresis, plasma intended solely for the recovery of proteins that are not labile in plasma is frozen using validated conditions by cooling rapidly in a chamber at 20°C or below as soon as possible and at the latest within 24 h of collection.
- When obtained from whole blood, plasma intended solely for the recovery of proteins that are not labile in plasma is separated from cellular elements and frozen using validated conditions in a chamber at 20°C or below as soon as possible and at the latest within 72 h of collection.
- Human Plasma for Fractionation, Leucocyte Depleted must not be transfused directly to patients.

7.37.2: Labelling

For general guidelines, see section 6.6. The following shall be included on the label in eye readable format:

(* = also in UKBTS approved barcode format)

- Human Plasma for Fractionation, Leucocyte Depleted*
- Recovered or Source plasma
- the component volume
- the blood component producer’s name

- the donation number and, if divided, sub-batch number*
- the date of collection
- the expiry date of the frozen component*
- the temperature of storage
- the blood pack lot number*
- the name, composition and volume of the anticoagulant.
- Not for transfusion

7.37.3: Storage

For general guidelines, see section 6.7.

- The component should be stored at a core temperature of –20°C or below for a maximum of 36 months.
- Although frozen storage temperatures improve the preservation of labile and non-labile proteins, lower temperatures increase the fragility of plastic. Particular care must be taken when handling such packs.

7.37.4: Testing

- In addition to the mandatory and other tests required for blood donations for Human Plasma for Fractionation, Leucocyte Depleted described in Chapter 9, and leucocyte counting (see sections 6.3 and 7.1), components should be tested for the parameters shown in Table 7.37.
- Total protein testing will be undertaken according to the British Pharmacopeia 2021 – Plasma for Fractionation *(Human Plasma for Fractionation, Ph. Eur. 10.3 monograph 0853)* or using equivalent, validated assays.

Table 7.37 Human Plasma for Fractionation, Leucocyte Depleted – additional tests

Parameter	Frequency of test	Specification
Volume	1% or as determined by statistical process control (if <=10 components produced per month then test every available component)	Stated volume ±10% **
Total Protein		Mean >= 50 g/L
Platelet Count		<50 x 10^9/L **/***
Red Cell Count		<6 x 10^9/L **/***
		<1 x 10^6/unit

Leucocyte count *	As per sections 6.3 and 7.1	equivalent ***
* Methods validated for counting low numbers of leucocytes must be used		
** A minimum of 90% of units tested should meet the required value		
*** Pre-freeze in starting component		

More than 90% of leucocyte-depleted components from relevant processes must have less than 1×10^6 leucocytes per unit and more than 99% of components must contain less than 5×10^6 leucocytes per unit, both with 95% confidence.
Where plasma is collected into one container for final frozen storage the specification must be assessed based on volume ranges of 200 mL to <=400 mL for a single unit equivalent, >400 mL to <=680 mL for a double unit equivalent, and >680 mL for a triple unit equivalent collection.

7.37.5: Transportation

For general guidelines, see section 6.11.

The frozen plasma should be stored and transported under conditions validated to maintain a temperature of -20°C or below. Temperature fluctuations in the plasma should be kept to a minimum during storage or transportation. A plasma temperature record during storage and transit of frozen plasma shall be available for inspection.

Short excursions of up to 30 minutes whilst preparing plasma for shipping are permissible.
Exceptional temperature deviations above -20°C, e.g. in the case of equipment failure, on one or more occasions are acceptable so long as the following conditions are met:

- the total period of time above -20°C does not exceed 72 hours
- the temperature does not exceed -15°C on more than one occasion
- the temperature does not exceed -5°C

Where plasma has been subject to temperature deviations during storage or transportation this must be recorded and reported to any third party receiving the plasma.